Order and the Coordinate Structure Constraint*

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Abstract

This paper analyzes apparent violations of Ross's 1967 Coordinate Structure Constraint in German. It links the violation to a property inherent in such coordinations (Höhle 1983, 1990): A subject gap in all coordinates but the first. We argue that the subject is shared between the coordinates and undergoes covert Across-the-Board movement. To account for the violation the following assumptions are made: First, order is computed in the narrow syntactic component. Second, covert Across-the-Board movement induces order among the coordinates. Lastly, the Coordinate Structure Constraint allows movement from one coordinate alone, if the coordinates are ordered.

Keywords: Coordinate Structure Constraint, covert Across-the-Board movement, German coordination, linearization, multiple dominance

1 Introduction

1.1 The phenomenon

Extraction from coordinations is known to be ungrammatical unless it takes place from all coordinates *Across-the-Board* (ATB). This restriction is generally referred

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to as the *Coordinate Structure Constraint* (CSC). In the grammatical (1a), extraction from the coordinate structure is ATB, whereas in the ungrammatical (1b) it is not, thus violating the CSC.

(1) a. What$_1$ did John [buy t_1] and [read t_1]?
b. *What$_1$ did John [buy t_1] and [read the magazine]?

A fairly well-known type of coordination that is found in some Germanic languages contradicts this generalization, since it apparently allows for a violation of the CSC. The present paper is concerned with this phenomenon in its German variety, which has been called *Subjektlücke in finiten Sätzen* ('subject lacking in finite clauses') by Höhle (1983, 1990), henceforth SLF. The term makes reference to a subject gap which occurs in all coordinates but the first (2). In the following, boldface indicates the correlate of the gap in the first coordinate (C1), the gap itself is designated by a line. The coordinates are in brackets. We depart from this convention only if they could be misleading in the discussion. For reasons of simplicity, we will mainly consider structures with only two coordinates.

The CSC-violating property of SLF is referred to as *asymmetric extraction* (AE), since material can be extracted from C1 of a coordination only, as in (2) (Höhle 1983, 1990). (3) shows that AE involves movement to a position above the site of coordination.[1] The extraction site is embedded, as the subjunctive morphology on the finite verb indicates.[2]

(2) Den Hund$_1$ [hat **er** t_1 gefüttert] und [wird __ jetzt essen gehen]
the dog has he fed and will now eat go
'The dog, he fed it and he will now eat.'

(3) Den Hund$_1$ hat er geglaubt [habe **sie** t_1 gefüttert] und [würde __ essen gehen]
the dog has he believed has she fed and would eat go
'The dog, he believed that she fed it and that she would eat.'

The CSC in (4), following Ross (1967) and Williams (1978), is clearly violated in the examples above, as material does not move in ATB-fashion, but from C1 only.

(4) *Coordinate Structure Constraint*
In a coordinate structure, no coordinate may be moved, nor may any ele-

[1] This does not follow straightforwardly from (2), where movement of the object could be analyzed as movement within C1 (Schwarz 1998).

[2] From now on, we will consistently use the subjunctive on embedded verbs and omit its indication in the glosses.

ment contained in a coordinate be moved out of that coordinate unless it moves from all coordinates.

Apart from the violation of the CSC, the most striking feature of SLF is that the subject of C1 cannot be straightforwardly compositionally related to the second coordinate (C2). In standard theories the V2-property of German places the finite verb in C (den Besten 1983).[3] Hence, C2 must be at least a big as C'. In (2)-(3), there is no obvious way in which the subject ATB-moves to its surface position, if the standard V2-analysis is accepted and coordination is symmetric – i.e. if C's are coordinated.[4] If this latter assumption can be shown to hold, the subject of C1 is below the site of coordination and cannot access C2 directly. The structural problem is schematized in (5).

(5) $[_{CP}\ Obj_1\ [_{C'}\ V_{fin}\ [_{TP}\ Subj\ ...\ t_1\ ...]]\ \&\ [_{C'}\ V_{fin}\ [_{TP}\ gap_{subject}\ ...]]]$

SLF thus have two properties that need to be accounted for: on the one hand, the CSC is violated by movement from C1 alone. On the other hand, the subject gap in C2 cannot be directly related to the subject in C1. Importantly, these two properties are linked: (6) minimally differs from (3) in that C2 has an overt subject. In this case AE is impossible.[5]

(6) *Den Hund$_1$ hat er geglaubt [habe sie t_1 gefüttert] und [würden wir essen gehen]
the dog has he thought has she fed and will we eat go

Our conjecture is that the explanation for AE in SLF should fall out automatically from the correct analysis of the subject gap.

[3]Contrary to Travis (1984), Zwart (1997).

[4]It must also be noted that no element can precede the finite verb in C2 of SLF, as is shown in (i). This has the consequence that C2 is also not bigger than C'. I.e. anticipating the conclusion from section 2.2, C2 in SLF is equal to C'.

(i) a. *Die Katze$_1$ hat **Hans** t_1 gestreichelt und barfuß wird __ den Hund treten
the cat has Hans stroked and barefoot will the dog kick
b. *Die Katze$_1$ hat **Hans** t_1 gestreichelt und den Hund$_2$ wird __ t_2 treten
the cat has Hans stroked and the dog will kick

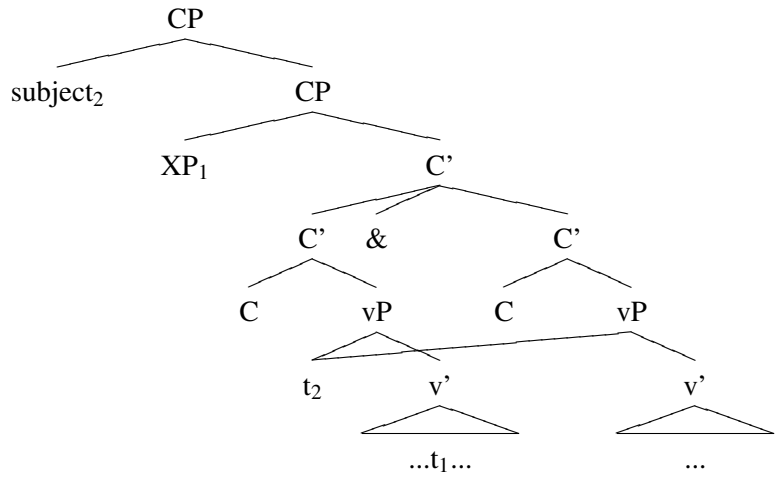
[5]We do not distinguish between finer-grained grammaticality judgments. Only truly ungrammatical examples are marked *.

1.2 Preview of the theory and outline of the paper

Section 2 presents the basic problem of SLF in greater detail. AE and ATB are shown to be in complementary distribution, AE being possible only if a subject gap is present in C2. The subject gap is shown to co-vary with the subject in C1. The relation between the former and the latter yields a structural problem, since C2 is argued to be a C'-coordinate joined with another C'-coordinate. Further, the violation of the CSC in SLF is real, as new data show that SLF are coordinate structures and not subordinate structures.

Section 3 argues that the subject gap in SLF is the result of covert ATB-movement of the subject. The input to any type of ATB-movement is taken to be sharing under multidominance (MD) of the moved element. The subject is thus dominated by nodes in C1 and in C2, and moved out of the coordinate structure covertly as in (7).[6] This ATB-theory of subject-gaps predicts that object gaps should exist, which we proceed to show. Hitherto their existence has not been acknowledged in the literature.[7]

(7)



In section 4 we present a phase-based theory that can linearize covert ATB-movement. We argue that order statements are established upon merge. Spell Out (S-O), in this

[6]We assume a ternary branching parallel structure as in (7). As will become evident below, however, something non-trivial must be said about the linearization of these structures. A binary branching structure as in Munn (1993) and Kayne (1994) is incompatible with certain claims that we make below.

[7]The TP-level is ignored, when we discuss our own proposal, because we claim that the subject stays *in situ*. We will return to this issue in section 6. We will also pretend that auxiliaries are base-generated in C, although strictly speaking they move there. This is done to keep the order derivations simple.

system, freezes the order statements established during the derivation. An inferential system runs in parallel to the merge procedure and determines the maximally consistent overall order based on these statements. If material is shared and linearized *in situ*, the inferential system deduces that the sisters of the shared material will be ordered relatively to each other. This, in turn, will determine the order of the coordinates. Since covert ATB-movement correlates with the possibility of AE, we argue that it is the order of the coordinates that the CSC is sensitive to. We thus formulate the CSC on overt movement as a constraint which treats ordered coordinates as one structure, so that movement can be AE. When the order of the coordinates is not determined, movement from the coordinate structure must be ATB.

In section 5 we discuss the consequences of our formulation of the CSC. It is a constraint distinct from specific conditions on ATB-movement. We show that the latter explain a set of data that is not touched upon by the CSC. Further, the CSC proposed is a constraint on movement that manipulates order alone. We propose a general CSC, which applies to order-manipulating as well as scope-manipulating movement. Section 6 summarizes our findings and addresses the predictions of the proposal as well as potential problems.

2 The structure of SLF

2.1 AE and ATB are in complementary distribution

The preceding section showed that AE is only possible if C2 does not have an overt subject. The picture, however, is more intricate than this. (8) and (9) show that AE and ATB are in complementary distribution in German. Non-SLF cases only allow ATB-movement (8a), but not AE (8b). SLF-constructions, on the other hand, allow only AE (9b), but not ATB-movement (9a).[8]

(8) a. Dieses Brot$_1$ [hat er t_1 gebacken] und [werde ich t_1 essen]
this bread has he baked and will I eat
'This bread, he baked it and I will eat it.'

b. *Dieses Brot$_1$ [hat er t_1 gebacken] und [werde ich die Suppe kochen]
this bread has he baked and will I the soup cook

(9) a. *Dieses Brot$_1$ [hat **er** t_1 gebacken] und [wird __ t_1 essen]
this bread has he baked and will eat

[8]See also Büring and Hartmann (1998) and Reich (2007) for related observations. However, to the best of our knowledge, the distribution has not been stated in its entirety and in this clarity yet.

b. Dieses Brot$_1$ [hat **er** t$_1$ gebacken] und [wird __ die Suppe kochen]
this bread has he baked and will the soup cook
'This bread, he baked it and will eat the soup.'

The presence of a subject gap thus makes AE possible, and at the same time blocks the application of ATB-movement. This link between the subject gap and the possibility of AE indicates that SLF and non-SLF coordinations must be structurally distinct. The question central to this paper is therefore why the presence of the subject gap allows for AE and at the same time prevents a process usually found in coordination, namely ATB-movement.

