

40. Word Order

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Abstract

This chapter discusses different theories of free word order alternations that commonly go by the name of scrambling. The main example discussed here is Mittelfeld scrambling in German. The chapter argues that scrambling is a genuinely syntactic process with reflexes both in the phonology (word order) and the semantics (binding and scope). The chapter then briefly introduces the three approaches to scrambling that have dominated the literature: trace-based accounts, base generation accounts, linearization-based accounts. Their main strengths and weaknesses are outlined and the most important lines of debate are sketched. The conclusion briefly turns to non-configurationality.

1. Introduction and overview

1.1. Scope of this article

This chapter treats various theoretical approaches to free constituent order.

The chapter is not concerned with typological patterns of word order (Greenberg 1963), such as the correlations between unmarked OV order and having postpositions. A recent overview of such typological patterns can be found in Dryer (2007). An influential parsing-based approach is contained in Hawkins (1990). Both treat word order pat-

terns within as well as across major category boundaries (clause, verb phrase, prepositional phrase, noun phrase); Cinque (2005, 2009) provides an important account of the range of permissible word-order types within a given major category.

Instead of the typological patterns, this chapter is concerned with the theoretical treatment of constituent order alternations within a given language. More specifically, it treats word order alternations that are often referred to as free.

Such alternations go by the name of scrambling in the literature. The concrete case studied here is *Mittelfeld* scrambling in German. The phenomenon has been widely worked-out from a broad range of theoretical perspectives; it therefore allows the comparison of different worked-out proposals. An introduction to the phenomenon itself is provided by Frey (this volume). I will not discuss more extreme cases of free word order, found in so-called *non-configurational* languages. I return briefly to the question of non-configurationality and its relation to scrambling in the conclusion but will otherwise ignore the issue.

1.2. Overview

The chapter is structured as follows. The first section characterizes the constructions that are referred to as scrambling informally. The second section briefly sketches the outline of four approaches to scrambling that have been pursued in the literature: (i) the nonsyntactic approach, (ii) the trace-based approach, (iii) the base-generation approach, and (iv) the linearization-based approach. Section 4 contains an overview of arguments against the nonsyntactic approach to scrambling in German and long-distance scrambling in Japanese. The following sections sketch versions of the trace-based, base generation, and linearization-based accounts. In the section on the trace-based account, particular attention is paid to the debate on whether scrambling is to be construed as an A- or an \bar{A} -movement phenomenon and to the triggering problem, which arises under the minimalist thesis of movement as a last resort. The section on base generation highlights, in particular, what the conditioning factors for the availability of scrambling are in a cross-linguistic perspective. The final section briefly discusses an argument from scope that has been used to claim superiority of the base generation account.

2. On the notion of scrambling

The term *scrambling* as a description of relative freedom in constituent order was coined by Ross (1967: section 3.1.2), who exemplifies it using discontinuous noun phrases in Latin. Ross' scrambling rule imposes few constraints, except that it is clause-bound. Ross suggests to locate the scrambling rule in a separate, stylistic, component of the grammar. Little is said about this stylistic component and Ross is usually taken to imply that scrambling is not a rule of syntax proper. Ross excludes scrambling from syntax because of the nature of the rule. Of course, we expect such a move to have consequences. The theory of syntax is, among other things, a theory of the structural aspects of meaning such as binding and scope. If an operation is extrasyntactic, it should not have

an impact on these structural aspects of meaning. For any given operation, this makes a testable claim.

It should be noted that the term structural is used here in a sense that is broader than that which is usually employed in the Government and Binding and Minimalist literature, where its meaning is often restricted to the dominance relations holding in tree structures. I have in mind instead the broader and less theory-bound notion of structure found in Keenan and Stabler (2003).

In informal usage the term scrambling has come to be used as a cover term for almost any kind of optional variation in word order. Corver and Riemsdijk (1994) for example label various constructions in the following languages as scrambling: Korean, Japanese, Russian, Warlpiri, Persian, Hindi/Urdu, Dutch, German, Hungarian, and Selayarese. The constructions called scrambling represent optional word order variation in the sense that they do not have a morphological reflex, do not determine clause type or are restricted to a particular clause type, and do not seem to be associated with unique positions. The first condition distinguishes scrambling from, for example, the passive, which is accompanied by characteristic verbal morphology and by case alternations on the arguments involved. Lack of a morphological reflex of a given alternation does not preclude the existence of morphological preconditions for it; in Turkish, for example, the presence of the accusative marker *-(y)I* is required for scrambling to be possible (Enç 1991; Kornfilt 2003). The second and third conditions distinguish scrambled structures from questions, relative clauses and *wh*-movement constructions in general, since those do play a part in clausal typing and do target specific positions in the clause.

The three properties of scrambling can be illustrated below for German. German is an SOV language with the additional property that in clauses without a subordinator, the finite verb is found in second position. In clauses with a subordinator, the finite verb, along with any nonfinite verbs, appears clause finally. In traditional grammar, the space that is defined, on the one side, by the finite verb in main clauses and the subordinator in subordinate clauses and, on the other side, by the non-finite verbs is called the *Mittelfeld* – ‘middle field’.

The examples in (1) illustrate the phenomenon called *Mittelfeld* scrambling (for a detailed empirical discussion see Frey, this volume). For a ditransitive verb like *streitig machen* – ‘compete’ all six conceivable linearizations of subject, direct object, and indirect object are possible within the *Mittelfeld* in one context or another. This is illustrated in (1) (from Haider 1993). These word order alternations are free in the sense outlined above, because (i) there is no morphological reflex of the alternation, (ii) the alternation does not interact with clause type (i.e., since scrambling is equally possible in main and subordinate clauses, in declarative and interrogative clauses, etc.), finally, because (iii) there is no single dedicated scrambling position. In fact, to account for the entire paradigm in (1), even assuming two dedicated positions per argument (a scrambling position and a non-scrambling position) would be insufficient, since this would allow deriving at most five of the six permissible orders.

- (1) a. *dass das Objekt dem Subjekt den* [German]
 that the.NOM.SG.N object the.DAT.SG.N subject the.ACC.SG.M
 erste-n Platz streitig macht
 initial-ACC.SG.M place contested makes
 ‘that the object competes with the subject for the initial position’

- b. *dass das* *Objekt den* *erste-n* *Platz dem*
 that the.NOM.SG.N object the.ACC.SG.M initial-ACC.SG.M place the.DAT.SG.N
Subjekt streitig macht
 subject contested makes
- c. *dass dem* *Subjekt das* *Objekt den*
 that the.DAT.SG.N subject the.NOM.SG.N object the.ACC.SG.M
erste-n *Platz streitig macht*
 initial-ACC.SG.M place contested makes
- d. *dass dem* *Subjekt den* *erste-n* *Platz*
 that the.DAT.SG.N subject the.ACC.SG.M initial-ACC.SG.M place
das *Objekt streitig macht*
 the.NOM.SG.N object contested makes
- e. *dass den* *erste-n* *Platz das* *Objekt dem*
 that the.ACC.SG.M initial-ACC.SG.M place the.NOM.SG.N object the.DAT.SG.N
Subjekt streitig macht
 subject contested makes
- f. *dass den* *erste-n* *Platz dem* *Subjekt*
 that the.ACC.SG.M initial-ACC.SG.M place the.DAT.SG.N subject
das *Objekt streitig macht*
 the.NOM.SG.N object contested makes

These properties make *Mittelfeld* scrambling a typical representative of the general type discussed under that label. Like scrambling in Ross's original rule but unlike so-called long-distance scrambling in languages like Hindi/Urdu, Korean, Japanese, and Persian, German *Mittelfeld* scrambling does not cross finite clause boundaries.

3. Approaches to free word-order alternations

Modern approaches to the analysis of word order usually take the traditional observation very seriously that those elements that belong together semantically also occur close to each other (Behagel 1932: 4). This old observation is expressed through the assumption that syntactic and semantic composition proceed hand in hand and generate phrase structure trees. Phrase-structure trees represent a hierarchical organization for a string of words; the hierarchical aspect is expressed in terms of the antisymmetric, reflexive, and transitive dominance relation, the linear aspect – in terms of the transitive and asymmetric precedence relation. In such phrase structure trees any two distinct nodes are either in a dominance relation to each other or in a precedence relation. Crucially, constituents in a tree are always continuous: two distinct nodes that are not in a dominance relation never overlap linearly. This is referred to as the Nontangling Condition on phrase structure trees, which can be formulated as follows:

- (2) **The Nontangling Condition:** In any well-formed constituent structure tree, for any nodes x and y , if x precedes y , then all nodes dominated by x precede all nodes dominated by y .

(Partee, Meulen, and Wall 1990: 440)

The nontangling condition rules out structures like the one in Figure (40.1b), where *b* precedes *c* and dominates *d* and *f*, yet *e*, which is dominated by *c*, precedes *f*. Assuming that sisters in the tree compose semantically, the nontangling condition strengthens Beha-gel's observation and claims that semantic composition corresponds to linear concatenation.

In many of the clearest cases this gives correct results: Words that belong together semantically also act as units in other respects.

The assumption that syntactic structures obey the nontangling condition is shared by theories as diverse as the Standard Theory of the sixties, the Extended Standard Theory of the seventies,

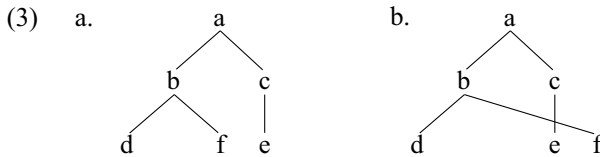


Fig. 40.1: A licit (a) and an illicit (b) structure according to the nontangling condition

Government and Binding theory, Minimalism, Generalized Phrase Structure Grammar, Lexical Functional Grammar, Categorical Grammar (without Bach's 1979 *wrap* operations), and Tree Adjoining Grammar. Theories vary in the amount of further restrictions that they impose on phrase structure trees. One set of restrictions concerns the labels of the nodes in these trees. Other types of constraints have to do with the geometry of the tree. Richard Kayne has made a number of influential proposals in this realm: Kayne (1981) suggests that all phrase structure is maximally binary branching and Kayne (1994) advances the idea that specifiers invariably precede heads which, in turn, invariably precede their complements. This view is generally taken to entail that even simple clauses like (1a) are derived by a number of movement operations that transform an underlying VO-structure into the more superficial OV-structure. We will not concern ourselves with these additional movement operations here (see Hinterhölzl 2006 for pertinent discussion).

Of course, there are many instances where words and phrases that belong together semantically are not adjacent and sometimes not even close to each other. Some simple examples are given below. In the constituent question in (4a), the object of the verb *buy* doesn't show up adjacent to the verb but displaced far to the left at the beginning of the sentence. In the raising construction in (4b), the noun phrase *der Garaus* – 'the do.in' occurs initially and separated from the verb *machen* – 'make' although semantically they belong together and make up the idiom *jemandem den Garaus machen* – 'somebody.dat the.ACC.M do.in make', which means to do somebody in. The idiom is passivized here and the direct idiomatic object *Garaus*, a noun which has no independent meaning in German, acts as the subject of *scheinen* – 'appear'. In (4c) the relative clause *who haven't turned in term papers* appears separated from the noun *students* although it restricts this noun and thus belongs together with it semantically. Finally, (4d) is a German example where the verb *lesen* – 'read' is separated from its argument *es* – 'it' by two other arguments and the verb *versprechen* – 'promise' is separated from its two nominal arguments by the verb *lesen*.