It should be noted, in this context, that if the subject gap in C2 of SLF were merely the result of phonological deletion of an independent subject – i.e. ellipsis (Schwarz (1998), Wilder (1997), Zwart (1991)) – the possibility of AE could not be tied to the subject gap. Further, such an account can be shown to be untenable since subject gaps in SLF lack the properties usually found in ellipsis. One such property of ellipsis is that non-referential DPs can receive independent interpretations for each of the coordinates they are contained in. The English example of VP-ellipsis in (10) exhibits this behavior. (10) allows a reading, where John and Bill did not kiss the same girl.

(10) John kissed some girl, and Bill did, too.

In the case of SLF, however, an indefinite subject such as *einer* 'someone' in (11a) can never be interpreted independently in C1 and C2. Sentence (11a) does not allow the reading in (11b). We conclude that no independent subject is present in C2 in SLF. Therefore ellipsis is uncalled for, since the only reading available for the subject gap is one where it co-varies with the subject of C1, i.e. a bound-variable reading (Büring and Hartmann (1998), Lechner (2000), Van Valin (1986)). One of the questions that will have to be answered, is how this reading can arise.

(11) a. Die Katze$_1$ [hat **einer** t$_1$ gestreichelt] und [wird __ den Hund
the cat has someone stroked and will the dog
treten]
kick
'The cat, someone stroked it and will kick the dog.'
b. ≠ 'Someone stroked the cat and someone (else) will kick the dog.'

2.2 SLF are C'-coordinations

It is hardly surprising that existing accounts of SLF try to void the analytical problems tied to AE and the subject gap. On the one hand, it has been proposed that

SLF are subordinate, rather than coordinate structures and thus do not exhibit a violation of the CSC. On the other hand, it has been argued that the subject gap in C2 can in fact be straightforwardly linked to the subject in C1, by assuming that coordination is lower than C'. In the following, we will refute both proposals, arguing that the analytical problems raised by SLF are real.

Consider first the problem of the subject gap. Above, we claimed that SLF involve coordination of C's, thus yielding the problem that the subject of C1 cannot be directly related to the subject gap in C2. The structural puzzle is repeated in (12).

(12) $[_{CP}\ \text{Obj}_1\ [_{C'}\ V_{fin}\ [_{TP}\ \text{Subj}\ ...\ t_1\ ...]]\ \&\ [_{C'}\ V_{fin}\ [_{TP}\ \text{gap}_{subject}\ ...]]]$

Clearly, if the site of attachment of C2 were below C' of C1, the subject of C1 would be directly accessible by C2. Büring and Hartmann (1998) claim that C2 is a full-blown CP which is adjoined to C1 below the position of the subject in C1. Johnson (2002) argues that C2 equals a smaller constituent – in essence a vP – and that the finite verb in C2 never moves to C, but rather to an additional position within vP. What these two approaches have in common is that the puzzle in (12) does not arise.

For the present discussion we take the structure in (13) to stand in for the types of analyses mentioned in the previous paragraph. The overt subject c-commands both a variable in VP of C1 and the subject position inside C2. We use *x* to indicate both positions so as to not commit ourselves to any claim, whether the subject has to actually move to Spec,TP.

(13) $[_{CP}\ \text{Obj}_1\ [_{C'}\ V_{fin}\ [_{TP}\ \text{Subj}_i\ [_{VP}\ [_{VP}\ ...\ x_i\ ...\ t_1\ ...]\ \&\ [_{C2}\ V_{fin}\ ...\ x_i\ ...]]]]]$

If (13) were the correct analysis, the presence of C2 low in the structure of C1 should not have an impact on processes above the coordination site. In particular, additional coordination at a point higher than VP should be possible.[9] Consider (14), where two TPs would be coordinated above VP. The second TP contains an independent subject. It should be clear that whatever prohibits movement from C2 cannot extend to TP. I.e. the CSC is predicted to be operative at the TP-level. Therefore ATB-movement of the object from both TPs and ATB-movement of the finite verb to C should occur. Nevertheless the structure is ungrammatical. It must be added that if one found a way to prohibit ATB-movement from the second TP, the structure would still be unacceptable, as can be seen by the ungrammaticality despite the presence of an object.

[9]The present argument evolved from an original observation due to Dominique Sportiche (personal communication) and criticism by Kyle Johnson (personal communication).

(14) *Den Hund$_1$ hat$_2$ [$_{TP}$ **der Hans** t$_1$ geschlagen t$_2$ [$_{C2}$ und wird die Katze
the dog has the Hans beaten and will the cat
quälen]] und [$_{TP}$ der Peter t$_1$/ das Pferd gebürstet t$_2$]
torture and the Peter the horse brushed

One might object that the ungrammaticality in (14) is due to the ATB-movement of the finite verb or a constraint that does not allow coordination of TPs. But as (15) shows, coordination of C's above VP is as impossible as (14). Again, both ATB-movement from both C's and no movement from the second C' result in ungrammaticality.

(15) *Den Hund$_1$ [$_{C'}$ hat **der Hans** t$_1$ geschlagen [$_{C2}$ und wird die Katze
the dog has the Hans beaten and will the cat
quälen]] und [$_{C'}$ hat der Peter t$_1$/ das Pferd gebürstet]
torture and has the Peter the horse brushed

No matter how we choose to relate the coordinate on the far right to the rest of the structure, ungrammaticality results, contrary to the predictions of the theories mentioned above. We thus consider (14) and (15) sufficient to rule out low coordination approaches[10] and maintain that SLF involve coordination of C'-coordinates.[11] This leaves us with the puzzle in (12).

It should also be noted that the main arguments that have been put forth in support of low coordination, namely, the scope of quantifiers in C1 with respect to the coordination or C2 are not valid. As observed in Büring and Hartmann (1998) and Sauerland (2000), object quantifiers in C1 of SLF-coordinations may scope over the coordination. The object quantifier in C1 of (16), for instance, can scope over the disjunction and bind a variable in C2, yielding the reading in (17).

(16) Heute hat **er** keinen Berg$_1$ bestiegen oder hat ihn$_1$ photographiert
today has he no mountain climbed or has him photographed
'Today, he climbed no mountain and photographed it.'

(17) ¬(he climbed a mountain) ∧ ¬(he took a picture of it)

At first sight, (17) seems to indicate that coordination must be below the site of the object quantifier in C1, since the latter can scope over the coordination and bind

[10]The analysis proposed in section 4, which employs high coordination and an ATB-account for the subject gap, straightforwardly derives (14) and (15).

[11]In addition to the data discussed above, a selectional restriction exists for SLF-structures, as observed in (Hallman 2004). If a verb selects for a declarative or an interrogative complementizer in C1, C2 cannot have V2 with a subject gap. This type of non-local selection is never attested with low coordination or adjunction. However, the analyses cited above would predict exactly this possibility. See Hallman (2004) for discussion.

a variable in C2. An alternative analysis of the data is that the object quantifier of C1 moves out of the coordination covertly and binds the variable in C2 from its derived position. Since cases like (16) are subject to the restrictions found on covert movement from coordinate structures, this analysis is to be preferred. As discussed in Fox (2000), if an element is to move out of a coordinate structure covertly, it can only do so if it binds a variable, i.e. a pronoun or a trace in C2. This requirement is fulfilled in (16). In (18), on the other hand (modeled after Sauerland's 2000 (16)), which forms a minimal pair with (16) above, C2 does not contain any such variable. As a result, the quantifier cannot scope over the disjunction, and only the surface scope reading is available (19).

(18) Heute hat **er** keinen Berg bestiegen oder hat den K2 photographiert
today has he no mountain climbed or has the K2 photographed
'Today, he climbed no mountain and photographed it.'

(19) ¬(Hans climbed a mountain) ∨ (Hans took a picture of the K2)

The contrast between (16) and (18) shows that the wide scope of the quantifier must be derived by movement, since movement restrictions are observed.[12] If C2 were below the quantified object, the variable in C2 should be optional: No movement of the object would have to occur and restrictions on covert movement from coordinate structures should not apply. Further, the object would always scope over the coordination and the reading in (19) would be impossible, contrary to fact. Thus, quantifier scope does not provide evidence for low coordination or adjunction and even shows that coordination must at least be higher than the quantified object.[13]

[12] Fox (2000) shows that in English QR out of a coordinate structure, just as any instance of QR, is subject to scope economy. The German examples discussed above do not exhibit this requirement, but this does not weaken the argument for movement, since scope economy is not obligatory in many cases of QR in German (Sauerland 2000).

[13] Another piece of evidence that has been used in support of low coordination concerns the scope of quantificational heads. Büring and Hartmann (1998) and Kyle Johnson (personal communication) argue that the fact that negation in C1 can scope over C2 in (ia) is a strong argument for low coordination, because negation is usually not assumed to be moveable. We strongly disagree with this conclusion, because the same result obtains when there is no subject gap and ATB-movement takes place as in (ib). We have nothing interesting to add about this fact, but just note that the possibility for wide scope of negation must be somehow connected to AE/ATB-movement of the object.

(i) a. Den Hund hat **sie** nicht gefüttert und hat ihn geschlagen
the dog has she not fed and has it hit
'She has neither fed the dog nor hit it.'
(Schwarz 1998:212)

b. Den Hund$_1$ hat **sie** nicht t_1 gefüttert und wird Peter t_1 schlagen
the dog has she not fed and will Peter hit
'Neither did she feed the dog, nor will Peter hit it.'

(16) and (18) are also relevant regarding the second important property of SLF, namely, the violation of the CSC. Büring and Hartmann (1998) assume that SLF in fact do not involve such a violation, since they are not coordinate, but rather subordinate structures. In their account, C1 is considered the matrix and it embeds C2 as an adjunct clause. No coordination is involved in this theory, hence the CSC is not expected to apply. Further, since C2 is treated as an adjunct, we get the immediate prediction that nothing can be extracted from it and AE, as it were, comes for free.

The first argument against such an analysis is that the contrast between (16) and (18) shows that covert movement from SLF adheres to restrictions typical of coordinate structures (Fox (2000), Ruys (1992)). A subordination account does not predict such restrictions at all, whereas they follow from a coordination analysis.

Furthermore, the assumption that C2 is an adjunct clause and that therefore nothing can be extracted from it is contradicted by (20). (20) shows that material can in fact move from the CPs embedded by C2, as the object *die Katze* is ATB-moved from the embedded coordination.[14] This ATB-movement also involves the object of C1 from which, so far, we have only seen AE.

(20) Das Pferd$_1$ [$_{C1}$ hat **er** t$_1$ gekauft] und [$_{C2}$ meinte __ [[hätte ich t$_1$
the horse has he bought and said have I
gequält] und [hättest du t$_1$ verwöhnt]]]
tortured and have you spoiled
'The horse, he bought and said that I tortured it and that you spoiled it.'

(20) shows that C2 is not a total island for movement and therefore falsifies the subordination account as formulated above, which predicts (20) to be ungrammati-

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The same line of argument can in fact be used against low coordination and in favor of high coordination. Consider another type of quantificational heads, modal verbs. As is shown in (ii), modals from C1 do not scope over the coordination. Given the structure in (13) the modal *muss* would falsely be predicted to do so, however. If C'-coordination is assumed, on the other hand, (ii) can be captured immediately.

(ii) Den Hund$_1$ muss **Hans** t$_1$ schlagen und wird sich hinlegen.
the dog must Hans hit and will REFL down-lie
'Hans must hit the dog and will lie down.'
$*$'It is necessary that Hans hits the dog and will lie down.'

[14] Adjunct clauses will prohibit extraction in this context, as shown by (i).

(i) *Welche Katze$_i$ hat Hans t$_1$ ausgesperrt [weil er glaubt dass sein Vater t$_i$ hasst und
which cat has Hans locked-out because he believes that his father hates and
seine Mutter t$_i$ zu oft füttert]
his mother too often feeds

cal. The coordination account, which makes no such prediction, is thus preferable. The fact that a coordinate structure embedded by C2 in (20) interacts with C1 in a way typical of coordinate structures, namely, by ATB-movement, is additional evidence for the hypothesis that SLF must be coordinate structures.

It also needs to be pointed out that (20) shows that the interaction of ATB-movement and the subject gap is local, in that the subject gap only blocks ATB-movement from the clause it occurs in. This latter fact is discussed extensively in Mayr and Schmitt (2008) in connection with embedded coordinations, to which we refer the reader.[15]

We conclude from this discussion that neither of the two properties of SLF can be rid of its analytical problems. First, the subject gap cannot be directly related to the subject in C1, since low coordination accounts cannot be maintained. Further, AE from SLF violates the CSC, since SLF are coordinate and not subordinate structures and thus must be subject to the CSC. The rest of this paper intends to explain the link of the subject gap to the fact that the CSC in SLF allows for AE.

3 The Subject gap

In this section we address the question how the subject gap in SLF arises. We argue that it is the result of covert ATB-movement of the subject, which is structurally shared by the coordinates.

3.1 Presence of a subject

A subject must be present in C2 of SLF, even though there is no phonological indication of it. The German anaphor *sich* must be bound from an A-position by a local *syntactic* subject.[16] Since in (21) coordination is at C', the only accessible A-position from which the anaphor could be bound is within C2 itself. Therefore, a subject must be present in C2.

[15] In light of the proposal presented in this paper, Mayr and Schmitt (2008) would have to be slightly modified regarding the nature of the CSC.

[16] As (i) shows, the argument in a *by*-phrase in the passive construction cannot serve as antecedent. We thank Kyle Johnson (personal communication) for reminding us of this.

(i) *Maria wurde sich$_1$ von Hans$_1$ vorgestellt.
Mary was REFL by Hans introduced

Since binding of *sich* must be from an A-position, QR of the subject from C1 in order to bind it would not suffice. (22) shows straightforwardly that an A'-element in Spec,CP cannot serve as A-binder for an anaphor in C2.

(21) Den Hund$_2$ [hat **keiner**$_1$ t$_2$ gebürstet] und [wird x$_1$ sich$_1$ Tollwutmittel
the dog has no one brushed and will REFL rabies-medicine
kaufen]
buy
'No one brushed the dog and will buy some rabies medicine for himself.'

We showed that the subject in C2 obligatorily co-varies with the one in C1. As coordination is at C', the subject position in C2 cannot be filled with the trace of the subject in C1. Therefore the subject in C1 must QR above the coordination in order to bind a variable – functioning as the syntactic subject – in C2.

If the subject in C2 is analyzed as pro (Van Valin 1986) bound by the subject in C1 from its derived position after QR (Sauerland 2001), the following problems arise: First, pro would have to impose restrictions with respect to its possible antecedent, as no element other than the subject of C1 may act as a binder (cf. Hallman (2004)). (22) shows that for instance objects cannot function as antecedents.

(22) Den Carsten$_1$ [hat **sie**$_2$ t$_1$ angerufen] und [musste __ sich$_{*1/2}$ dann
the Carsten has she called and must REFL then
betrinken]
get-drunk.
'She called Carsten and then had to get drunk.'

Second, it is unclear why pro would have to be silent. We will argue that the subject in C1 does in fact move above the coordination covertly, but we will not identify the subject in C2 with pro.

3.2 Interpretation of the subject gap

(23) gives the LF for (21), where the subject from C1 has moved covertly to a position above the coordination. It binds variables in both coordinates, its own trace in C1 and some yet to be identified subject variable in C2.

(23) keiner λ1 [den Hund hat t$_1$ gebürstet und wird x$_1$ sich$_1$ Tollwutmittel kaufen]

This predicts that quantificational subjects in SLF always outscope inert quantifiers, such as modal verbs or quantificational adverbs. This prediction is borne out, as can be shown by examples where wide scope of the subject is independently unavailable. In (24) the so-called split-scope reading is preferred for the negative quantifier. I.e. negation is interpreted as having scope over the modal without the existential taking wide scope, too. In the SLF case in (25), for which we claim

that QR is a prerequisite, ungrammaticality ensues. Given that wide scope of the subject is prohibited independently, this is expected.

(24) Die Katze$_1$ darf niemand t_1 schlagen
the cat may no one hit
'No one may hit the cat.'
$(\neg < \Diamond < \exists)$, $*(\neg\exists < \Diamond)$, $\#(\Diamond < \neg\exists)$

(25) *Die Katze$_1$ [darf **niemand** t_1 schlagen] und [muss __ sich danach
the cat may no one hit and must REFL after-it
hinlegen]
lie-down
$*(\neg < \Diamond < \exists)$, $*(\neg\exists < \Diamond)$, $\#(\Diamond < \neg\exists)$

Further evidence comes from the observation that existential subjects cannot scope over a universal adverbial, as shown in (26). This makes the strong prediction that in SLF-coordinations, ungrammaticality should arise. (27) confirms this:[17]

(26) Kuchen$_1$ backt immer einer der Köche t_1
cake bakes always one of-the cooks
'Some cook always bakes a cake.'
$(\text{always} < \exists)$, $*(\exists < \text{always})$

(27) *Kuchen$_1$ [backt immer **einer der Köche** t_1] und [muss __ dann
cake bakes always one of-the cooks and must then
abwaschen]
do-the-dishes
$*(\text{always} < \exists)$, $*(\exists < \text{always})$

Thus a QR-based approach makes the correct predictions for the interpretation of SLFs. The question now is how the variable in C2 is to be characterized.

[17] Hans-Martin Gärtner (personal communication) cites the grammaticality of (i) as a counterexample to (27). On closer scrutiny (i) turns out to actually support our argument. The adverbial *so* forces inverse scope. It is expected under our analysis that (i) is grammatical, because the existential subject is forced to QR.

(i) So [backt immer **einer der Köche** einen Kuchen] und [muss __ dann abwaschen]
this-way bakes always one of-the cooks a cake and must then do-the-dishes
'Some cook always bakes a cake this way and must then do the dishes.'
$*(\text{always} < \exists)$, $(\exists < \text{always})$

3.3 Covert ATB-movement

The obligatory presence of the gap, the fact that it can only be bound by the subject of C1, and the observation that the subject must always move covertly can be elegantly captured if the gap is analyzed as the result of covert ATB-movement – that is, covert movement of the subject from all coordinates. (28) gives the LF-structure after covert ATB-movement of an SLF-subject.

(28) Subj $\lambda 1$ [[....t_1...] and [...t_1...]]

We assume that (28) is the correct treatment for SLF-subjects. We will now first deal with facts that set covert and overt ATB-movement apart, and then with data that highlight similarities. Evidence for our approach comes from the observation that covert ATB-movement of material other than subjects is possible, too.

3.3.1 Locality

Locality restrictions are expected, if SLF-subjects move. Indeed, covert ATB-movement is subject to an extreme sort of locality. It is phase-bound, where vP and CP are phase-nodes. Subjects can leave their vP, as they are in an inherent edge position, but can covertly ATB-move at most above the next CP-node, which means that coordination must not be higher than this CP. In (29) the second subject trace is in an embedded clause. The subject would have to move out of the embedded clause above the matrix CP to count as ATB-movement from both C1 and the embedded part of C2. This movement is too long.

(29) *Das Buch$_1$ [hat **er** t_1 gelesen], aber [hat sie gesagt [hatte __ Mühe damit]]
the book has he read but has she said had trouble with-it

Similarly, in (30), ATB-movement from two embedded subject positions would have to be across matrix vP to CP. Ungrammaticality ensues. In (31), which resembles (3), on the other hand, ATB-movement need only be above embedded C', which is grammatical.

(30) *Das Buch$_1$ [hat sie behauptet, [habe **er** t_1 gelesen]], aber [du hast gesagt [habe __ damit Mühe gehabt]]
the book has she claimed have he read but you have said have with-it trouble had

(31) Das Buch$_1$ hat sie behauptet, [habe **er** t$_1$ gelesen], aber [habe __ damit
the book has she claimed have he read but have with-it
Mühe gehabt]
trouble had
'She claimed that he read the book, but that he had problems with it.'

3.3.2 Object gaps

Once this locality restriction is taken into account, we have a precise prediction where object gaps are to be found. Subjects can covertly ATB-move to the next CP-phase, because they are in an inherent edge position. Objects on the other hand are not in an edge position and are thus predicted to only be able to move to the edge of their own vP. As (32) shows, vP-coordination indeed allows for object gaps. The indirect object makes sure that coordination cannot be lower than vP.It must be added that object gaps show the same interpretive restriction as subject gaps. The indefinite in (32) can only be interpreted as binding a variable in C2.[18]

(32) Hans hat [dem Peter **einen Ring** gezeigt], aber [dem Heinz __
Hans has the Peter a ring shown and the Heinz
geschenkt]
given
'Hans showed a ring to Peter but gave it to Heinz.'
'*Hans showed some ring to Peter, and gave a different ring to Heinz.'

In fact, a subject can be present, too, in C2 as long as no finite verb is. This is to be expected if subjects can stay *in situ* in German:

(33) Gestern hat [Hans **einen schönen Ring** gesehen] und [Fritz __
Yesterday Hans has a beautiful ring seen and Fritz
gekauft]
bought
'Yesterday, Hans saw a beautiful ring and Fritz bought it.'

The structures that are expected and also observable once the phase-boundness of covert ATB-movement is taken into account, are summarized in (34).

[18] We therefore argue contra the consensus in the literature, where the existence of object gaps is denied (e.g. Büring and Hartmann (1998), Johnson (2002), Thiersch (2005), Reich (2007)). The following example is expected to be ungrammatical under our account, as coordination is too high, which is indicated by the finite verb in C2.