- (4) a. *What do you think that Bill said that Sally will buy tomorrow?*
- b. *Der Garaus scheint ihm gemacht worden zu sein.* [German]
 the.NOM.SG.M do.in appears 3SG.DAT.M made become to
 be
 ‘He appears to have been done in.’
- c. *I only want those students to take the exam who haven’t turned in term papers.*
 (McCawley 1987: 196)
- d. *dass es ihm jemand zu lesen versprochen hat* [German]
 that 3SG.ACC.N 3SG.DAT.M somebody.SG.NOM to read
 promised has
 ‘... that someone promised him to read it’
 (Reape 1994: 157)

Theoretical reactions to these types of examples have varied. One approach has been to posit inaudible abstract elements, *traces* or silent copies, in the position where an element would canonically be expected to occur. This is illustrated for (4a) in (5). The trace fills the gap at the position where the object is expected to occur. It fulfills the object’s semantic function with respect to the verb and its presence makes the generalization that elements that belong together semantically occur close to each other true on the (abstract) surface.

- (5) *What do you think that Bill said that Sally will buy t_{what} tomorrow?*

While the presence of traces makes surface syntactic representations more abstract, their postulation holds fast to the assumption that elements that belong together semantically also occur close to each other both structurally and linearly. In the Principles and Parameters tradition and in Minimalism, all arguments are usually assumed to be licensed within the maximal projection of the argument-taking lexical head. This includes the external argument under the VP-internal subject hypothesis (Koopman and Sportiche 1991). Under these assumptions the analysis of (4b) would involve a trace of *der Garaus* – ‘the do.in’ within the projection of the verb *machen* – ‘make’, as shown in (6). The strategy of positing inaudible traces has also been applied to scrambling.

- (6) *Der Garaus scheint [ihm $t_{\text{der Garaus}}$ gemacht] worden zu sein.* [German]
 the.NOM.SG.M do.in appears 3SG.DAT.M make
 become to be.

Other researchers have assumed that argument taking can be delayed to a certain extent. Under such approaches (Hinrichs and Nakazawa 1989, 1994; Jacobson 1990; Neeleman and van de Koot 2002; Pollard and Sag 1994 a.o.) argument satisfaction is not restricted to the projection of the argument-taking lexical head and mechanisms are put in place

that allow higher predicates to inherit the unsaturated argument(s) of their complement. This is schematized in (7), where the subscripted [θ] on *gemacht* – ‘made’, *scheint* – ‘seems’ and all intermediate verbs is intended as a notation for argument inheritance from the lower verb by the higher verb. The strategy here is to relax the notion of what belongs together semantically and then to show that under these relaxed assumptions phrase structures obey the Nontangling Condition. Base generation analyses of scrambling typically follow this path.

- (7) *Der Garaus scheint_[θ] ihm gemacht_[θ]* [German]
 the.NOM.SG.M do.in appears 3SG.DAT.M make
worden_[θ] zu sein_[θ].
 become to be.

Yet a different reaction to some of the cases in (4) has been to give up the Nontangling Condition (Bach 1979; Blevins 1990; Kathol 2000; McCawley 1982; Ojeda 1988; Reape 1994, and the contributions in Bunt, and Horck 1996; Huck, and Ojeda 1987). We will discuss Reape’s analysis of scrambling below.

A final reaction to some of the discontinuities in (4) might be to assume that they do not arise in the syntax proper. As we have seen, Ross’s analysis of scrambling follows this general line.

In the next sections we discuss these four strategies for the analysis of scrambling.

4. Scrambling is a syntactic phenomenon

Let us turn to the question of whether there is evidence that scrambling is syntactic. By assumption, a phenomenon is syntactic if it has an effect on structural aspects of meaning like binding and scope. We start the investigation with German. Here the answer is that scrambling is clearly syntactic. Consider the following two pairs (from Frey 1993). Frey indicates that (8a) is scopally unambiguous while (8b) is scopally ambiguous. The word order alternation in (8) therefore has a scopal effect, thus, scrambling is to be represented syntactically (see Frey 1993; Kiss 2001; Lechner 1996, 1998; Pafel 2005 for detailed discussion of scope alternations in scrambling). The same point is made by the pair in (9), where the order of subject and object are scrambled, which gives rise to different binding possibilities. As discussed in G. Müller (1995: chapter 3.9), these judgments are not shared by all speakers, however. (Note that the translation of [9b] is passive only to facilitate the relevant reading. The German example is in the active voice.)

- (8) a. *DASS er mindestens ein Geschenk fast jede-m* [German]
 THAT he at.least one.ACC.SG present almost every-DAT.SG
Gast überreichte
 guest handed $(\checkmark \exists \gg \forall, * \forall \gg \exists)$
 ‘that he handed at least one present to almost every guest’

- b. *DASS er fast jede-m Gast mindestens*
 THAT he almost every-DAT.SG guest at.least (✓∃ ≫ ∀, ✓∀ ≫ ∃)
ein Geschenk überreichte
 one.ACC.SG present handed
- (9) a. **weil sein-e_i Mutter jede-m Kind_i hilft* [German]
 because his-NOM.SG.F mother every-DAT.SG.N child helps
 ‘because his_i mother helps every child_i’
- b. *weil jede-m Kind_i sein-e_i Mutter hilft*
 because every-DAT.SG.N child his-NOM.SG.F mother helps
 ‘because every child_i is helped by his_i mother’

Similar judgments regarding clause-bound scrambling have been reported in the literature on Japanese (Hoji 1985; Saito 1985, 1992; Ueyama 2003), Hindi/Urdu (Kidwai 2000; Mahajan 1994), and Persian (Browning and Karimi 1994). In all of these languages clause-bound scrambling changes scope and binding relations in ways closely resembling German. *Mittelfeld* scrambling in German and the various clause-bound scrambling operations in other languages are therefore clearly syntactic.

The empirical situation is often assumed to be different for long-distance scrambled orders, at least in Japanese (Bošković and Takahashi 1998; Saito 1992). Relevant examples from Saito (1992) with the original bracketing and translation are given below. Example (10) is similar to (9) and indicates that scrambling of arguments within the same clause affects binding relations.

- (10) a. ?*[*Masao-ga* [[*otagai_i-no sensei*]-*ni* [*karera_i-o* [Japanese]
 Masao-NOM each.other-GEN teacher-to they-ACC
syookaisita]]] (*koto*).
 introduced (fact)
 ‘Masao introduced them_i to each other’s_i teachers.’
- b. [*karera_i-o* [*Masao-ga* [[*otagai_i-no sensei*]-*ni*
 they-ACC Masao-NOM each.other-GEN teacher-to
[t_i syookaisita]]]] (*koto*).
 introduced (fact)
 ‘Them_i, Masao introduced t_i to each other’s_i teachers.’

Example (11) shows that the same is not true for reordering of arguments that belong to different clauses (see Ueyama 2003 for detailed discussion and references).

- (11) a. *[*Masao-ga* [*otagai_i-no sensei*]-*ni* [_{CP} [_{IP} *Hanako-ga* [Japanese]
 Masao-NOM each.other-GEN teacher-to Hanako-NOM
karera_i-o hihansita] *to*] *itta*] (*koto*).
 they-ACC criticized comp said (fact)
 ‘Masao said to each other_i’s teachers that Hanako criticized them_i.’

- b. **[Karera-o_i [Masao-ga [otagai-no sensei]-ni [CP [IP Hanako-ga t_i hihansita] to] itta]] (koto).*
 they-ACC Masao-NOM each.other-GEN each-to Hanako-NOM
 criticized comp said (fact)
 ‘Them_i Masao said to each other_i’s teachers that Hanako criticized t_i.’

Similarly, long-distance scrambling, in contrast to clause-bound scrambling, does not affect scope relations of elements that originate in different clauses (Hoji 1985; Tada 1993; Ueyama 1998 and references cited there). This contrast between clause bound and long-distance scrambling is illustrated in (12) (from Miyagawa 2006) and (13) (from Bošković and Takahashi 1998).

- (12) a. *Dareka-ga daremo-o sikatta.* [Japanese]
 someone-NOM everyone-ACC scolded (∃ >> ∀, *∀ >> ∃)
 ‘Someone scolded everyone.’
- b. *Daremo-o_i dareka-ga t_i sikatta.*
 everyone-ACC someone-NOM scolded (∃ >> ∀, ∀ >> ∃)
 ‘Everyone, someone scolded.’
- (13) a. *Dareka-ga [Mary-ga daremo-ni atta to]* [Japanese]
 someone-NOM Mary-NOM everyone-dat met comp
omotteiru.
 thinks (∃ >> ∀, *∀ >> ∃)
 ‘Someone thinks that Mary met everybody.’
- b. *Daremo₁-ni dareka-ga [Mary-ga t₁ atta to]*
 everyone-dat someone-NOM Mary-NOM met comp
omotteiru.
 thinks (∃ >> ∀, *∀ >> ∃)
 ‘Someone thinks that Mary met everybody.’

These facts in and of themselves would not have given rise to the claim that long-distance scrambling in Japanese is semantically vacuous. Similar patterns are, in fact, attested in many cases of long distance movement. In this regard, a comparison between long-distance scrambling in Japanese and long topicalization in German is instructive. Frey (1993) reports the following pattern of data for long-distance topicalization in German. These examples show that long-distance topicalization in German behaves like long-distance scrambling in Japanese: It does not give rise to new pronominal binding relations, (14a), and does not extend the scope of a quantifier, (14b).

- (14) a. *Jede-n Jungen_i hat sein-e-_{*i/k} Mutter behauptet,* [German]
 every-ACC.SG.M boy has his-NOM.SG.F mother claimed
habe der Mann bestohlen.
 have.3SG.SBJV the.NOM.SG.M man mugged
 ‘Every boy_i, his-_{*i/k} mother claimed that the man mugged.’

- b. *Fast jede-n hat mindestens ein-er behauptet,*
 almost everyone-ACC.SG.M has at.least one-NOM.SG.M claimed
habe der Mann bestohlen.
 have.3SG.SBJV the.NOM.SG.M man mugged (∃ ≫ ∀, *∀ ≫ ∃)
 ‘At least one person has claim that the man mugged almost everybody.’

The observation that led Saito (1992) to make the famous claim “that scrambling in Japanese, even when it moves a constituent ‘long distance’, can be literally undone in the LF component” is illustrated in (15). The point to note about the examples in (15) is that both are interpreted as indirect constituent questions. The scope of the *wh*-phrase *dono hono* – ‘which book’ is unaffected by its position in the main or embedded clause. In the framework of assumptions about the interpretation of questions underlying Saito (1992), this is only possible if the position of the *wh*-phrase among the elements of the matrix clause in (15b) can literally be semantically equivalent to its positioning among the elements of the embedded clause, as in (15a). This has come to be called the undoing property of long-distance scrambling in Japanese. The observation that Japanese long-distance scrambling has the undoing property, has led various authors (Bošković and Takahashi 1998; Kitahara 2002; Saito 1989, 2004; Tada 1993) to make the strong claim that long-distance scrambling in Japanese never has an effect on structural aspects of interpretation. If this were true, i.e., if long-distance scrambling in Japanese never had a semantic effect, this would furnish a good argument for an extrasyntactic account.

- (15) a. [*Masao-ga* [_{CP} [_{IP} *Hanako-ga dono hon-o* [Japanese]
 Masao-NOM Hanako-NOM which book-ACC
tosyokan-kara karidasita] ka] siritagatteiru] koto
 library-from checked.out Q want.to.know fact
 the fact that Masao wants to know [Q [Hanako checked out which book from
 the library]]
 ‘the fact that Masao wants to know which book Hanako checked out from
 the library’
- b. ?[*dono hon-o_i* [*Masao-ga* [_{CP} [_{IP} *Hanako-ga t_i tosyokan-kara*
 which book-ACC Masao-NOM Hanako-NOM library-from
karidasita] ka] siritagatteiru] koto
 checked.out Q want.to.know fact
 the fact that which book_{*i*}, Masao wants to know [Q [Hanako checked out *t_i*
 from the library]]
 ‘the fact that Masao wantso to know which book Hanako checked out from
 the library’

Again, a comparison with topicalization in German is instructive (see Tada 1993). Although long-distance topicalization in German does not have the undoing-property in all cases, it does in a restricted environment. Reis and Rosengren (1992) discuss a construction they call *wh*-imperatives, an example of which is given in (16a). Like (16b), (16a) is interpreted as an imperative which embeds an indirect question. The *wh*-word *wen* – ‘whom’ takes embedded scope but is topicalized to the beginning of the main clause.