(i) *[Hans hat **die Katze** gefüttert] und [Michael hat __ geschlagen]
Hans has the cat fed and Michael has beaten

(34) a. *Covert ATB-movement of subjects*
(i) $[_{vP}$ subject$_1$ $[_{vP}$ $[_{vP}$ ... t_1 ...] and $[_{vP}$ ... t_1 ...]]]
(ii) $[_{CP}$ subject$_1$ $[_{C'}$ $[_{C'}$ ... $[_{vP}$ ... t_1 ...]] and $[_{C'}$ ... $[_{vP}$ ... t_1 ...]]]]
b. *Covert ATB-movement of objects*
$[_{vP}$ object$_1$ $[_{vP}$ $[_{vP}$ ... t_1 ...] and $[_{vP}$ ... t_1 ...]]]

3.3.3 Movement from all coordinates

In this analysis of subject and object gaps, covert movement must be from all coordinates. The restrictions on simple movement have been found to hold in the case of overt ATB-movement for each coordinate (Munn 1992). In section 3.2 we gave evidence that SLF exhibit covert movement of the subject from C1. But data that show that movement takes place from all coordinates are still lacking. For this purpose, consider (35). As shown in Beck (1996) , the quantifier *kein Hund* acts as an intervener for covert movement of *jeden Briefträger*. I.e. the object cannot move covertly across the subject.

(35) Gestern hat kein Hund jeden Briefträger gebissen.
yesterday has no dog every mailman bitten
'Yesterday, no dog bit every mailman.'
$(\neg\exists < \forall)$, $*(\neg < \forall < \exists)$, $*(\forall < \neg\exists)$

The prediction of our proposal is clear: Since object gaps involve covert movement from all coordinates, movement must be licensed from each coordinate. Accordingly, if an intervener occurs in any coordinate, the result is expected to be ungrammatical. (36)-(37) are object gap configurations, where the quantified object *jeden Briefträger* moves covertly from all coordinates. The subject *kein Hund*, just as in (35), acts as intervener. (36) shows that if the intervener occurs in C1, ungrammaticality ensues. (37) shows the same for C2. This means that covert ATB-movement requires movement from both C1 and C2.

(36) *Gestern hat [kein Hund **jeden Briefträger** gebissen] und [Peter __
yesterday has no dog every mailman bitten and Peter
geschlagen]
beaten

(37) *Gestern hat [Peter **jeden Briefträger** geschlagen] und [kein Hund __
Yesterday has Peter every mailman beaten and no dog
gebissen]
bitten

3.3.4 Parallelism

Another observation that supports the proposal made above is that constraints displayed by overt ATB-movement also hold for covert ATB-movement. As discussed in Williams (1978), overt ATB-movement imposes structural conditions on the elements it targets, namely, parallelism constraints.[19] ATB-moved material cannot function as subject in C1 and as object in C2, as in (38).[20]

(38) *I know a man [who$_1$ [Bill saw t$_1$] and [t$_1$ likes Mary]]
(Williams 1978:34)

Covert ATB-movement also exhibits such parallelism constraints. In (39), *die Maria* cannot be interpreted as subject in C1 and as object in C2, and vice versa in (40).[21]

(39) *Das Buch$_1$ hat [**die Maria** t$_1$ ausgelesen] und [der Hans __ bewundert]
the book has the Maria out-read and the Hans admired

(40) *Der Hans$_1$ hat[t$_1$ **die Maria** getroffen] und [__ das Buch ausgelesen]
the Hans has the Maria met and the book finished

3.3.5 Intermediate conclusion

We argued that subject and object gaps are best viewed as covert ATB-movement. This analysis is corroborated by the observation that covert ATB-movement can be shown to involve movement from all coordinates, as well as by the fact that the parallelism constraints found in overt ATB-movement are also observable in covert ATB-movement. The phase-boundedness of covert ATB-movement will be explained in section 5.1.

It is crucial for our analysis that subject gaps and object gaps should behave maximally similar to overt ATB-movement. However, (Büring and Hartmann

[19] In addition, case matching requirements may apply (cf. Citko (2003)). These are ignored for present purposes. Wherever case syncretism is relevant, this is controlled for in the examples below.

[20] It must be noted, however that it is possible to ATB-move material that serves as object in C1 and as embedded subject in C2 (i). We have nothing to add about this interesting observation. It is clear that cases such as (i) contrast with covert ATB-movement, which we have already shown to be phase-bound:

(i) I know the man [who [John likes t] and [we hope t will win]]
(Williams 1978:34)

[21] Note that the phase-boundedness of covert ATB-movement does not explain these data. We are assuming that subjects can stay in Spec,vP in German, as we have already done in the preceding discussion. Due to this a subject and an object are in the same phase.

1998:189f.) argue that there is an interpretative difference between the sentence in (41), which involves overt ATB-movement of the subject, and (42), which exhibits a subject gap and therefore, in our proposal, covert ATB-movement. They claim that both (41) and (42) can have the bound variable interpretation in (43b), but only (41) can have the independent construal of the existential for each conjunct (43a).

(41) Eine Frau$_1$ [ist t_1 in Amerika Außenministerin] und [bekleidet t_1 in
a woman is in America foreign-secretary and has in
Deutschland sogar das zweithöchste Amt des Staates]
Germany even the second-highest position in-the state

(42) In Amerika [ist **eine Frau** Außenministerin] und [bekleidet __ in
in America is a woman foreign-secretary and has in
Deutschland sogar das zweithöchste Amt des Staates]
Germany even the second-highest position in-the state

(43) a. $\exists$x(x is a woman $\wedge$ x is foreign secretary in the U.S.) $\wedge$ $\exists$y (y is a woman $\wedge$ y has the second-highest office of state in Germany)
b. $\exists$x(x is a woman $\wedge$ x is foreign secretary in the U.S. $\wedge$ x has the second-highest office of state in Germany)

Büring and Hartmann (1998) assume that (41) can get the reading in (43a) through reconstruction of the existential quantifier in each coordinate. (42) cannot get this reading, because under their analysis the subject does not move from C2 and therefore no reconstruction is possible. Under our analysis no such difference is expected.

To the data above we have to add the observation that the reading in (43) becomes possible in SLF, if no AE occurs as in (44). We have no analysis for this fact, but take it to show that the (non)-availability of syntactic reconstruction cannot be the factor discriminating between (41) and (42).[22]

(44) Endlich [ist **eine Frau** in Amerika Außenministerin] und [bekleidet __
finally is a woman in America foreign-secretary and has
in Deutschland sogar das zweithöchste Amt des Staates]
in Germany even the second-highest position in-the state

[22]The reading in question is also only available for existential quantifiers and only in copula constructions, which adds to the suspicion that Büring and Hartmann's 1998 data are not a deep fact distinguishing between SLF and non-SLFs.

3.4 Multidominance

If an element a moves ATB from the coordinates c_1,....c_n of a coordinate structure C, a must somehow be present in all coordinates before movement (Williams 1978). The question is, which relation must hold between a in c_1 and a in c_i for a to be able to move from C and how this relation is syntactically encoded. Descriptively, for covert ATB-movement the relation between a in c_1 and a in c_i is captured as follows: a in c_1 is semantically identical and syntactically parallel to a in c_i and can be linearized only once.[23]

There are at least three possible answers to this question. First, it could be assumed that ATB-movement of a involves movement of a only from c_1 and that movement in all other coordinates is in fact movement of an operator co-indexed with a (Munn 1992), as shown in (45a). Another possibility is an account that assumes a to be present in all coordinates and further assumes obligatory deletion under identity of all instances of a except for the one in c_1 (Williams 1978), as shown in (45b), where boldface indicates phonological deletion. Both approaches yield the linearization facts and at least (45a) also semantic identity.

(45) a. [[...XP_1...] and [...Op_1...]]
b. [[...XP_1...] and [...**XP**$_1$...]]

Neither of these options, though, can straightforwardly account for syntactic identity, i.e. parallelism restrictions. Both operator movement and deletion under identity occur in other environments as well, where no such restrictions can be observed.[24] In other words, if ATB-movement could be analyzed as in either (45a) or (45b), why do we find parallelism restrictions on that operation only in coordinate structures?

Because of this, we opt for a third possibility. We assume that syntax does not rule out that elements are immediately dominated by more than one node (Blevins (1990), Citko (2005), Engdahl (1986), Gärtner (2002), Gazdar et al. (1985), and others). Further, we assume that elements may be dominated by nodes that occur in parallel structures. This allows us to view ATB-constructions as involving MD. I.e. the ATB-moved material is shared by all the coordinates (see also Citko (2005))

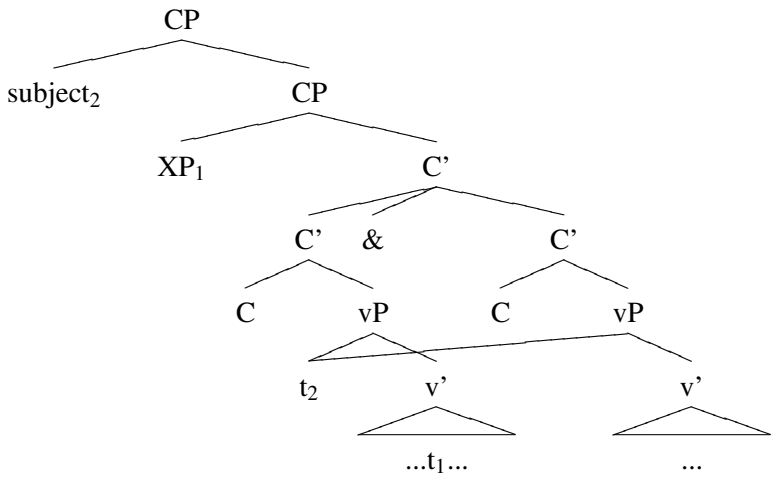
[23] Bošković and Franks (2000) claim that covert ATB-movement does not exist. If the present analysis is on the right track they are considering the wrong examples, namely, constructions where the material that is to move ATB is phonologically present in all coordinates. It seems that such cases might be incompatible with the identity condition on ATB-movement. See also Williams (1978) and Munn (1999).

[24] Operator movement has been assumed to occur in relative clauses, parasitic gap or tough-movement constructions, none of which exhibits the restrictions found for ATB-movement. (Obligatory) deletion under identity is found for instance in comparative deletion, which is also not constrained by parallelism restrictions.

and thus identity comes for free.

For SLF, we take the subject to be immediately dominated by vP in C1 and vP in C2 (46). This immediately accounts for the fact that we find indications of the presence of the subject in C2. After QR of the shared material, the trace functions as a variable in each coordinate. Furthermore it follows that the subject will only be linearized once in parallel structures.

(46)



Semantic identity will follow immediately. More importantly, however, (46), as opposed to (45a) and (45b) establishes a direct syntactic relation between a in c_1 and a in c_i. Parallelism restrictions are easily derivable, namely, as restrictions on a particular syntactic process. Most importantly, we will argue that the link between the subject gap and AE is connected to the specific linearization requirements of the shared subject.

Before we proceed, however, we would like to briefly comment on the conceptual problems of the analysis in (46). Clearly, if horizontal MD is possible, syntax runs the risk of massive over-generation. To prevent this, we assume that horizontal MD is limited to structures that satisfy the ATB-input condition (85) (section 5.1 for discussion) and that further horizontal MD is restricted by parallelism. Note that any account of ATB-movement will end up with stipulations in order to derive its particular properties: If the analysis employs operations that are also found in other constructions (45a)-(45b), it must still stipulate that, in the context of coordination, this operation has special properties. In this sense our approach is not more stipulative than others.

4 The proposal

The analysis we propose in this section rests upon the question how elements targeted by covert ATB-movement, such as subject and object gaps, get linearized. We submit that after linearization at most one element α' may correspond to an element α in the syntax. (46), when linearized, can thus have only one exponent of the subject. In our proposal, if α is shared and does not move out of the coordination overtly, the linearization requirements will impose a relative order on the coordinates between which α is shared. This order, we argue, correlates with the possibility of AE. Our central claim will be that the CSC on overt movement is sensitive to whether the coordinates are ordered or not. If they are not ordered, movement will be ATB. If they are, however, the coordinates will be treated as "one" structure, and AE is allowed. This is the crucial link between subject and object gaps and the possibility of AE. Before we introduce the new formulation of the CSC, we will give a detailed picture of Spell Out (S-O) and the establishment of order.

4.1 Spell-Out

We assume a phase-model for syntax. S-O proceeds cyclically and is induced by phase heads p endowed with a S-O feature. The phase heads are taken to be v and C (Chomsky 2001). Coordination is not assumed to be a phase. If two phases are coordinated, the resulting constituent counts as a phase, i.e. there is one instead of two phases.

The view we assume is that some information relevant for other linguistic components is derived in parallel to syntactic operations, namely order for PF, and scope for LF. This information is established with each step of merge. At S-O for a phase P, henceforth S-O(P), the information established during the derivation is sent to the interfaces, PF and LF, respectively. S-O(P) for PF fixes order in P, S-O(P) for LF fixes scope in P.

Regarding the S-O domain, we depart from both Chomsky (2001), who assumes that a phase head p induces S-O of its complement, and Fox and Pesetsky (2004), according to who it is the maximal projection of p that undergoes S-O. Rather, we adopt a proposal similar in effect but not in motivation to Bachrach and Katzir (2009), where the maximal projection of p minus edge positions created through cyclic movement constitutes the S-O domain. Such edge positions will always be part of the next S-O domain, as given in (47).

(47) *Spell-Out domain*
If p is a phase head and P the maximal projection of p, then all material

in P is in S-O(P) except for material *moved* to the edge of P.

Extending the proposal by Fox and Pesetsky (2004) we assume that there are two ways to overtly move from phase P. First, order and scope relations that have been fixed by S-O cannot be contradicted by subsequent operations. Hence, movement from S-O(P) is only possible if it does not contradict such fixed relations. Second, movement is possible from the cyclic edge of P, to which no S-O has applied.

(48) *Movement from phases*

a. All elements $\alpha_1, ..., \alpha_n$ contained in P that are not overtly moved to the edge of P or linearized leftmost in S-O(P) are inaccessible for overt movement.

b. All elements $\beta_1, ..., \beta_n$ contained in P are inaccessible unless they are base-generated in or have moved to the edge of P.

In a sense, the present paper unites the view of Chomsky (2001) and Fox and Pesetsky (2004) since overt movement from a phase can proceed either from the cyclic edge, which is not part of the S-O domain, or from the leftmost position inside the S-O domain. We show below that these two types of movement differ in one respect: Whereas movement from positions that have not yet undergone S-O according to (47) directly manipulates order or scope and makes the previous order or scope relations unrecoverable, this does not apply to movement from positions that have been targeted by S-O. In this case, previous order or scope relations are recoverable.

We will now discuss the effect of S-O for the PF and the LF interfaces, respectively.

4.1.1 Spell-Out and PF

Upon merge of a and b, order statements are established for these elements. Order statements thus hold of sisters, as in (49). Two outcomes are available and the linearization rules of the particular language may choose one over the other. In allowing this type of language variation, we follow Fox and Pesetsky (2004), and not Kayne (1994), who argues that asymmetric c-command fully determines order. If a is a head and language X orders heads before their complements, then the order $a < b$ is chosen. At each application of merge these language particular rules must be instantiated.

(49) If a and b are sisters, then either $a < b$ or $b < a$.

We follow Kayne and others (e.g. Chomsky (1995)) in assuming that the order between A and B determines the order for all terminals in A with respect to all terminals in B:

(50) a. If $A < B$, then $d(A) < d(B)$.
b. $d(X)$ is the image of X under dominance, that is the order of all terminals dominated by X.

As the syntactic derivation manipulates order statements, the system must keep track of these statements in parallel to the dominance relations. In particular, overt movement has a direct impact on the order statements. The moved element is ordered with respect to its higher sister and the lower copy is ignored for order purposes. The pre-movement order thus becomes unrecoverable. At the same time, covert movement is a vacuous operation regarding order statements. We therefore depart from approaches, where the order relations of all copies of a moved element remain visible. Rather only the order relation of one copy is visible. Which copy is pronounced is not determined by S-O in the present system, but rather by movement itself, which is either overt or covert, (51).

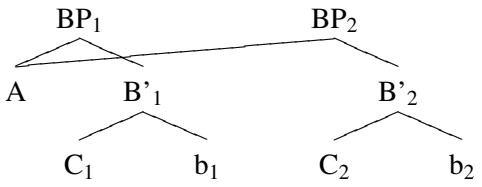
(51) *Movement and order*
If b is not the highest sister of an overtly moved a, not $a < b$ and not $b < a$.

Importantly, we assume that (51) only holds if the position from which movement occurs has not yet been targeted by S-O. In case movement applies to an element having undergone S-O, it becomes ordered with respect to its higher and lower sister. The new order must not contradict any previously established order (Fox and Pesetsky 2004). I.e. if $a < b$ at S-O(P_i), it cannot be the case that $b < a$ at S-O(P_{i+n}). Thus order statements derived at S-O are fixed, in the sense that they are recoverable. This implies that only the the element that is linearized leftmost in S-O(P_i) may move after S-O, contra (Fox and Pesetsky 2004). Movement of more than one element would necessarily create order statements contradicting those established at S-O(P_i).

The difference in recoverability of previous order relations thus distinguishes cyclic and non-cyclic overt movement. We submit that elements undergoing cyclic movement must always move to the edge of their phase. Non-cyclic movement cannot feed cyclic movement. It is local and applies, for instance, if subjects move from Spec,vP to Spec,TP.

Coordinates are built in parallel. For the MD-structure in (52), where b_1 and b_2 are phase-heads, C_1 and C_2 their respective complements, and A the shared base-generated specifier, (49) will generate the set of orders in (53) upon merge, if the tree is to reflect order directly.

(52)



(53) $\{A < \left\{ \begin{array}{c} B'_1 \\ B'_2 \end{array} \right\}, C_1 < b_1, C_2 < b_2\}$

(53) is unreadable by PF and cannot be frozen by S-O. There is an inference system that deduces from the input in (53) a maximally consistent overall order set. We formulate this as in (54).

(54) a. In language X, give parallel structures containing shared material order statements that violate no language particular linearization rule.

b. The edges of two parallel structures A and B, which are not merged with each other, must be maximally consistent.

(54a) says that in the present case A must precede both its sisters, because this is consistent with the language particular requirements. (54b) says that the two sisters of A must not interleave when order statements are derived. I.e. the left edge of A must precede the left edge of B and the right edge of A must precede the right edge of B, or vice versa.

For (52) this means that the system has to choose one sister of A as following the other sister. We indicate this inferred order relation by $\ll$. Note that in (55a) A is not directly ordered before B'_2 anymore, as A is linearized in S-O(BP_1) only. This set of order relations corresponds to the overall order in (55b), even though the coordinates have not been merged with each other yet. The parallel structures in (52) thus count as ordered, in that it has been determined which coordinate precedes the other, which is, in this case, reflected by the tree.

(55) a. $\{A < B'_1 \ll B'_2, C_1 < b_1, C_2 < b_2\}$
b. $A < C_1 < b_1 \ll C_2 < b_2$

The information in (55) is frozen at S-O. We assume that once S-O(P) has applied, only the interface information of S-O(P) is available at later phases. This means that the dominance relations in S-O(P) are opaque for further computation and only the linear order in S-O(P) is visible. For (52) this means that after S-O(BP_1) and S-O(BP_2) the fact that A is dominated not only by BP_1, but also by BP_2 is irrelevant at subsequent phases, as A is linearized in S-O(BP_1) only. The left edge

of BP_2, after S-O(BP_2), is thus not constituted by A anymore, but by the left edge of C_2.

4.1.2 Spell-Out and LF

For LF the relevant information generated by the system is scope, i.e. c-command.[25] At each step of merge, scope can be directly read off. Scope can be altered by both overt and covert movement. The lower instance of the moved element will immediately undergo trace conversion (Fox (2002), Sauerland (2004)). The assumptions are identical to those made in section 4.1.1 for PF above: Movement will directly manipulate scope if movement takes place pre-S-O, i.e. in cases of intra-phasal or cyclic movement. Previous scope relations are only in these cases unrecoverable. S-O, which targets the domain specified in (47), freezes the scope statements within that domain. No contradicting scope relations may be added subsequently. Hence, if an element is to move from a phase P, it must either move to the edge of P or, else, must out-scope any other element within its S-O-domain. In analogy to order, scope relations that have been spelled out must remain recoverable throughout the derivation.

Even though scope can be altered by both overt and covert movement, the two types of movement differ in that only the former can move successive cyclically. Covert movement, on the other hand, is arguably clause-bound (May 1985). In the present theory, this means that while overt movement can always move to the phase-edge and thus escape S-O, covert movement must be more restricted in this respect. However, the restriction cannot be straightforwardly captured: Objects may move covertly from vP, which means that they must move through the edge of vP, avoiding S-O(vP). If they did not, they would be part of S-O(vP) and any subsequent movement would immediately give rise to contradicting scope statements. However, it seems objects cannot move from Spec,vP to Spec,CP, because otherwise their movement should not be clause-bound. Why this should be the case is unclear to us; to our knowledge, no satisfactory account of the clause-boundedness of QR exists.

Regarding covert movement of subjects, we would like to suggest that subjects do not need to move to a cyclic edge position if moved covertly. Since they are the highest element in their S-O domain, further movement will not introduce contradicting order statements. Further, since covert movement into the cylic edge of CP seems to be ruled out in any case, there is no additional requirement for movement into the vP-edge.[26]

[25] See von Stechow (2005) for a possible approach to the interpretation of a phase model.