- (16) a. *Wen stell dir vor, dass Peter besucht hat!* [German]
 who.ACC imagine 2SG.DAT PRT that Peter visited has
 ‘Image who Peter visited!’
- b. *Stell dir vor, wen Peter besucht hat!*
 imagine 2SG.DAT PRT who.ACC Peter visited has
 ‘Imagine who Peter visited!’

Reis, and Rosengren (1992) argue that the examples cannot be analyzed in terms of a parenthetical imperative but involve true embedding. The construction is limited to imperative verbs that take interrogative complements. *Wh*-imperatives provide a case, then, in which long-distance topicalization in German also exhibits the undoing property. Once an account of the undoing property of topicalization in German *wh*-imperatives is available that deals with it in the syntax, as, by commonly held assumption, it would have to, the existence of the undoing property with Japanese long scrambling no longer furnishes an argument for an extrasyntactic treatment. It should be noted that if the parallel between topicalization and scrambling turns out to be real, German constitutes a counterexample to Bošković’s (2004) generalization that only languages without articles display movement operations with the semantic footprint of long-distance scrambling in Japanese.

Returning to Japanese, we note that Saito (1985: chapter 3) had already discussed examples like (17). In the unscrambled order, (17a), the subject pronoun *kanozyo* – ‘she’ cannot be coreferential with Mary while such an interpretation is possible under the scrambled order in (17b). On standard assumptions, the condition governing the possibility of coreference between pronouns and proper names is structural (Condition C of the binding theory in Government and Binding theory). If we follow this assumption, we have to conclude that long-distance scrambling is syntactic because it has an impact on structural aspects of meaning. The same conclusion can be reached on the basis of the patterns of coreference discussed in Miyagawa (2005, 2006) and Nishigauchi (2002). A relevant pair is given below in (18). Similar conclusions emerge from facts concerning the scope of long-distance scrambled quantifiers discussed in Miyagawa (2005, 2006), and the observation that the possibility of binding into an element depends on how far it has been scrambled (Saito 2003: section 5.1).

- (17) a. **John-ga [kanozyo_i-ga [NP kinoo Mary_i-o tazunete* [Japanese]
 John-NOM she-NOM yesterday Mary-ACC visit
kita hito-o] kirat-tei-ru to] omot-tei-ru (koto).
 came person-ACC dislike-PROG-PRS comp think-PROG-PRS fact
 ‘John thinks that she_i dislikes the person who came to see Mary_i yesterday.’
- b. *[NP kinoo Mary_i-o tazunete kita hito-o]_j John-ga*
 yesterday Mary-ACC visit came person-ACC John-NOM
[kanozyo_i-ga t_j kirat-tei-ru to] omot-tei-ru (koto).
 she-NOM dislike-PROG-PRS comp think-PROG-PRS fact
 ‘The person who came to see Mary_i yesterday, John thinks that she_i dislikes.’

- (18) a. [*John_i nituite-no dono hon-o*]_j *kare_i-ga* [*Hanako-ga t_i* [Japanese]
 John about-GEN which book-ACC he-NOM Hanako-NOM
kiniitta ka] *sit-tei-ru* (*koto*).
 liked Q know-PROG-PRS fact
 [Which book about John_i]_j, he_i knows [Q [Hanako likes t_j]]
 ‘He_i knows which book about John_i Hanako likes.’
- b. **Kare_i-ga* [*Hanako-ga* [*John_i nituite-no dono hon-o*] *kiniitta ka*]
 he-NOM Hanako-NOM John about-GEN which book-ACC liked Q
sit-tei-ru (*koto*).
 know-PROG-PRS fact
 ‘He_i knows [[which book about John_i]_j [Hanako likes t_j]]’

All of this illustrates that long-distance scrambling in Japanese does have an effect on coreference, binding, and scope, and is therefore not extrasyntactic. The same type of argument has been made for Korean by Johnston and Park (2001). What we have seen so far is that both scrambling in the *Mittelfeld* and long-distance scrambling have effects on structural aspects of meaning, which leads to the conclusion that they are syntactic phenomena.

We turn to various proposals for the representation of structures that involve scrambling in the *Mittelfeld* in German in the next sections. The analyses entertained by different researchers depend in part on the vocabulary for syntactic analysis made available by the theories in which the analyses are formulated. They also depend crucially on the theory of scope and binding that accompanies the analysis of scrambling.

5. Trace-based analyses of *Mittelfeld* scrambling

There is a large number of analyses of scrambling that involve overt fillers and abstract traces (see Fanselow 1990; Frey 1993; Grewendorf and Sabel 1999; Haider and Rosen-gren 2003; Hinterhölzl 2006; Kidwai 2000; Kitahara 2002; Mahajan 1990; G. Müller 1995; G. Müller and Sternefeld 1993; Putnam 2007; Sabel 2005; Saito 1985; Stechow and Sternefeld 1988; Ueyama 2003; Webelhuth 1989, 1992 among numerous others). Some of these are expressed in terms of a movement operation while others are not. The distinction will not play a role until the very end of this section.

Work done in the Principles and Parameters and Minimalist traditions usually assume that the theory of scope and binding should be expressed strictly in terms of tree-configurational notions, in particular, in terms of dominance and command relations but not in terms of precedence. A strong formulation of this general position is offered by Chomsky (2008), who says “that order does not enter into the generation of the C-I [conceptual-intentional] interface, and that syntactic determinants of order fall within the phonological component.” This is usually taken to entail that only those aspects of trees that are expressed in terms of dominance and command relations enter into the determination of scope and binding but crucially not those that are expressed in terms of precedence.

Lenerz (1977) had suggested criteria for establishing the unmarked word order in the *Mittelfeld* of German sentences. One of the properties of unmarked orders (see Frey

1993; Lechner 1996, 1998; Pafel 2005 for extensive discussion as well as Frey, this volume) is that they give rise to unequivocal scope relations while marked orders give rise to scope ambiguities. This was illustrated above in (8), where the unequivocal example (8a) shows the order that is considered the unmarked order for this class of verbs. Example (8b) shows the marked word order and is ambiguous.

If the dominance and command relations encoded in trees are the only way in which scope relations are encoded, then these relations must be different in the two examples in (8). Given the Nontangling Condition in combination with certain additional assumptions, such as a restriction to binary branching structures for example, the conclusion that the hierarchical structures are different is, of course, already entailed by the linear order. A very simple account of the lack of ambiguity in (8a) and the presence thereof in (8b) can be given if the direct object in the marked order is moved across the indirect object. The general idea is that scope corresponds to c-command and that an element that has moved can be interpreted in its moved position or in the position of its trace(s) (see Aoun and Li 1989, 1993; Hornstein 1995; Lechner 1996, 1998) for proposals along these general lines). Neither of the objects has moved in (19a), therefore scope relations are unequivocal and since the accusative object c-commands the dative object, the former takes scope over the latter. In (19b) on the other hand, there are two potential scope positions for the dative object, one of which does and the other one of which does not c-command the accusative object. Consequently, the example is ambiguous.

- (19) a. *[DASS [er [[mindestens ein Geschenk] [[fast jede-m Gast] überreichte]]]]* [German]
 THAT he at.least one.ACC.SG.N present almost
jede-m Gast] überreichte]]]]
 every-DAT.SG.M guest handed (✓ \exists \gg \forall , * \forall \gg \exists)
 ‘that he handed at least one present to almost every guest’
- b. *[DASS [er [[fast jede-m Gast]; [[mindestens ein Geschenk] [t_i überreichte]]]]]*
 THAT he almost every-DAT.SG.M guest at.least one.ACC.SG.M
Geschenk] [t_i überreichte]]]]]
 present handed (✓ \exists \gg \forall , ✓ \forall \gg \exists)
 ‘THAT he handed at least one present to almost every guest’

The reasoning given here represents only the bare outline of the intricate arguments in the literature. Clearly, once the premise is accepted that scope relations are syntactically expressed exclusively in terms of c-command, a movement account of scrambling becomes all but unavoidable. We return to the issue of scope once we have discussed some of the alternatives.

Another reason for assuming a movement analysis of scrambling can be derived from the hypothesis that thematic structures map in a uniform way onto underlying syntactic structures across languages (see Fanselow 2001 for critical discussion). Baker (1988) gave an influential formulation to this idea under the name of the Uniformity of Theta Assignment Hypothesis (UTAH), (20). UTAH and various slightly weaker versions discussed in the literature (see Baker 1997; Baltin 2001; Levin and Rappaport Hovav 1995; Perlmutter and Postal 1984; Pesetsky 1995; Rosen 1984 for relevant discussion) entail that if two sentences have the same thematic representation, as the sentences in (8) do, then the hierarchical organizations of the arguments in the underlying structure of the

sentence must be identical. Therefore, at least one of the two sentences in (8) must deviate from the underlying structure and hence be derived through movement.

(20) The Uniformity of Theta Assignment Hypothesis (UTAH):

Identical thematic relationships between items are represented by identical structural relationships between those items at the level of D-Structure.

(Baker 1988: 46)

Once the trace-based account is in place, the structural difference between the scrambled and non-scrambled orders is used to derive other differences between the sentences. For example, Lenerz (1977) observed that examples with the neutral word order allow focus projection if the main sentence accent is on the immediately preverbal argument (and a number of further conditions are met) while sentences with the scrambled order do not allow focus projection (see Frey, this volume). Given the trace-based account of scrambling, the impossibility of focus projection with scrambled orders can be related to the presence of a trace. One can, for example, make the assumption that focus projection from a verbal satellite is possible only if that satellite is both the sister of the verb and selected by it. Consider an example where the neutral order is NOM-ACC-DAT, i.e., an example much like (19a), but without the additional complication of having quantificational objects. If focus projection is possible only from the sister of the verb, then focus projection from the accusative object is not possible: Although the accusative is selected by the verb, it is not the verb's sister. In (19a) the dative is the sister of the verb rather than the accusative; hence, focus projection is correctly predicted to be possible from the dative here but not from the accusative. In (19b), the sister of the verb is the silent trace. Since the trace cannot act the focus exponent, focus projection is banned altogether in this structure.

5.1. The A- vs. A-movement debate

In the Principles and Parameters theory an attempt was made to unify all movement operations under a single transformation, Move α (Lasnik and Saito 1992). Given its generality, conditions on this transformation had to be kept to a minimum. The bulk of the empirical limitations on movement came from representational constraints on the output of this transformation. The generalization that fillers generally c-command the site of the gap for example was handled by the Proper Binding Condition (Fiengo 1977), various locality constraints – by the Empty Category Principle (Chomsky 1981, 1986; Cinque 1990; Lasnik and Saito 1992; Rizzi 1990), etc. A representational device that was instrumental in the attempted unification of all movement transformations under Move α was the typology of abstract elements. Alongside abstract pronominals, the theory recognized exactly two kinds of traces: NP-traces and *wh*-traces. The former were assimilated to anaphoric elements: like anaphors, they were assumed to require a local c-commanding binder in an A(argument)-position. (A-positions were standardly understood to be all those where a thematic role could potentially be assigned and, in addition,

the canonical subject position.) *Wh*-traces on the other hand were assimilated to referential expressions: like referential expressions, *wh*-traces were assumed to be incompatible with any kind of *c*-commanding coindexed expression in an *A*-position. There were no other traces: movement had to leave behind either an *A*-trace or an \bar{A} -trace.

The dichotomous partitioning of movement operations goes back to Postal's (1971) study on the interaction of movement with binding and the assignment of reference. Postal observes that the range of logically possible interactions between movement, binding and reference is quite large. Nevertheless, he claims, only two kinds of interactions are observed in English: type *A* and type *B*. Since there is no third class, *B* is simply the complement of *A*, that is, *B* is non-*A* or \bar{A} . Postal's terminology was widely adopted, though with *A* and \bar{A} given additional meaning.

The relevant facts are clearest where bound-variable interpretations rather than simply coreferential interpretations of pronouns and anaphors are concerned. The examples in (21) illustrate the pattern found with raising, an *A*-movement operation in Postal's typology. The examples in (21b) show that when raising does not take place, binding of the experiencer of *seem* is impossible, (21b [i]), and binding *into* the experiencer is likewise impossible, (21b [ii]). On the other hand when the subject of *be a genius* is raised into the main clause, binding becomes possible. The examples in (22) illustrate the pattern with \bar{A} -movement. The examples show that when a *wh*-phrase moves across a pronoun this movement does not extend the binding domain of the *wh*-phrase. The violation in (22a [i]) is felt to be very severe and goes by the name of strong crossover, while the violation in (22a [ii]) is much less severe and goes by the name of weak crossover (Wasow 1972). The examples here crucially involve quantifiers to guarantee binding rather than anaphoric dependency without binding or simply coreference (see Reinhart 1983; Reinhart and Grodzinsky 1993; Williams 1997). The binding-theoretic approach to traces sketched above offers an immediate account of strong crossover, (22a [i]): the trace left behind by *wh*-movement behaves like a referential expression; therefore, it must not be *c*-commanded by a coindexed element in an *A*-position; in examples like (22a [ii]) this condition is violated; hence, they are ungrammatical.

- (21) a. (i) *Every general_k seems to himself_k t_{every general} to be a genius.*
 (ii) *Every general_k seems to his_k brother t_{every general} to be a genius.*
 b. (i) **It seems to him_k/himself_k that every general_k is a genius.*
 (ii) **It seems to his_k brother that every general_k is a genius.*
- (22) a. (i) **Who_k did he_k see t_{who}?*
 (ii) **Who_k did his_k brother see t_{who}?*
 b. (i) **When did he_k see who_k?*
 (ii) **When did his_k brother see who_k?*

It should be noted that there are well-known problems with the binding-theoretic treatment of traces as referential expressions. Traces of topicalized anaphors and pronouns behave respectively like anaphors and pronouns rather than like referential expressions, as discussed by Frey (1993) and Postal (1971, 2004).

Postal (1971) noted that all of the *A*-movements, i.e., those that give rise to new binding relations, involved relatively local movements crossing finite clause boundaries.

The class of \bar{A} -movements on the other hand includes unbounded movement operations like *wh*-movement, relativization, clefting, etc. Work in the Principles and Parameters tradition assumed that the two classes of binding behavior discovered by Postal correlated closely with the type of position an element moved to, and with the motivation for this movement. A-movement was seen as movement of nominal arguments from a position where their case could not be licensed to a different argument position where their case could be licensed: In the raising example in (21), the launching site of the movement is the position associated with the thematic interpretation of *every general* in the embedded infinitive and the landing site is the subject position in the matrix. The subject position is an A-position by assumption. \bar{A} -movements on the other hand are movements to positions outside of the thematic and case systems, the non-A or \bar{A} -positions: Examples like (22) involve movement to the specifier of CP, a position that is not involved in thematic or case-licensing.

Later work correlated a number of further properties with \bar{A} -movement: unboundedness on a par with *wh*-movement in the sense of Chomsky (1977) and parasitic gap licensing (Chomsky 1982).

In this context, the question arises where scrambling falls in the typology of movement operations. Is it an A-movement operation or an \bar{A} -movement operation? This question cannot be answered straightforwardly.

On the one hand, one can argue from the principles of the theory (Stechow and Sternefeld 1988) that scrambling cannot be A-movement, because it does not target an A-position, i.e., a potential thematic or case position. This is clear for prepositional phrases. The examples in (23) illustrate scrambling of argumental PPs. Only the scrambled orders are given, in the unmarked order the subject precedes the PP. The movement of the PP behaves like scrambling in that it induces a scopal ambiguity, (23a), and allows binding into the subject, (23b). However, unlike nominal arguments prepositional arguments do not need to be case-licensed; hence, the examples in (23) cannot be accounted for in terms of movement to a case position.

- (23) a. *weil über mindestens ein echtes Problem fast jeder* [German]
 because about at.least one real problem almost every
Doktorand nachgedacht hat
 PhD.student after.thought has $(\exists \gg \forall, \forall \gg \exists)$
 ‘Because almost every PhD student has thought about at least one real
 problem’
- b. *weil mit jedem Kind_i seine_i Mutter geschimpft hat*
 because with every child its mother scolded has
 ‘because his_i mother scolded every child_i’

Further examples of PP scrambling add to this argument. Example (24) (from Frey and Pittner 1998) illustrates scrambling of a non-argumental instrumental PP. Again, the scope ambiguity is taken to be one of the diagnostic properties of scrambling; hence, (24b) represents the scrambled order. In the Principles and Parameters framework, adjuncts can never move to A-positions, because the resulting movement chain would be ill-formed (Chomsky and Lasnik 1993). Hence, scrambling cannot be A-movement.

- (24) a. *WEIL an mindestens einem Abend mit fast jedem* [German]
 because at at.least one evening with almost every
Computer gearbeitet wurde
 computer worked was $(\exists \gg \forall, * \forall \gg \exists)$
 ‘because work was done on at least one evening with every computer’
- b. *WEIL mit mindestens einem Computer an fast jedem Abend*
 because with at.least one computer at almost every evening
gearbeitet wurde
 worked was $(\exists \gg \forall, \forall \gg \exists)$
 ‘because work was done with at least on computer on almost every evening’

Finally, (25) illustrates that scrambling can split noun phrases (Fanselow 1987; Kuthy and Meurers 2001; G. Müller 1995; S. Müller 1999 for discussion and references). Again this movement displays the characteristic properties of scrambling in that it gives rise to new binding relations and induces a scope ambiguity. Clear cases of A-movement never split up noun phrases, hence, scrambling is not A-movement. The NPs split in (25) are headed by the noun ‘books’, which takes the about-PP as an optional complement.

- (25) a. *WEIL über jeden Popstar_i seine_i Fans Bücher aus* [German]
 because about every popstar his fans books from
der Bibliothek ausgeliehen haben
 the library checked.out have
 ‘because his_i fans have checked out books about every popstar_i from the li-
 brary’
- b. *WEIL über mindestens einen Popstar fast jeder Student ein Buch*
 because about at.least one popstar almost every student a book
aus der Bibliothek ausgeliehen hat
 from the library checked.out has $(\exists \gg \forall, \forall \gg \exists)$
 ‘because almost every student has checked out a book about a least one pop-
 star from the library’

On the other hand, the fact that scrambling, like A-movement, does not cross finite clause boundaries (Fanselow 1990) and does not give rise to weak crossover effects militates against treating it as \bar{A} -movement. Other considerations that have been invoked in this debate involve the interaction of anaphor and reciprocal binding with scrambling and the licensing of parasitic gaps. We turn to these arguments now. Neither of them turns out to be conclusive.

5.1.1. Anaphors and reciprocals

Regarding anaphor and reciprocal binding, the generally agreed upon fact is that in a double object construction a dative object cannot bind an accusative reciprocal no matter what the order of the two elements is, (26a). On the other hand the accusative object can bind a dative reciprocal, (26b) – there is a certain amount of disagreement to what extent this depends on the order of the two objects. It is equally clear that a subject reciprocal can never be bound by an object, independently of the word order, (26d–e).

- (26) a. **dass ich {den Gäst-e-n einander | einander} [German]*
 that I the.DAT.PL guest\PL-PL-DAT each.other each.other
den Gäst-e-n} vorgestellt habe
 the.DAT.PL guest\PL-PL-DAT introduced have
 intended: ‘that I introduced the guests to each other’
- b. *dass ich die Gäst-e einander vorgestellt habe*
 that I the.ACC.PL guest\PL-PL.ACC each.other introduced have
 ‘that I introduced the guests to each other’
- c. *?dass ich einander die Gäst-e vorgestellt habe*
 that I each.other the guest\PL-PL.ACC introduced have
 ‘that I introduced the guests to each other’
- d. *dass der Fisch und der Frosch einander angeguckt haben*
 that the.NOM.SG.M fish and the.NOM.SG.M frog each.other at.looked
 have
 ‘that the fish and the frog looked at each other’
- e. **dass {den Fisch und den Frosch einander | einander}*
 that the.ACC.SG.M fish and the.ACC.SG.M frog each.other each.other
den Fisch und den Frosch} angeguckt haben
 the.ACC.SG.M fish and the.ACC.SG.M frog at.looked have
 intended: ‘that the fish and the frog looked at each other’

The conclusions to be drawn from these facts and the much murkier judgments involving the reflexive *sich* have varied substantially. For a representative sample, see Frey 1993; Haider 2006; Haider and Rosengren 2003; G. Müller 1995, 1999; Putnam 2007. The problem is the following. On the assumption that the underlying order of objects for *vorstellen* – ‘introduce’ is indirect object (dative) before direct object (accusative), (26b) represents the scrambled order. The fact that the accusative may antecede the reciprocal seems to show that scrambling behaves like English A-movement (see [21] above). If this is taken to be the core fact, the rest of the observations in (26) have to be attributed to independent factors: the fact that the dative cannot antecede the accusative reciprocal can be traced to a restriction against accusative reciprocals not being able to co-occur with dative DPs (Frey 1993: 113), that the order in (26c) is derived from that in (26b) by further movement of the reciprocal which is not scrambling (see Gärtner and Steinbach 2000 for reasons to be skeptical), the observations in (26e) must be attributed to some special status of subjects in the binding theory, etc. Alternatively, we could take (26e) as the starting point and conclude that scrambling is not A-movement and therefore does not allow binding of a co-argument anaphor or reciprocal from the derived position. This might then be coupled with the assumption that the order in (26b) is the underlying order (G. Müller 1995, 1999). Finally one might conclude that reciprocal and anaphor binding in German operates in terms of a case or argument hierarchy rather than the phrase structural c-command hierarchy (Grewendorf 1985). At the present level of understanding (Sabel 2002; Sternefeld and Featherston 2003), no firm arguments can be based on these facts. The central question for the A- vs. \bar{A} -movement debate is whether scrambling ever has an effect on reciprocal and anaphor binding in German, a question which has not been settled.

5.1.2. Parasitic gaps

The second inconclusive argument revolves around the question whether scrambling licenses parasitic gaps. Example (27a) is a standard case of a parasitic gap. The example indicates the position assumed for the trace and the parasitic gap according to standard Principles and Parameters analyses. Example (27b) shows that the presence of a gap in the object position of *read* is indeed parasitic upon the presence of a gap in the object position of *file*. Without the latter gap, the former is illicit. The following two additional generalizations are at the heart of the argument concerning the A- vs. \bar{A} -movement nature of scrambling: (i) The real gap, the trace in (27a), may not c-command the parasitic gap, (28), and (ii) only \bar{A} -movement but not A-movement licenses parasitic gaps, (27) vs. (29).

- (27) a. *What did John file t_{what} without reading e_{PG} ?*
 b. **What did John file the book without reading t_{what} ?*
- (28) a. *Who did you [[run into t_{who}] [without recognizing e_{PG}]]?*
 b. **Who t_{who} [[ran into you] [without (you) recognizing e_{PG}]]?*
- (29) **The book was filed $t_{the\ book}$ without reading e_{PG} .*

Examples like (30) were discussed by Felix (1985), who analyzes them in the way indicated, that is, as structures with parasitic gaps licensed by scrambling. If this is the correct analysis and if parasitic gaps are indeed licensed only by \bar{A} -movement, then (30) provides a strong argument against an A- and for an \bar{A} -movement analysis of scrambling.