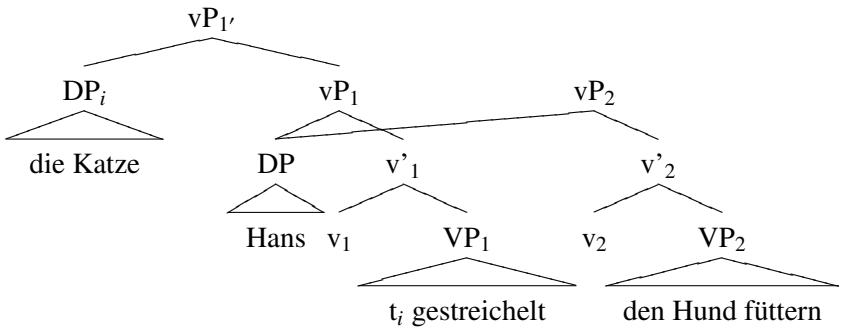
[26] Possibly, cyclic movement can only be applied to elements that are not ordered at all, i.e. elements, for which no previous order or scope statements are recoverable. The question arises

4.1.3 A sample derivation

Before we proceed to the discussion of the CSC, we go through a sample derivation of an SLF-construction. (56) is an example where AE occurs in the presence of a subject gap. (57) is the tree at the point where the first S-O applies. Let us go through a detailed derivation leading to an order for (57).

(56) Die Katze$_1$ [hat **Hans** t$_1$ gestreichelt] und [wird __ den Hund füttern]
the cat has Hans stroked and will the dog feed
'The cat, Hans stroked it and will feed the dog.'

(57)



Order statements are derived upon merge, following (49). As a first step, the determiners and the NPs in object position are merged. As in German DP is head-initial, the determiners will precede their complements (58).

(58) $Det_{die} < d(NP_{Katze}) \mid Det_{den} < d(NP_{Hund})$

After merge of the verb in both coordinates, the order statements in (59) are obtained. As German is head-final in VP, the verb follows its complements. According to (50), (59) corresponds to (60).

(59) $d(DP_{dieKatze}) < V_{gestreichelt} \mid d(DP_{den\ Hund}) < V_{füttern}$

(60) $die < Katze < gestreichelt \mid den < Hund < füttern$

Merging silent v does not alter the order. The subject is merged in Spec,vP$_1$ and Spec,vP$_2$. Since specifiers in German precede their sisters, the subject precedes both of them (61).

(61) $d(DP_{Hans}) < \left\{ \begin{array}{l} d(v'_{die\ Katze\ gestreichelt}) \\ d(v'_{den\ Hund\ füttern}) \end{array} \right\}$

whether long-distance cyclic movement can only occur in cases where the moved element is neither recoverable for previous order relations nor for previous scope relations, i.e. overt wh-movement.

However, (61) cannot be read by PF. The inference system thus must compute the maximally consistent order, adhering to (54). It has to choose one sister, in this case v'$_1$ *die Katze gestreichelt*, as preceding the other (62). The subject, *Hans* is linearized in vP$_1$ *die Katze gestreichelt* only. This corresponds to the overall order in (63). I.e. vP$_1$ and vP$_2$ count as ordered.

(62) $d(DP_{Hans}) < d(v'_{die\ Katze\ gestreichelt}) \ll d(v'_{den\ Hund\ füttern})$

(63) $Hans < die < Katze < gestreichelt \ll den < Hund < füttern$

The next step in the derivation is that the object *die Katze* moves and adjoins to vP$_1$ in order to escape the phase. This yields the order statements in (65): The object is ordered before its sister, vP$_1$, in which the subject is linearized. It is thus also ordered before vP$_2$, which is relatively preceded by vP$_1$, as in (63) above.

(64) $d(DP_{die\ Katze}) < d(vP_{Hans\ gestreichelt}) \ll d(vP_{Hans\ den\ Hund\ füttern})$

Note that overt movement of the object directly manipulates order statements, according to (51) above. Movement alters the order statements for v'$_1$ in (59), such that d(v'$_1$) now correponds to (65).

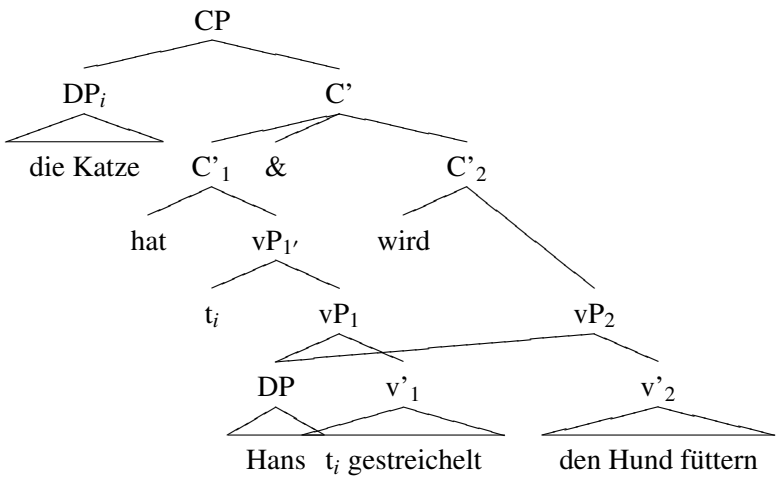
(65) $d(v'_1) = gestreichelt$

After movement of the object *die Katze* to Spec,vP$_1$, S-O applies to both vPs. It targets the maximal projection of v, excluding cyclic positions. The object *die Katze* is thus not contained in S-O(vP$_{1'}$). The order in (66), which is inferred from the order statements of S-O(vP$_{1'}$) and S-O(vP$_2$) is sent to PF.

(66) $Hans < gestreichelt \ll den < Hund < füttern$

At the next phase we get the tree in (67), with covert movement of the subject being ignored.

(67)



Head-movement of the auxiliary to C takes place, which we treat as external merge here. This derives the order statements in (68).

(68) $C_{hat} < d(vP_{die\ Katze\ Hans\ gestreichelt}) \ll C_{wird} < vP_{den<Hund<füttern}$

Note that there is no requirement that the auxiliary in C2 precede the shared subject: The subject is in S-O(vP$_1$) and S-O(vP$_2$). After S-O, the dominance relations within the S-O domain are no longer visible to further computation. Rather, only the interface information – in this case the frozen order statements – is available. In (68) above it is not the image of vP$_2$, but simply the order relations with respect to which the auxiliary *wird* is ordered. Since the shared subject is not part of the order relations of S-O(vP$_2$) that are sent to PF, as determined by the inference system, the auxiliary of C2 need not precede it. Note that the auxiliary *hat* of C1 is ordered with respect to the image d(vP$_{1'}$). d(vP$_{1'}$) contains both order and dominance information. The latter is only available for the object *die Katze*. This is so because it is in a cyclic position and therefore not inside S-O(vP$_{1'}$).

At the C'-level, the coordinates are merged, (69). The inferred order that holds between the vPs determines the order established upon merge C1 and C2. If no inferred order had been established before the point of coordination, both orders would be maximally consistent and either order could be fixed at S-O.

(69) $d(C'_{hat\ die\ Katze\ Hans\ gestreichelt}) < d(C'_{wird\ den\ Hund\ füttern})$

We have nothing interesting to say about the role of the coordinating element *und*. Assuming a ternary branching structure for coordination, *und* will have more than one sister (but, as opposed to shared elements, not more than one mother). In German, *und* requires to be ordered in between the coordinates, but does not impose a

relative order between them.

Finally, the object *die Katze* moves out of the coordinate structure, to Spec, CP. The question, why this movement is not prohibited by the CSC is addressed in subsection 4.2. Note that covert ATB-movement of the subject does not pass through the cyclic edges of the vPs.

Before that we must address the point that AE in SLF can only take place from the first coordinate, as illustrated by (70).[27]

(70) *Den Hund$_1$ [hat **Hans** die Katze gestreichelt] und [wird __ t$_1$ füttern]
the dog has Hans the cat stroked and will feed

Consider the derivation of (70). In order to undergo AE, the object *den Hund* from vP_2 moves to Spec,vP_2. Its sister is vP_2, hence it must be ordered with respect to $d(vP_2)$. Since $d(vP_2)$ contains the subject, *den Hund* must be ordered before the subject. The only possibility to do so without order contradictions is if *den Hund* is ordered before both vPs, as in (71). This order, however, violates (54b) above, according to which the edges of parallel structures must be maximally consistent: The left edge of vP_2, *den Hund* precedes the left edge of vP_1, but the right edge of vP_2 does not precede the right edge of vP_1. (70) is therefore correctly predicted to be ungrammatical.

(71) $d(DP_{den\ Hund}) < (vP_{Hans\ die\ Katze\ gestreichelt}) \ll d(vP_{Hans\ füttern})$

4.2 The Coordinate Structure Constraint

We define the CSC as a constraint sensitive to (inferred) order between the coordinates. The CSC, as considered in the present paper, is a constraint on overt movement from coordinate structures (cf. Williams (1978), see section 5.2 for discussion). As such, it has traditionally been equated with the requirement that if an element is to move out of a coordinate structure it must do so ATB. Since SLF are coordinate structures and must be subject to this condition, but, at the same time, violate it through AE, they should be ungrammatical. The fact that they are not shows that the traditional formulation of the CSC cannot be correct. The alternative CSC proposed here is fulfilled by AE in SLF, and by ATB-movement in non-SLF. In order to derive this difference, the input to CSC-evaluation in the case of SLF must be distinct from the input in the case of non-SLF.

We have shown that SLF-constructions introduce relative order between C1 and C2. The central claim of the present paper is that the relative order of the

[27] We thank Gennaro Chierchia (personal communication) for pointing out a problem with a previous version of our theory regarding this property of SLF.

coordinates has consequences for the CSC. In particular, ordered coordinates allow AE from them, because the CSC treats them as "one" structure.

(72) *Coordinate Structure Constraint*
Let C be a coordinate structure with coordinates $c_1, ..., c_n$,
a. then a may move out of C if it moves out of all distinct coordinates of C,
b. c_i is distinct from c_j iff neither $c_i < c_j$ or vice versa, nor $c_i \ll c_j$ or vice versa at the point of coordination (henceforth $c_i \mid c_j$).

In order for (72) to be useful, the CSC must apply before S-O of the phase that the coordinate structure is contained in. The generalization can be paraphrased as follows: If, at the point where the CSC applies, the coordinates are unordered and thus distinct, movement must be ATB. If the coordinates are ordered, as in the case of SLF, they are not distinct according to (72). AE from that structure thus satisfies the CSC.