- (30) *weil er ihn ohne e_{PG} interviewt zu haben* [German]
 because 3SG.NOM.M 3SG.ACC.M without interviewed to have
 t_{ihn} einstellte
 hired
 ‘because he hired him_k without having interviewed him_k’

The argument is not straightforward however. Example (31) is taken from Webelhuth (1992: 207) and probably the most famous example in this debate. The example is intended to show that scrambling can simultaneously exhibit A-properties and \bar{A} -properties. The A-property in this examples is the lack of a weak-crossover effect and the creation of binding into the dative object by the quantified accusative object, the \bar{A} -property is the licensing of a parasitic gap in the infinitival adjunct. The simultaneity of A-properties with \bar{A} -properties has come to be known as Webelhuth’s paradox. Example (31) was intensely discussed in the subsequent literature, which tried to resolve the paradox for government and binding theory (see many of the papers in Corver and Riemsdijk 1994).

- (31) *?Peter hat jede-n Gast_i [ohne e_{PG} anzuschauen]* [German]
 Peter has every-ACC.SG.M guest without look.AT.INF
sein-em_i Nachbar-n t_i vorgestellt.
 his-DAT.SG.M neighbor-DAT.SG.M introduced
 ‘Peter introduced every guest to his neighbor without looking at.’

An important approach to the paradox was proposed by Mahajan (1990: 60), who uses the contrast between (31) and the much worse (32) to argue that the A- and \bar{A} -properties of scrambling are not simultaneous. Rather, on Mahajan's analysis, there is an initial step of A-movement, followed by a subsequent step of \bar{A} -movement. This analysis allows (31), where the \bar{A} -property is exhibited lower in the tree than the A-property, but in conjunction with the ban on improper movement it disallows (32), where the \bar{A} -property is established lower than the A-property.

- (32) *?Peter hat jede-n Gast_i sein-em_i [German]
 Peter has every-ACC.SG.M guest his-DAT.SG.M
 Nachbar-n_j [ohne e_{PG} anzuschauen] t_j t_i vorgestellt
 neighbor-DAT.SG.M without look.AT.INF introduced
 'Peter introduced every guest to his neighbor without looking at.'

However, Mahajan's solution to the paradox is not viable. Various authors have pointed out that the contrast between (31) and (32) does not stem from the illicit binding relation between the accusative object and the possessor in the dative object, but rather from the fact that the accusative has been too far removed from the infinitive containing the putative parasitic gap (Fanselow 1993; Lee and Santorini 1994; G. Müller and Sternefeld 1994). Thus Fanselow (1993: 34) claims that a scrambled object cannot be separated from the infinitive containing the parasitic gap except by adjuncts and subjects. The degradation in (32) then comes from the lack of adjacency between the accusative and the infinitival.

Neeleman (1994: 403) provides the acceptable Dutch example (33). The example involves two stacked adjuncts, the higher one exhibits surface binding, the lower one a parasitic gap. Because of the hierarchical arrangement of the adjuncts, the example is not amenable to Mahajan's solution. Similar German examples, like (34), seem to be equally acceptable as (31) and much better than (32).

- (33) Dat Jan [de rivalen]_i namens elkaar_i [O_i [zonder t_i aan te [Dutch]
 That Jan the rivals on.behalf.of each.other without at to
 kijken]] feliciteert
 look congratulates
 'That Jan congratulates the rivals in each other's name without looking at them'
- (34) weil du [jede-n Gast]_i an sein-em_i Geburtstag [German]
 because you every-ACC.SG.M guest on his-DAT.SG.M birthday
 ohne e_{PG} anzugucken t_i umarmt hast
 without look.at.INF hugged have
 'because you hugged every guest on his birthday without looking at him'

On the assumption that the example in (34) involves a parasitic gap, it provides evidence against Mahajan's account in terms of a succession of A- and \bar{A} -movements and reaffirm the existence of Webelhuth's paradox.

Deprez (1994: 128) gives the example in (35) to make a similar point. The infinitive contains both the parasitic gap and the bound pronoun. The example shows that the object in (35) can simultaneously bind a pronoun and license a parasitic gap.

- (35) *weil Maria jede-n Gast [ohne sein-em Partner [German]*
 because Maria every-ACC.SG.M guest without his-DAT.SG.M partner
e_{PG} vorzustellen] allein t läßt
 introduce.INF alone lets
 ‘because Maria lets every guest alone without introducing him to his partner’

As presented, Deprez’s argument is inconclusive, as it rests on the untested assumption that the parasitic gap in the infinitival cannot scramble (Lee and Santorini 1994: 294 fn. 15). Since scrambling is clause bound, it is in principle clear how to control for scrambling of the parasitic gap. Relevant examples would have to have the form in (36). As far as I know, this question has not been studied.

- (36) [_{CP₁} *wh_k* [... [inf adjunct ... [his_k N] e_{PG} ...] [_{CP₂} ... t_{wh} ...]]]

A more fundamental way out of the paradox is taken by authors who deny that parasitic gaps are involved to begin with (Fanselow 2001; Haider 1993; Haider and Rosengren 2003; Kathol 2001). These authors question whether the relevant constructions involve parasitic gaps at all. Haider and Rosengren (2003: 243) make the following observation. Postal (1993a) in his discussion of distributional differences between parasitic gaps and secondary gaps in across-the-board (ATB) constructions claims that parasitic gaps are impossible in contexts that Postal (1998) came to call antipronominal, that is, contexts where anaphoric pronouns cannot appear, while across-the-board gaps are possible in such environments. Relevant examples that contrast parasitic gaps with ATB gaps from Postal (1993b) are given in (37).

- (37) a. (i) *Where did Elaine work t_{where} without ever living e_{PG}?
 (ii) Where did Elaine work t_{where} and Gwen vacation t_{where}?
 b. (i) *What he became t_{what} without wanting to become e_{PG} was a traitor.
 (ii) What Ted was t_{what} and Greg intended to become t_{what} was a doctor.
 c. (i) *This is a topic about which he should think t_{about which} before talking e_{PG}.
 (ii) This is a topic about which you should think t_{about which} and I should talk t_{about which}.

Crucially, the putative parasitic gaps licensed by scrambling in German pattern with ATB gaps in English rather than with parasitic gaps in that they are possible even in antipronominal contexts. This suggests that the empty category in the examples in (38) is an ATB gap rather than a parasitic gap.

- (38) a. *Wo hat Elena, anstatt mit dir e zu wohnen, ihr Büro [German]*
 where has Elena instead.of with you to live her office
ingerichtet?
 set.up
 ‘Where did Elena set up her office instead of living there together with you?’

- b. *Was er wurde, ohne eigentlich e werden zu wollen, war ein*
 what he became without actually become to want was a
Syntaktiker.
 syntactician
 ‘What he became without really wanting to do was become a syntactician.’
- c. *Das ist ein Thema, über das er, anstatt e zu schwätzen, nachdenken*
 that is a topic about which he instead.of to chat think.after
sollte.
 should
 ‘This is a topic he should think about instead of chatting.’

Conversely, parasitic gaps but not ATB gaps can be licensed in complex subjects, (39). Again, example (40) (from Haider and Rosengren 2003: 243) shows that the putative parasitic gaps in German pattern with English ATB gaps rather than with parasitic gaps. Fanselow uses related arguments against the parasitic gap analysis of examples like (30) and (31). He suggests that the relevant infinitival subordinators *ohne* – ‘without’, *anstatt* – ‘instead of’, etc. act as ‘quasi coordinating conjunctions’ and that examples like (30) and (31) result from ellipsis under quasi coordination. For a different analysis of these facts see Kathol (2001).

- (39) a. *He’s a man that anyone who talks to e_{PG} usually likes t*
 b. **He’s a man that anyone who talks to t and anyone who sees t leaves immediately.*
- (40) **Welches Haus wollte jeder, dem er e zeigte, $t_{welches Haus}$* [German]
 which house wanted everyone whom he showed
sofort kaufen
 at.once buy

In view of the rather drastic differences between the German construction under discussion here and parasitic gaps in English, the least we can conclude is that the argument for the \bar{A} -status of scrambling based on these facts rests on a very weak foundation.

5.1.3. Conclusion

At the beginning of this subsection, we noted that proponents of the \bar{A} -movement analysis of scrambling often point out that the set of categories that undergo scrambling is a superset of those that undergo A-movement. This was illustrated for PPs above, which are not (at least not outside of locative inversion) assumed to undergo A-movement. This does not mean, however, that the set of categories that undergo scrambling is identical to the set undergoing standard \bar{A} -movement. That this expectation of an \bar{A} -movement account of scrambling is frustrated is illustrated in (41) which contrasts the possible topicalization of a separable verbal prefix with the impossibility of scrambling this prefix. The judgments given below assume that no focal stress is placed on *aus*. Movement of focused phrases in the *Mittelfeld* is generally taken not to be scrambling (Haider and

Rosengren 1998; Lenerz 1977, 2001; G. Müller 1999; Stechow and Sternefeld 1988) and to show substantially different behavior from scrambling (see also Neeleman 1994).

- (41) a. *Aus hat er das Radio sicher nicht gemacht.* [German]
 off has he the radio certainly not made
 'He has certainly not turned off the radio.'
- b. *dass (*aus) er (*aus) das Radio (*aus) sicher (*aus) nicht *(aus) gemacht hat*
 that off he off the radio off certainly off not off
 made has
 'that he has certainly not turned off the radio'

Mittelfeld scrambling differs from A-movement in terms of the categories targeted and in terms of locality (extraction from NP is allowed). *Mittelfeld* scrambling also differs from \bar{A} -movement in terms of the categories targeted and in terms of locality (extraction across finite clause boundaries disallowed). Scrambling differs from \bar{A} -movement in terms of its cross-over behavior, and potentially also from A-movement with respect to anaphor and reciprocal binding. It seems clear then that scrambling is neither A-movement nor \bar{A} -movement.

5.2. The trigger problem

Under standard Government and Binding-theoretic assumptions, movement was a free operation, its output – subject to a number of constraints whose function it was to curb the generative power of the free movement operation. This meant in particular that the question why a particular movement happened was not of primary importance, as long as the result did not violate any constraints. In this context, proposals were made that linked the availability of scrambling in a particular language to the availability of landing sites in that language (e.g., G. Müller 1995). The theory did not require the analyst to identify triggers for a particular movement.

The advent of the Minimalist Program has brought a change in perspective. The copy theory of movement (Chomsky 1993) made obsolete the dichotomous treatment of movement gaps as either anaphors (A-movement) or R-expressions (\bar{A} -movement). Under the copy theory, movement gaps are filled by much richer and much more flexible objects than traces. Among other things, copies allow for simple solutions to the problems encountered by the binding-theoretic treatment of traces mentioned below example (22). In Minimalism movement is no longer viewed as free in principle, but is subject to a last-resort condition, under which an item may move only if it has to (a.o. Chomsky 1995b, 2000; Lasnik 1995; Stroik 1999). A further constraint on theorizing comes from the idea that movement is driven by features that must have either a morphological or an interpretive reflex (Chomsky 1995a: section 4.10).

While this change in perspective on movement in general has rendered the debate on the A- vs. \bar{A} -nature of scrambling somewhat theoretically obsolete (Kidwai 2000; Putnam 2007), the underlying issues have not been resolved, and indeed, the same question arises in other frameworks, as we will see shortly: How many different ways do natural

languages provide for establishing antecedent-gap relationships? How do these interact with each other (Abels 2007) and with interpretive (scope and anaphoric) properties? What, if any, generalizations govern the relation between the length/landing site/trigger of a movement operation and its semantic behavior? How can we account for such generalizations (for a general approach see Williams 2002, 2011)?

The Minimalist perspective brings into sharp focus a different issue: Why does scrambling apply? In Minimalism the answer to this type of question lies in identifying the trigger for scrambling. The concrete suggestions have ranged from case (Zwart 1993), via a number of semantic features (e.g., topic in Meinunger 2000, scope in Hinterhölzl 2006, referentiality in Putnam 2007), to purely formal triggers (Grewendorf and Sabel 1999; G. Müller 1998).