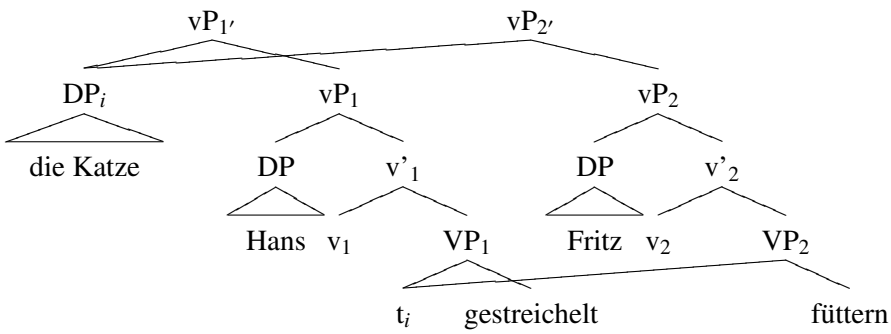
When we consider example (56) again, it now becomes clear, why AE is allowed. As the order in (69) (caused by the order in (66)) above shows, the coordinates are ordered. Thus, the coordination consists of non-distinct coordinates. AE can satisfy the CSC in this case. This links the subject gap via the inferred order introduced by it to the possibility of AE.

4.3 Overt ATB-movement

We will now show how the CSC works for cases of overt ATB-movement and that it correctly rules out AE in non-SLF cases. (73) is an example of a non-SLF construction. We will concentrate on the aspects that make such cases distinct from the derivation of SLF in section 4.1.3. The first phase for (73) has the structure in (74).

(73) Die Katze$_1$ [hat Hans t$_1$ gestreichelt] und [wird Fritz t$_1$ füttern]
the cat has Hans stroked and will Fritz feed
'Hans stroked the cat and Fritz will feed it.'

(74)



The object *die Katze* is first merged with the two verbs giving the order statement in (75).

(75) $d(DP_{die\ Katze}) < \left\{ \begin{array}{l} V_{gestreichelt}) \\ V_{füttern} \end{array} \right\}$

As discussed in section 4.1.1 above, (75) is unreadable for PF, thus the inference system determines a maximally consistent order. Assume that the order in (76) is chosen. At this point, the coordinates are inferred to be ordered to each other.

(76) $die < Katze < gestreichelt \ll füttern$

The derivation then proceeds to built up vP, maintaining the relative order of the coordinates. Finally, the object moves as in (74), to escape the phase. It is now shared by the Spec,vPs. By this movement previous order statements are manipulated, according to (51) above. I.e. the lower copy is disregarded for order. Thus the inferred order between the coordinates (76), does not hold anymore. Order between V'_1 and V'_2 is no longer available, as in (77).

(77) $gestreichelt \mid füttern$

In its new position, however, Spec,vP, the object is again merged with two sisters, vP_1 and vP_2, which yields the order statement in (78).

(78) $d(DP_{die\ Katze}) < \left\{ \begin{array}{l} d(vP_{Hans\ gestreichelt}) \\ d(vP_{Fritz\ füttern}) \end{array} \right\}$

Due the unreadability of (78) the inference system determines that one sister of the moved object must precede the other. Assume that the order in (79) is determined. As a next step, S-O(vP) applies. Importantly, the object in the Spec,vPs is neither within S-O($vP_{1'}$) nor S-O($vP_{2'}$), since cyclic positions are not part of the S-O domain. The piece of structure that is sent to PF therefore, does not require the vPs to

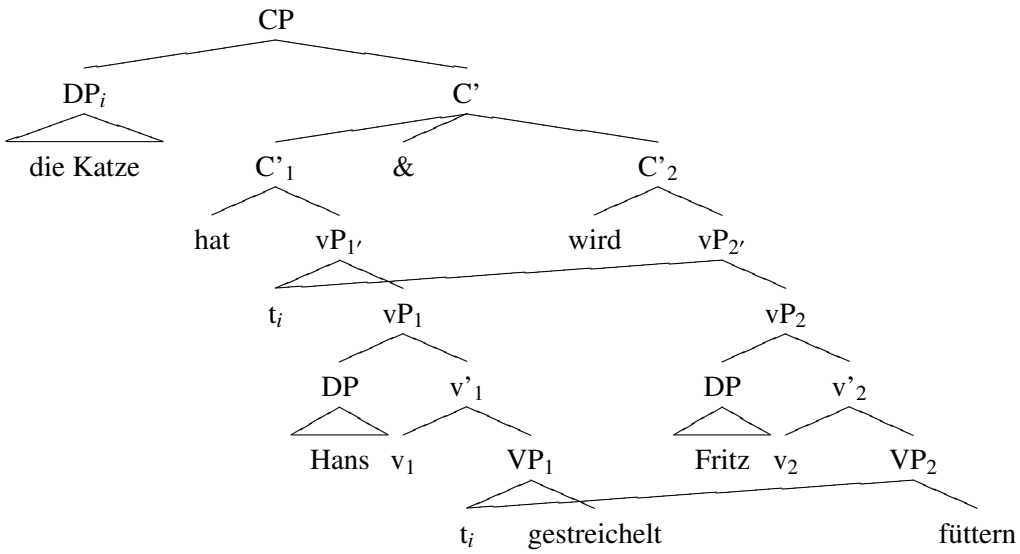
be ordered, as in (79): Rather, (80) is the maximally consistent order for the S-O domain. S-O thus freezes an inferred order between the coordinates only, if the S-O fixes the order of a shared element. In other words, relative order between the coordinates is fixed at S-O only if a shared element is linearized within that S-O domain. Therefore, S-O($vP_{1'}$) and S-O($vP_{2'}$) do not freeze an order between the vPs.

(79) $die < Katze < Hans < gestreichelt \ll Fritz < füttern$

(80) $Hans < gestreichelt \mid Fritz < füttern$

We leave out merge of the auxiliaries. When the object moves ATB to Spec,CP, as in (81), its previous order statements are deleted, analogously to movement in the previous phase. Since the the intermediate position of the object is neither in S-O($vP_{1'}$) nor in S-O($vP_{2'}$) , no previous order statements are recoverable (81).

(81)



Hence, no order is determined between the coordinates. The object is moved to Spec,CP and its trace which previously had introduced order between vP_1 and vP_2 (79) is now irrelevant. The coordinating element itself does not introduce order between the coordinates, as discussed above. Therefore upon ATB-movement of the object, C1 and C2 are unordered. The CSC counts them as distinct and ATB-movement is licensed.

It is clear why (82), where AE applies, is ungrammatical. The structure is the same as in (81) upon application of the CSC with the only difference that there is an object present in C2. Nevertheless the coordinates are unordered with respect to

each other, because no material – in particular not the subject – undergoes covert ATB-movement and S-O($vP_{1'}$) and S-O($vP_{2'}$) does not contain shared material in it. Therefore the coordinates count as distinct and the CSC can only be satisfied by ATB-movement.

(82) *Die Katze$_1$ [hat Hans t_1 gestreichelt] und [wird Fritz den Hund füttern]
the cat has Hans stroked and will Fritz the dog feed

Further, since overt ATB-movement does not impose order on the coordinates, as the traces are ignored for order, we predict instances of multiple overt ATB-movement to be possible. This is exactly what we find, as (83) shows.

(83) Dem Hund$_1$ hat die Leine$_2$ [der Hans t_1 t_2 angelegt] und [der Kai t_1 t_2 abgenommen]
the dog has the leash the Hans on-put and the Kai off-taken
'Hans put the dog on the leash and Kai took it off.'

5 Predictions and problems

The CSC in (72) predicts that AE is possible only in SLF and that non-SLF will only allow for ATB-movement. In the following two subsections, we will address two phenomena that are not covered by it.

5.1 ATB-movement

In theories that conceive of the CSC as a condition on movement from coordinate structures, such as Williams (1978), movement *as such* proceeds ATB. The CSC simply captures this restriction on movement. If ATB-movement is impossible, the structure becomes ungrammatical (which is expressed by saying that the CSC has been violated). The CSC in (72) is not reducible to a restriction on ATB-movement; it is a general condition on movement from coordinate structures, which only *can* be met by ATB-movement.

This raises the question of the constraints on the configuration where ATB-movement may apply. Assume that C is a coordinate structure with coordinates $c_1, ..., c_n$ and an element a within C. For a to be targeted by ATB-movement, the first condition is that a be present in all coordinates, $c_1, ..., c_n$ (Williams 1978). For us this means that a must be shared by all coordinates, $c_1, ..., c_n$.

Note that this requirement, in combination with the assumption that the subject in SLF undergoes covert ATB-movement explains why (15), discussed in section 2.2 and repeated in (84) below is ungrammatical: The subject is shared between

C1 and C2, but not C3. This violates the requirement that ATB-movement targets all coordinates.

(84) *Den Hund$_1$ [$_{C'}$ hat **der Hans** t$_1$ geschlagen] und [$_{C'}$ wird __ die Katze
the dog has the Hans beaten and will the cat
quälen] und [$_{C'}$ hat der Peter t$_1$/ das Pferd gebürstet]
torture and has the Peter the horse brushed

This also means that partial ordering of coordinates on the same level of coordination, as would be the case for C1 and C2 in (84), is predicted to be ungrammatical: Since it is covert ATB-movement that induces order between all coordinates, and since ATB-movement must target all coordinates, order will always be established between all coordinates.

Apart from the requirement that ATB-movement requires sharing of an element in all coordinates, and in addition to the parallelism restrictions on sharing discussed in 3.3.4, we formulate a condition, when sharing may occur at all. We propose that the necessary configuration for sharing involves the absence of order between the structures $c_1, ..., c_n$, as in (85a). (85a) must be met for each step of movement, as specified in (85b). (85) is taken to be a sufficient condition for both overt and covert ATB-movement.

(85) *General ATB-input condition*
Let C be a coordinate structure with coordinates $c_1, ..., c_n$, then
a. a can be shared by $c_1, ..., c_n$ if no S-O within $c_1, ..., c_n$ has frozen an order between $c_1, ..., c_n$; and
b. if a is to ATB-move out of C, a must be shared by $c_1, ..., c_n$ in its base position and at each intermediate landing site within C.

Importantly, (85) is independent of the CSC in (72). The latter is a derivational constraint, which checks upon movement whether the coordinates are ordered or not. (85), on the other hand, is a representational constraint. As such it can only be active once a representation has been established, i.e. when the first piece of structure has undergone S-O. If the coordinates are inferred to be ordered, even if only relatively, the ATB-input condition does not allow sharing of any material that c-commands the spelled out pieces of structure.

Once (85) is assumed, two seemingly unrelated problems that were discussed above can be accounted for. The first problem is that even though the CSC in (72) correctly predicts AE in non-SLFs to be impossible, it does not exclude ATB-movement in SLFs, which was shown to be unavailable. Further we have not determined the reason yet, why covert ATB-movement is a local operation. In the following subsections, we show that in both cases, the relevant aspect is that (85)

excludes movement through edge positions in the given configuration.