All of these are somewhat problematic. Linking scrambling to case is problematic, because it leads to the wrong expectation that only noun phrases will undergo scrambling. The other proposals have similar shortcomings. Linking scrambling to scope, leads to the wrong expectation that non-scopal elements (such as proper names) do not scramble and that scrambling across them does not happen; such scrambling would have no scopal consequences. If the trigger for scrambling were scope, the fact that scope reconstruction is compatible with scrambling would have to remain mysterious. The proposals that scrambling is triggered by a referentiality feature or a topic feature stumbles on the fact that quantifiers scramble, although they are clearly not referential and make for bad topics. Purely formal features triggering scrambling may be able to describe the data correctly, but shed no light on the nature of scrambling.

One of the problems for a triggering account, as the previous paragraph shows, is that scrambling does not seem to have a uniform effect. Haider and Rosengren (2003) have taken this as an argument for a return to an account where antecedent-trace relationships can be created without a trigger. Grewendorf (2005) follows the opposite strategy, claiming, in essence, that scrambling is not a unified phenomenon and should be further analyzed into a set of different movement operations triggered by different features and targeting slightly different dedicated positions in the *Mittelfeld*, basing his analysis on Belletti (2004).

Grewendorf (2005) is of course not alone in suggesting a multi-factorial analysis of scrambling. Optimality theoretic accounts (Choi 1996, 1997, 2001; Cook and Payne 2006; G. Müller 1999) and similar competition-based accounts (Wurmbrand 2008) are inherently multifactorial. Such accounts allow the same word order patterns to be conditioned by different factors, which is their advantage. However, as argued by G. Müller (1999), standard optimality theory is incapable of capturing the fact that in any given context more than one scrambled or unscrambled word order may be acceptable.

At present, there is no satisfactory solution that has been shown to work over a broad range of facts. Scrambling remains as a theoretical problem for Minimalism, as it appears to defy the condition that movement is a last resort.

We now turn our attention away from approaches where the unmarked and scopally unambiguous order of elements is represented in the (abstract) surface constituent structure in the form of traces. There are two types of approaches that avoid traces in their treatment of scrambling: those that do adhere to the Nontangling Condition and those that do not.

6. Base generated adjunction structures: LFG

The treatment of scrambling in Lexical Functional Grammar is typical of a traceless phrase-structure based approach. Similar traceless base generation accounts have also been proposed in other frameworks. See for example Bayer and Kornfilt (1994), Fanselow (2001), Kiss (2001), Neeleman (1994), and Neeleman and van de Koot (2002).

Phrase structure in Lexical Functional Grammar strictly adheres to the Nontangling Condition. However, scope and binding are not expressed in terms of dominance relations in phrase structure trees alone and the idea that there is universal alignment of thematic structure with abstract phrase structure is also not part of the theory, which removes two of the main arguments for the movement analysis in Government and Binding theory and Minimalism. On these assumptions, scrambled structures without traces can easily be entertained. Bresnan (2001) suggests an approach in which the grammatical function of an element in a scrambled position can be recovered using case information. The general schema for such associations, which is restricted to adjoined positions, is given in (42). The schema licenses structures for scrambling where the scrambled elements are base generated in VP-adjoined positions. Case rather than configuration identifies the grammatical function of elements, which allows them to appear in any order. Crucially, (42) allows to identify grammatical function only in the *local* f-structure, which encodes the observation that scrambling is clause-bounded.

- (42) Morphological Function Specification via dependent marking
 $(\downarrow \text{CASE}) = k \Rightarrow (\uparrow \text{GF}) = \downarrow$
 (Bresnan 2001: 111)

To go with this analysis, Bresnan (1998, 2001) formulates a binding theory designed to capture the observation that in some languages long movement does but clause internal scrambling does not give rise to weak crossover effects. This was illustrated above for Japanese ([11] vs. [10]) and German ([14] vs. [9]). Bresnan suggests that binding relations can be read off at different levels. The domain of a binder is the minimal clause or predication structure containing it. Furthermore, a binder must be at least as prominent as any pronoun bound by it. This prominence requirement holds across levels, but the definition of prominence is slightly different. On a-structure, prominence is defined in terms of a thematic hierarchy (*agent* > *beneficiary* > *experiencer/goal* > *instrument* > *patient/theme* > *locative*); on f-structure, prominence is defined as higher rank in the relational hierarchy of grammatical functions (SUBJ > OBJ > OBJ_θ > OBL_θ > COMPL > ADJUNCTS); finally on c-structure, prominence is defined in terms of linear order. The precise notion invoked is f-Precedence, defined as follows:

- (43) Definition of f-Precedence
 Given a correspondence mapping φ between a c-structure and its f-structure, and given two subsidiary f-structures α and β , α f-precedes β if the rightmost node in $\varphi^{-1}(\alpha)$ precedes the rightmost node of $\varphi^{-1}(\beta)$.
 (Bresnan 2001: 195)

According to this definition, prominence on c-structure is determined in terms of the collection of c-structure nodes that correspond to a particular f-structure. An f-structure α f-precedes an f-structure β just in case every correspondent of α precedes some corre-

spondent of β . Bresnan further assumes that long-distance filler-gap relations are mediated via inaudible traces. Therefore, the f-structure that a long-distance displaced element corresponds to has, in fact, two correspondents on c-structure: the filler and the trace at the site of the gap. This f-structure f-precedes another f-structure only if the other f-structure has a correspondent that follows both the filler and the gap corresponding to the former.

With these notions of prominence at different levels in place, Bresnan argues that there is variation regarding the type of prominence that is relevant to binding theory in different languages. Languages can vary whether a binder has to be more prominent than a bound pronoun in terms of f-Precedence, syntactic rank, or the thematic hierarchy. Disjunctive and conjunctive formulations are also allowed.

For a language like German, in which local scrambling does not give rise to weak-crossover effects but long movement does, Bresnan assumes that prominence can be construed in terms of f-precedence. Bresnan also assumes that if a constituent containing a pronoun scrambles, then the binder of the pronoun may follow it, just in case it is more prominent on the relational hierarchy. This is accounted for by assuming that prominence may also be construed in terms of syntactic rank. In other words, an unscrambled or locally scrambled argument can always bind (into) arguments that follow it, but it can bind (into) arguments that precede it only if it, the binder, is more prominent syntactically than the argument which is being bound (into). This accounts directly for examples like (9). The overall formulation of the binding theory for a language like German is therefore disjunctive: prominence on c-structure or prominence on f-structure.

Bresnan (2001: 91) assumes that there is an economy condition on the insertion of traces, (44).

(44) Economy of Expression

All syntactic phrase structure nodes are optional and are not used unless required by independent principles (completeness, coherence, semantic expressivity).

(Bresnan 2001: 91)

This principle entails that local scrambling, local topicalization, and local *wh*-movement never leave a trace in German. The reason is that local scrambling, topicalization and *wh*-movement never require traces for completeness, coherence, or expressivity. Therefore, postulating a trace would involve positing an extra node that is not required, which is disallowed under the principle of economy of expression.

In Bresnan's theory there is a fundamental distinction between local movement and long-distance movement. Local *wh*-movement, local topicalization, and local scrambling are predicted to pattern together and to behave differently from long *wh*-movement and long topicalization. Most other theories predict that *wh*-movement and topicalization behave the same way, whether long or short, and distinguish them from short scrambling. The reconstructive behavior short scrambling, short *wh*-movement, and short topicalization furnishes a relevant test of these divergent predictions. While all three operations allow an object to reconstruct for binding below the subject, Frank, Lee, and Rambow (1992), Frey (1993), and Lechner (1998) claim that a scrambled direct object cannot reconstruct for binding below an indirect object. Topicalized and *wh*-movement direct objects, on the other hand, readily reconstruct under an indirect object. This state of affairs undermines one of the fundamental assumptions of Bresnan's account. (Wurmbrand 2008 provides a somewhat more nuanced description of the scrambling facts, but the essence of the problem for Bresnan's account remains.)

A number of further questions for this approach have been raised in the literature. Berman (2003: 84) discusses the fact that subject-experiencer verbs allow backwards binding even if the order is nominative before accusative:

- (45) ... *weil seine_i Mutter jeden_i interessiert.* [German]
 because his mother everyone interests
 ‘... because everyone is interested in their mother’

Here *jeden* does not f-precede the bound pronoun and neither does *jeden* outrank the subject on the relational hierarchy. Bresnan’s formulation of the binding theory therefore fails to predict that examples like this are acceptable. A solution can be given, Berman argues, if prominence is defined as the disjunction of f-precedence and thematic prominence.

Berman (2003: 85 fn. 12) points out another problem for Bresnan’s formulation of the binding theory:

- (46) **Jeden_i geliebt hat seine_i Mutter* [German]
 everyone loved has his mother

Here the operator *jeden* precedes – and indeed f-precedes – the pronoun, yet binding of the pronoun is impossible.

Cook and Payne (2006) raise the more fundamental point that a disjunctive formulation is inherently non-explanatory. Their paper is concerned with scope rather than binding, but the criticism of a disjunctive scope theory carries over *mutatis mutandis* to a critique of the disjunctive binding theory.

Another issue that remains unaddressed are examples like (25) above. Example (25) was used to illustrate the possibility to scramble a PP out of an NP. Notice now that the PP would be realized as a c-structure daughter of a node that corresponds to the f-structure of the verb. Therefore, the relation between the PP and the gap would have to be mediated via a trace. Therefore, the scrambled PP in (25) does not f-precede the pronoun. Since the PP in addition fails to outrank the subject, Bresnan’s account predicts a cross-over effect here, counter to fact.

Finally, to account for scrambling of adjuncts (Frey and Pittner 1998), additional assumptions would have to be invoked. Frey and Pittner themselves argue for a trace-based analysis of argument and adjunct scrambling and assign different classes of adjuncts different base-positions. A straightforward translation of this into LFG would be to assume that there is a hierarchy of adjunct grammatical functions, but allowing caseless adjuncts to scramble would threaten the idea of function identification on the basis of case.

The LFG account just sketched highlights an important question: What is the conditioning factor licensing scrambling? Under the LFG account, freedom in word order is tied to the availability of function specification either via head marking (not discussed above), i.e., agreement on the verb, or dependent marking, (42). Under this theory, a language requires sufficiently differentiated case morphology to allow scrambling. The same intuition is expressed by Neeleman and Weerman (1999). In their account case is always expressed as a syntactic head, but when this head fails to be expressed through a morphological case paradigm, it is subject to the Empty Category Principle. The Empty

Category Principle, according to Neeleman and Weerman (1999), derives case adjacency effects in languages like English and the possibility to scramble in languages with overt case morphology.

The truth of this correlation between case morphology and scrambling has been questioned. Dutch is often cited as a counterexample to the claim that rich case paradigms are a necessary condition for scrambling, since Dutch has no morphological case marking on full nominals yet allows a certain degree of word-order freedom in its *Mittelfeld*. This word-order freedom, which is also called scrambling in the literature, is much more restricted than scrambling in German; Dutch scrambling generally cannot permute arguments with each other but only arguments with adjuncts. When arguments *are* permuted in the Dutch *Mittelfeld*, the scope and binding patterns closely resemble those found in long-distance *wh*-extractions (Neeleman 1994), i.e., scope reconstruction is obligatory and weak-crossover effects do obtain. Dutch therefore does not seem to exhibit scrambling of the type found in German, Japanese, Hindi, and Persian; crucially, it also does not show morphological case. Nevertheless, the connection between scrambling and case has recently been called into question by Putnam (2007), who claims that some of the German heritage dialects of North America allow scrambling of the German type even in the absence of case morphology. Unfortunately, the examples provided by Putnam (2007) do not establish the point clearly.

A different connection that has been made, but which is not expressed in the LFG account of scrambling, is one between head-finality and the availability of scrambling. Haider (1997, 2006), and Riemsdijk and Corver (1997) among others claim that head-finality is a prerequisite for scrambling. In German for example, scrambling is possible only in head-final phrases (verb phrases, the *Mittelfeld*, adjective phrases), but it is impossible in head initial ones (noun phrases). The following examples from Haider (2006: 206) illustrate this point.

- (47) a. [_{VP} Dem Subject den erste-n Platz [German]
 the.DAT.SG.N subject the.ACC.SG.M first-ACC.SG.M position
 streitig gemacht] hat das Objekt.
 contested made has the.NOM.SG.N object
 ‘The object has competed for the first position with the subject.’
- b. [_{VP} Den erste-n Platz_i dem Subjekt e_i *streitig*
 the.ACC.SG.M first-ACC.SG.M position the.DAT.SG.N subject contested
 gemacht] hat das Objekt.
 made has the.NOM.SG.N object.
 ‘The object has competed with the subject for the first position.’
- (48) a. *der* [_{AP} *dem* *Briefträger in vielen Merkmalen* [German]
 the.NOM.SG.M the.DAT.SG.M postman in many features
 nicht unähnliche] Sohn der Nachbarin
 not dissimilar son the.GEN.SG.F neighbour.F
 ‘the son of the neighbor resembling the postman in many features’
- b. *der* [_{AP} *in vielen Merkmalen dem* *Briefträger nicht*
 the.NOM.SG.M in many features the.DAT.SG.M postman not
 unähnliche] Sohn der Nachbarin
 dissimilar son the.GEN.SG.F neighbor.F
 ‘the son of the neighbor resembling the postman in many features’

The same is claimed to be true in a cross-linguistic perspective. According to the authors just mentioned, scrambling occurs only in head-final languages. There are superficial counterexamples to this claim (e.g., Russian and some of the other Slavonic languages). Riemsdijk and Corver (1997) limit the scope of their claim to *neutral* scrambling, that is, scrambling which does not require the scrambled element to be interpreted as focal, contrastive, or topical, and claim that once this is taken into account, the generalization that scrambling is possible only in head-final structures is correct. Another potential counterexample is Yiddish. Yiddish is often analyzed as basically VO (Diesing 1997 a.o.), but it does allow scrambling. The analysis of the basic word order in Yiddish remains disputed (Haider and Rosengren 2003; Vikner 2001).

While both case and head directionality may well play a role in licensing scrambling, the issue needs to be investigated further.

7. Word-order domains: HPSG

The last type of account to be considered here are ones that do not involve movement and that abandon the Nontangling Condition. Most work of this type has been done in the tradition of HPSG (for German see for example Kathol 2000; S. Müller 2004; Reape 1994, 1996). The account rests on a clean separation between hierarchical and linear information. Earlier work that separated out statements about immediate dominance from those concerning linear precedence (see a.o. Falk 1983; Gazdar 1981; Gazdar et al. 1985; Sag 1987) had maintained the Nontangling Condition, but it is given up under Reape's concept of word-order domain. The central idea behind word-order domains is the claim that in certain domains, hierarchical structure and word order are independent of each other: the structure is hierarchically organized, but ordering proceeds as if on a flat structure.

Reape first introduces a relation called *domain union* and notated '○'. Domain union is related to the *shuffle* operator of formal language theory. Intuitively, two lists stand in the domain union relation to a third list if all and only the elements from the first two lists occur in the third list, and if the relative order of elements in the first list is observed in the third list and the relative order of elements in the second list is also observed in the third list; thus, the two lists in (49) stand in the domain union relation to those in (49a) but not to those in (49b).

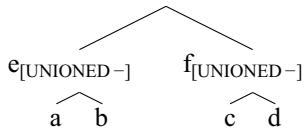
- (49) $\langle a, b \rangle \circ \langle c, d \rangle$
- | | |
|---------------------------------|---------------------------------|
| a. $\langle a, b, c, d \rangle$ | b. $\langle b, a, c, d \rangle$ |
| $\langle a, c, b, d \rangle$ | $\langle b, c, d, a \rangle$ |
| $\langle a, c, d, b \rangle$ | $\langle b, c, a, d \rangle$ |
| $\langle c, a, b, d \rangle$ | $\langle a, b, d, c \rangle$ |
| $\langle c, a, d, b \rangle$ | $\langle d, a, b, c \rangle$ |
| $\langle c, d, a, b \rangle$ | $\langle b, a, d, c \rangle$ |
| | $\langle a, b, c, d, e \rangle$ |
| | $\langle a, b \rangle$ |
| | $\langle a, d \rangle$ |
| | ... |

The idea is now that each node in a tree is associated with an ordered list of elements representing the order of words under that node. The lists associated with sisters in a local tree are not concatenated, as in standard approaches, but shuffled together. An additional feature on a constituent ($[UNIONED\pm]$) is used to control whether that constituent may or may not be linearized discontinuously. Constituents that are $[UNIONED-]$ are also called compacted, since they behave as an unbreakable unit with respect to material higher up in the structure. Constituents that are $[UNIONED+]$ are also called liberating, because material in liberating domains is free to interleave with material from higher domains.

All constituents in the structure in (50) are compacted; therefore, this structure obeys the Nontangling Condition and allows only the linearizations in (50a–d). If one of the constituents is liberating, as in (51), the additional possibilities in (51e–h) obtain. Finally, if both e and f are liberating all orders become possible in principle. Structures with constituents that are liberating may violate the Nontangling Condition. (Fox and Pesetsky's 2005 notion of cyclic linearization and linearization domains has certain similarities to Reape's domain union operator with liberating domains. Unlike Reape, Fox, and Pesetsky assume non-tangling trees, however. For discussion of Fox and Pesetsky 2005 see the other papers in that volume of *Theoretical Linguistics*.)

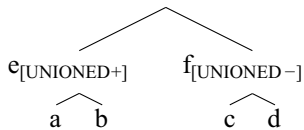
With this technology in place, Reape (1994) can easily analyze a sentence like (4d). He assigns the example the syntactic structure in Figure 40.2 and assumes the linear precedence constraints that NP precedes V, that a verb follows any verb that it governs, and that all the VPs in Figure 40.2 are liberating.

(50)



- a. $\langle a, b, c, d \rangle$
- b. $\langle b, a, c, d \rangle$
- c. $\langle a, b, d, c \rangle$
- d. $\langle b, a, d, c \rangle$

(51)



- a. $\langle a, b, c, d \rangle$
- b. $\langle b, a, c, d \rangle$
- c. $\langle a, b, d, c \rangle$
- d. $\langle b, a, d, c \rangle$
- e. $\langle a, c, d, b \rangle$
- f. $\langle a, d, c, b \rangle$
- g. $\langle b, c, d, a \rangle$
- h. $\langle b, d, c, a \rangle$

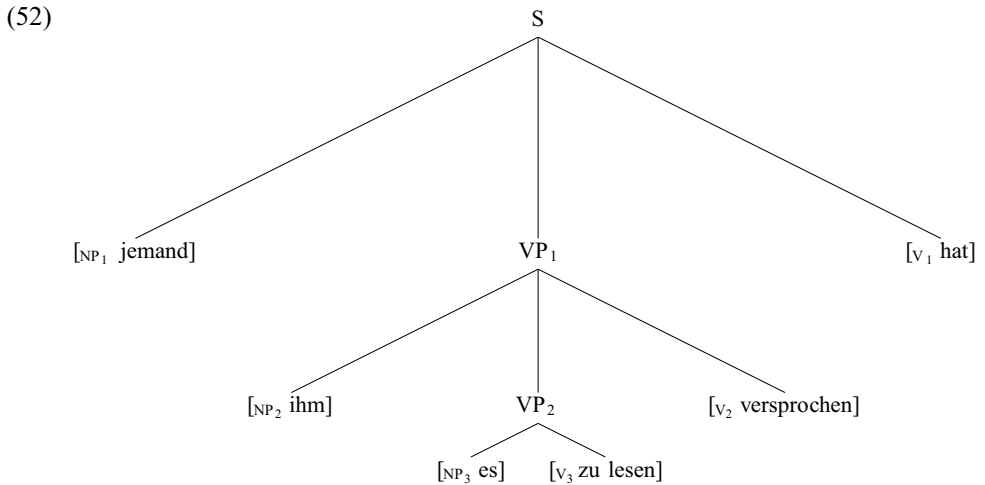


Fig. 40.2: Reape's structure for example (4d)

NP precedes V forces all the verbs in Figure 40.2 to appear right peripherally, *a verb follows any verb that it governs* forces the verbs in Figure 40.2. to appear in the order *zu lesen versprochen hat*, and the assumptions that the VPs are liberating allows all six conceivable relative orders of the NPs, among them, the order found in (4d).

The example in (4d) and the tree in Figure 40.2 are Reape's but they simplify the more nuanced use of word-order domains to account for word order in the *Mittelfeld* in HPSG considerably. The reason is that (4d) exemplifies two properties of German that have been subject to intense scrutiny: clustering of the verbs *zu lesen versprochen hat* and scrambling of the arguments *es ihm jemand*. (Hinterhölzl 2006 provides a recent book-length exploration of possible connections between these properties.) Reape treats both of these phenomena in terms of word-order domains. It is standard practice in HPSG now to assume the generalized raising analysis of Hinrichs and Nakazawa (1989, 1994) for verb clustering. Under Hinrichs and Nakazawa's analysis verbs in the cluster may inherit the argument-taking properties from their complements. The topmost verb then takes as its own arguments the arguments from all the embedded verbs in the cluster.

If this analysis is combined with a flat phrase structure for the *Mittelfeld*, there is no need to invoke word-order domains for argument reordering. This can be achieved by run-off-the-mill linear precedence constraints. Even under this set of assumptions, word-order domains might still have a role in accounting for scrambling under preposition stranding, (53), or scrambling from AP, (54).

- (53) a. *weil offenbar niemand damit gerechnet hat* [German]
 because apparently nobody there.with reckoned has
 'because apparently nobody expected that'
- b. *weil da offenbar niemand mit gerechnet hat*
 because there apparently nobody with reckoned has
 'because apparently nobody expected that'

- (54) a. *dass auf jeden Jungen_i sein_i Vater sehr stolz war* [German]
 that of every boy his father very proud was
 ‘that his_i father was very proud of every boy_i’
- b. *dass auf mindestens einen Jungen fast jeder Mann sehr stolz war*
 that of at.least one boy almost every man very proud was
 ‘that at least one man was very proud of almost every boy’ $(\exists \gg \forall, \forall \gg \exists)$

As mentioned at the outset, the central idea behind word-order domains is the claim that in liberating domains, hierarchical structure and word order are independent of each other: the structure is hierarchically organized, but ordering proceeds as if on a flat structure. Under such an approach, the nominal and fully-clausal arguments of verbs are treated as compacting domains, to guarantee their linear coherence. The *Mittelfeld* itself is made up of (possibly several layered) liberating domains. The linearization rules guarantee that verbs follow their arguments and that verbs are linearized correctly with respect to each other. The linearization rules do not regulate the order of arguments with respect to each other, however.

It should be noted that to the extent that finer grained, more parochial linearization rules are needed, these can be added. For example, it is a commonly held assumption that weak pronouns in the *Mittelfeld* are strictly ordered with respect to each other and with respect to other arguments. This refinement is often expressed by invoking dedicated positions to which these pronouns move, but it can also be expressed in terms of specific linear-precedence rules.

Independently of the details of phrase structure assumed, this system allows a very compact statement of the generalizations concerning linear order. Scrambling is simply the result of the fact that the domain union operator may allow associating various strings with the same hierarchical organization. This has the great advantage that, for example, information structure annotations can be accessed directly by linear precedence rules.

As discussed above, scrambling has effects on scope and binding relations. Obviously, an adequate theory of scrambling that uses word-order domains cannot define scope and binding strictly in hierarchical terms, since the hierarchical organization of scrambled and unscrambled clauses is identical. Rather, it is necessary to formulate theories of binding and scope that are sensitive directly to linear order. Kathol (2000) proposes a theory of variable binding whose linear aspects are similar to the LFG proposal discussed above. As pointed out above, Bresnan (1998, 2001) assumes that when binding is not determined by the surface linear order, it is determined by rank on the relational hierarchy of grammatical functions at f-structure. Kathol (2000) (following Frank, Lee, and Rambow 1992; Frey 1993; Lechner 1998 empirically) instead assumes that binding can be determined by linear order of co-dependents, but that the subject may bind into its co-dependents even when it follows them.

Similarly to the analyses previously discussed, a touchstone of this analysis is its ability to handle scrambling from NP, as in example (25). S. Müller (1997) argues that a simple extension of the idea that scrambling domains are liberating domains runs into difficulties with scrambling from NP, (25), and from AP. Treating NPs as liberating domains would give rise to the wrong prediction that material can be scrambled in between the determiner and the noun, (55b).

- (55) a. *dass dem Subjekt das Objekt den* [German]
 that the.DAT.SG.N subject the.NOM.SG.N object the.ACC.SG.M
erste-n Platz streitig macht
 first-ACC.SG.M place contested makes
 ‘that the object competes with the subject for the initial place’
- b. **dass das dem Subjekt Objekt den*
 that the.NOM.SG.N the.DAT.SG.N subject object the.ACC.SG.M
erste-n Platz streitig macht
 first-ACC.SG.M place contested makes

Similar overgeneration problems arise for scrambling from AP.

S. Müller (1997, 1999) suggests to treat scrambling as extraction into the *Mittelfeld*, i.e., he suggests to extend the HPSG mechanism for long-distance filler-gap dependencies to cover these cases. de Kuthy (2002) disagrees and suggests instead to extend the scope of Hinrichs and Nakazawa (1989, 1994) generalized raising analysis to cover the cases of scrambling from NP. A treatment which could also be extended to APs, as already mentioned in passing in S. Müller (1997). The question discussed in these papers is which of the mechanisms provided by HPSG should be extended to cover scrambling, the mechanism responsible for *wh*-movement constructions or the one responsible for raising. This question bears a great similarity to the debate on the A- vs. \bar{A} -nature of scrambling, which is not accidental.

Similarly, the fact that binding is possible from the scrambled position when scrambling removes a PP from an NP, (25), is problematic for Kathol’s formulation of the crossover constraint, as the PP and argument into which it binds are not co-dependents.

8. Scope

Although we have seen that all existing theories of scrambling wrestle with certain questions and run into problems with the same types of constructions, a direct comparison remains difficult. Too much depends on ancillary assumptions about binding, scope, prosody, etc.

Nevertheless, Fanselow (2001) and Kiss (2001) claim that the interaction of scope with scrambling provides an argument against the trace-based account.

As shown above, trace-based accounts have a relatively easy time with the prediction that the unmarked order is unambiguous while scrambled orders are ambiguous. This is, because the unmarked order can be directly generated and in it every argument is associated with a unique hierarchical position in the phrase structure. Scope can then be read off the *c*-command relations directly. In scrambled word orders on the other hand, the scrambled arguments are associated (via copies or traces) with multiple positions in the phrase structure tree. If a quantificational element has scrambled across another quantificational element, the first *c*-commands the latter on the surface and the latter *c*-commands the trace of the former. Allowing the scoping mechanism to make reference to either of the positions associated with a scrambled element will then derive ambiguities between two quantificational expressions just in case one has scrambled across another. The idea of reconstruction to a trace position is, despite all differences, at the

heart of all trace-based accounts of scope determination (see in particular Frey 1993; Haider 1993; Haider and Rosengren 2003; Lechner 1996, 1998). While there is some disagreement in the literature on the question whether all (e.g., Frey 1993; Haider 1993; Kiss 2001) or only some (Lechner 1996, 1998; Pafel 1993) quantifiers, namely the weak ones, may take non-surface scope under scrambling, we can ignore this complication here.

Fanselow's and Kiss's argument against trace-based accounts rests on the claim that they overgenerate readings. Consider example (56) (Kiss 2001: 146). The example features scrambled indirect and direct objects preceding the subject. The order amongst the objects is the same as in the neutral order, which for the verb *anbieten* – 'offer' is S > IO > DO. A schematic representation of the structure of this example under a trace-based account of scrambling is given in (56a). Since, under the trace-based account of reconstruction, IO and DO can reconstruct independently of each other to their respective trace positions, the account predicts a scopal ambiguity between IO and DO. IO will take scope over DO if (i) both objects are interpreted in their surface position, or if (ii) DO (but not IO) reconstructs, or if (iii) both IO and DO reconstruct. In case only IO but not DO reconstructs, scope reversal results. Fanselow (2001) and Kiss (2001) claim that in examples like these, the relevant reading (and a number of expected readings with three quantificational expressions in scrambling structures) are, in fact, absent. Both of them use this as an argument for a traceless account of scrambling.

- (56) *Ich glaube, dass mindestens ein-em Verleger fast [German]*
 I believe that at.least one-DAT.SG.M publisher almost
jed-es Gedicht nur dies-er Dichter angeboten hat.
 every-ACC.SG.N poem only this-NOM.SG.M poet offered has
 'I believe that only this poet has offered at least one publisher almost every poem.'

- a. [C⁰ [IO [DO [S [t_{IO} [t_{DO} V]]]]]]]
 b. [C⁰ [IO [DO [S V]]]]

Kiss (2001) assumes a phrase structure very similar to the one sketched above in the discussion of the LFG account of scrambling, (56b). He argues for a theory of scope whereby scope is either determined configurationally or relationally. The relevant configurational notion is, very roughly, c-command; the relational notion – the obliqueness hierarchy. A quantifier may either take its sister in its scope or it may take scope according to its position on the obliqueness hierarchy. If the latter, that element's scope relations are fixed with respect to all other elements according to obliqueness; no other element can take configurational scope with respect to it. Since IO and DO are arguments of the same verb, they are co-dependents. IO can take DO in its scope in two ways in (56b), configurationally, because DO is contained in IO's sister and hence in its configurational scope, or relationally, because DO is a more oblique co-dependent. DO on the other hand cannot take IO in its scope, because IO is not contained in DO's configurational scope and it is *less* rather than more oblique. While the case of three quantifiers cannot be discussed without presenting a fair amount of Kiss's technical apparatus, the upshot of the analysis is that non-surface scope construals come about by giving a quantifier scope over all more oblique co-dependents.

Cook and Payne (2006) claim that Kiss's characterization of scope is inherently disjunctive, and thereby non-explanatory. They diagnose a disjunction because for a given quantifier scope is determined on the basis of prominence either in the phrase-structure or on the argument hierarchy.

Kiss's and Fanselow's argument is relatively simple and undermines an important support of the trace-based account. Unfortunately, the facts are less than clear. Frey (1993: 188) gives an example which is identical in relevant structural properties to (56) and claims that it is ambiguous. Further empirical work should be able to shed more light on this question.

9. Conclusion

This chapter has argued for a structural, syntactic approach to scrambling and discussed a number of different approaches to the phenomenon.

Word order alternations in languages that are usually dubbed non-configurational were set aside at the beginning. In these languages, word order freedom is more extreme than in scrambling languages like German and, crucially, the word order alternations provide no or very little evidence of being structural. The language of this type most frequently discussed in the formal literature is Warlpiri, a Pama-Nyungan language of Australia.

Warlpiri has a set of auxiliaries that occupy the second clausal position, but the relative position of other elements in the clause is not fixed. This is illustrated in (57) from Legate (2002: 16–17) based on Hale (1983: 6–7).

- (57) a. *Ngarrka-ngku ka wawirri panti-rni.* [Warlpiri]
 man-ERG PRS.IPFV kangaroo spear-NPST
 'The man is spearing the kangaroo.'
- b. *Wawirri ka panti-rni ngarrka-ngku.*
 kangaroo PRS.IPFV spear-NPST man-ERG
- c. *Panti-rni ka ngarrka-ngku wawirri.*
 spear-NPST PRS.IPFV man-ERG kangaroo
- d. *Ngarrka-ngku ka panti-rni wawirri.*
 man-ERG PRS.IPFV spear-NPST kangaroo
- e. *Panti-rni ka wawirri ngarrka-ngku.*
 spear-NPST PRS.IPFV kangaroo man-ERG
- f. *Wawirri ka ngarrka-ngku panti-rni.*
 kangaroo PRS.IPFV man-ERG spear-NPST

Warlpiri also allows constituents to split, (58) (Hale 1983: 6), and arguments of the verb to remain unpronounced altogether (Hale 1983: 7). (It should be noted that, as argued in Austin and Bresnan 1996, these properties do not necessarily co-occur.)

- (58) a. *Wawirri yalumpu kapi-rna panti-rni.* [Warlpiri]
 kangaroo that AUX spear-NPST
 'I will spear that kangaroo.'
- b. *Wawirri kapi-rna panti-rni yalumpu.*
 kangaroo AUX spear-NPST that
- (59) *Panti-rni ka.* [Warlpiri]
 spear-NPST PRS.IPFV
 'He/she is spearing him/her/it.'

Now, the question of whether the word order alternations in (57) are syntactic in the sense of section 3 of this chapter is usually answered in the negative (see Hale 1994). The reason for this is that (non-)coreference between elements seems to be fixed independently of the order of elements; we do not find cross-over effects, condition C effects hold or do not hold independently of the order of elements, and familiar subject/object asymmetries are usually claimed to be absent. (A similar state of affairs is discussed for the Hungarian VP in É. Kiss 1987, 1994. Note though that the data available for Warlpiri are much less detailed than for better-studied languages and many of the conclusions must therefore remain tentative.)

The difference between a structural operation of scrambling and apparently non-structural word-order permutations in non-configurational languages provides a *prima facie* argument for treating non-configurationality in a substantially different way from scrambling. Not surprisingly then, a number of proposals have been made according to which the syntax of non-configurational languages differs quite dramatically from that of configurational languages. One tradition (Austin and Bresnan 1996; Bresnan 2001; Hale 1983) assumes that non-configurational languages possess a flat, n-ary branching surface syntactic representation that, in particular, does not contain a VP-node, which would include verb and object to the exclusion of the subject. Another tradition, going back to Jelinek (1984) assumes that noun phrases in non-configurational languages never occupy argument positions of the verb but are adjuncts that semantically modify (null or clitic) pronouns, which are the actual arguments of the verb.

Not all researchers have found the *prima facie* argument entirely convincing, though. They have instead tried to account for the word order in non-configurational languages using the tools already available for the analysis of scrambling in the sense of this chapter and of other displacement phenomena. Thus, Donohue and Sag (1999) sketch an approach to word-order in Warlpiri using Reape-style domain union, while Legate (2002, 2003) suggests that a particular combination of movement operations needed independently in the analysis of configurational languages can provide an analysis for Warlpiri.

To determine whether the *prima facie* argument for a distinct system of non-configurational word-order alternations stands up, much more detailed work on the relevant languages will be necessary.

Besides arguing for a structural approach to scrambling, this chapter has provided an overview of the main approaches to the syntactic structures and processes underlying scrambling. Despite many differences between the approaches a number of convergent themes emerge. The noncanonical cases of scrambling, that is, scrambling from NP, AP, and PP, pose unsolved difficulties for almost all theories. Partly, the difficulties stem

from the urge to assimilate scrambling to established phenomena, partly, they stem from the concepts of locality for binding relations. The issue of a trigger for movement was highlighted, as was the question of what the crosslinguistic correlates of scrambling are. The final section on Fanselow's (2001) and Kiss's (2001) argument from scope suggests that, 40 years after Ross set aside scrambling as too different from other syntactic rules even to be considered syntax, enough progress has been made so that scrambling can begin to inform theory in earnest.

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