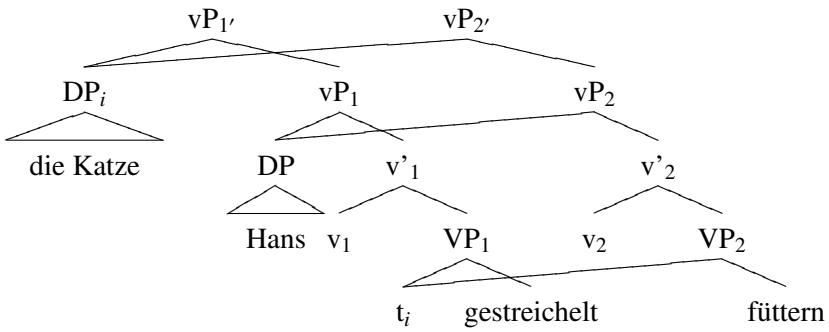
5.1.1 ATB-movement in SLF

The CSC in (72) does not rule out ATB-movement from ordered coordinates, yet SLF strictly prohibit overt ATB-movement, as repeated in (86).

(86) *Die Katze$_1$ [hat **Hans** t$_1$ gestreichelt] und [wird __ t$_1$ füttern]
the cat has Hans stroked and will feed

Since *die Katze* is an object and coordination is at C', it must move cyclically through the edges of the phases it is contained in, i.e. it should be shared by the two Spec,vPs. At the vP-level the structure in (87) is obtained. (85a) is fulfilled for the base position of the object and for the subject in the Spec,vPs as no S-O has applied yet. Thus sharing in these positions is possible.

(87)



We treat edge-positions created through remerge differently from edge-positions created by first-merge. Because of this the subject is in S-O(vP$_{1'}$) and S-O(vP$_{2'}$). As it is to move covertly, it must be linearized *in situ*, say, in S-O(vP$_{1'}$) only. This in turn has the consequence that the inference system deduces that vP$_1$ and vP$_2$ are definitely ordered to each other, which also gets spelled out that way. The object, which moves overtly to the Spec,vPs, is not linearized with S-O(vP$_{1'}$) and S-O(vP$_{2'}$). (85) will not allow the configuration in (87) after S-O of the vPs, however, because the coordinates are inferred to be ordered and S-O has frozen the order relations, in particular the ones of the shared subject. Therefore no sharing is possible anymore outside of the two S-O domains. (85b) is violated.[28]

[28]Covert movement of the subject in SLF is not ruled out by (85), as subjects are in an inherent edge position. This means that even though linearization of the shared subject *in situ* induces relative order of the coordinates at S-O(vP), this order is irrelevant for movement of the subject itself, since it needs no intermediate landing sites when it moves out of the coordination. Section 6.1 discusses cases, where the subject has to move to Spec,TP, which makes SLF unavailable.

It should be noted at this point, that in this analysis the complementary distribution of covert ATB-movement and overt ATB-movement observed is contingent on the positions of the shared elements with respect to coordination. If the coordination coincides with a S-O-domain, then covert and overt ATB-movement can co-occur (88). The indirect object *der Maria* is shared by C1 and C2 and undergoes covert ATB-movement. Although ordering statements are derived immediately, they are only frozen at the next S-O, which is the vP-coordination itself. Therefore, the direct object *die Katze* may be both shared *in situ* and moved to the edge of the vP-coordination. The latter is allowed, because no intermediate landing site is needed and therefore also no further sharing.[29]

(88) Die Katze$_1$ hat [er **der Maria** t$_1$ gezeigt] aber [der Fritz __ t$_1$ geschenkt]
the cat has he the Maria shown but the Fritz given
'The cat, he showed it to Maria, but Fritz gave it to her.'

On the other hand, AE is also licensed in the same environment (89). This is due to the fact that order statements are derived upon merge. Therefore sharing of *der Maria* has the consequence that the inference system determines that the coordinates are to be ordered, when *die Katze* is to move from the coordination. Since the coordinates are ordered at the point of coordination, AE can fulfill the CSC.

(89) Den Ring$_1$ hat [der Hans **der Maria** t$_1$ nur gezeigt] aber [der Fritz __
the ring has the Hans the Maria only shown but the Fritz
die Kette geschenkt]
the necklace given
'The ring, Hans showed it to Maria, but Fritz gave her the necklace.'

5.1.2 The locality of covert ATB-movement

We saw that covert ATB-movement is a local operation, since it is restricted to contexts where coordination is not higher than the S-O domain from which that movement takes place. Since the object is located in vP in (90), and coordination is at C', covert ATB-movement would have to cross the vP-phase-boundary. Ungrammaticality results.

[29]The same is true if the direct object is to ATB-move covertly, as (i) shows. We thank Jeroen van Cranenbroeck (personal communication) for pointing out this possibility.

(i) Gestern hat [der Hans **ihr die Katze** gezeigt] aber [der Fritz __ __ geschenkt]
Yesterday has the Hans her the cat shown but the Fritz given
'Yesterday, Hans showed the cat to her, but Fritz gave it to her.'

(90) *Hans [hat **jede** **Katze** gefüttert] und [wird __ schlagen]
Hans has every cat fed and will beat

According to the ATB-input condition in (85) *jede Katze* in (90) can be shared in its base position, as this is the first phase. But since it is to move covertly out of the coordination it must move through the Spec,vPs. Upon S-O the sister node of the remerged specifier is linearized. The object is linearized *in situ* and therefore after S-O the inferred order between the coordinates is frozen. This means that no sharing of material c-commanding the S-O domain is possible. Sharing of the object therefore makes its own cyclic ATB-movement impossible. (90) is predicted to be ungrammatical.

If the coordination is at vP, objects may ATB-move covertly. This situation is the same as in (88) above. We therefore do not discuss it again.

5.2 The General Coordinate Structure Constraint

We claimed above that the CSC in (72) is a condition that only holds for overt movement. In this section, we will specify this claim and discuss it in relation to covert movement from coordinate structures. In particular, we will argue that the CSC evaluates movement that changes order (overt movement) on the one hand, and movement that changes scope (overt and covert movement) on the other. In the first case, the requirements are the ones formulated in (72). In the latter case, the requirement is that variables be bound in all coordinates.

Covert movement from a coordinate structure seems to be less restricted than overt movement in the same environment. For covert movement from a coordination to be possible, it suffices that the moved element bind a variable in all coordinates ((Ruys 1992) and especially (Fox 2000)), as formulated in (91). Since both traces and pronouns can act as variables, both (92a) and (92b) are possible post-movement configurations and yield the desired biding configuration in (93).

(91) *Covert movement from coordinate structures*
Let C be a coordinate structure with coordinates $c_1, ..., c_n$, then, if a moves out of C, it must bind a variable in $c_1, ..., c_n$.

(92) a. X_1 [...t_1...] & [...t_1...]
b. X_1 [...t_1...] & [...pro_1...]

(93) X λ1 [...x_1...] & [...x_1...]

The cases of overt movement from coordinate structures that have traditionally been considered are more restricted than covert movement, in that (92a) is the only post-movement configuration possible. However, variable binding could still be

considered a necessary condition on all movement from coordinate structures.

In this paper, our focus was on data that do not seem to pattern with either (92a) or (92b), because they exhibit the surface structure in (93).

(94) X_1 [...x_1...] & [.....]

However, we want to maintain that variable binding is a necessary condition for movement from coordinate structures, as long as this movement changes scope. In particular, we want to propose that the CSC formulated in (72) is a condition of movement that changes order relations. As such, it will only concern overt movement. However, movement can not only manipulate order relations may also scope. We follow Fox (2000) and others in assuming that as soon as movement manipulates interpretation, i.e. scope, (91) must hold. We want to put forth that as soon once an element moves out of a coordinate structure, the CSC evaluates whether this movement adheres to its requirements.[30] The latter depend on which kind of interface information, which we take to be built up parallel to syntactic derivation, is manipulated by movement. We propose (95) as the formulation of the CSC for all types of movement.

(95) *The General Coordinate Structure Constraint*
Let *C* be a coordinate structure with coordinates $c_1, ..., c_n$ then *a* may move out of *C* iff the following holds:
   a. if movement of *a* out of *C* manipulates order, then *a* must move out of all distinct coordinates of *C*;
   b. if movement of *a* out of *C* manipulates scope, then *a* must bind variables in all coordinates.

(95) yields the following picture. As soon as movement changes scope, but not order, the only condition is (95b), i.e. the requirement that it binds variables in all coordinates. Both (92a), exemplified by covert ATB-movement in (96) and (92b), exemplified in (97) are possible post-movement structures, since both of them will yield the binding configuration (98b). (98a) gives the relevant reading for both examples.

(96) Gestern hat [Hans **keine Katze** gefüttert] und [Peter __ gebürstet]
Yesterday has Hans no cat fed or Peter brushed

[30] We depart from the view that the CSC is a general requirement that holds at LF. Importantly, the CSC only applies if an element actually moves out of a coordinate structure and does not hold in cases where an element that is base-generated above the coordination binds variables inside the coordination. The CSC must thus be tied to movement.

(97) Gestern hat [Hans keine Katze$_i$ gefüttert] und [Peter sie$_i$ gebürstet]
Yesterday has Hans no cat fed or Peter her brushed

(98) a. $\neg\exists$ x (cat(x) $\wedge$ (Hans fed x) $\wedge$ (Peter brushed x)
b. [keine Katze] λx [Hans fed x] & [Peter brushed x]

If, on the other hand, movement changes both scope and order, both (95a) and (95b) must hold. The only configuration that fulfills both of them is (92a). This immediately predicts that AE should be impossible in such cases. (99) meets this prediction.

(99) *Wen$_1$ [hat **Hans** t$_1$ getroffen] und [wollte __ eine Suppe essen]
Who has Hans met and wanted a soup eat

Finally, if movement manipulates order, but does not lead to a change in scope, (95a) is the only requirement. Thus, movement in these cases can either be ATB or AE, depending on whether or not the coordinates are distinct. (95) makes the strong prediction that AE, as in the focussed on in this paper should only involve movement that manipulates order, but not scope. (99) indicates that this prediction might be correct, whether it is borne out across-the-board is left to future research.

6 Discussion

This paper put forth a new formulation of the CSC, based on the analysis of German SLF-constructions. It showed that SLF involve coordination; since they allow for AE, the traditional CSC, which requires movement to be from all coordinates, cannot be correct. The possibility of AE in SLF was directly linked to the subject gap they exhibit. New evidence showed that there is no straightforward account for the latter, as coordination in SLF must be high, at C'.

We proposed that the subject gap is the result of covert ATB-movement, an operation that has not received much attention so far (but cf. (Pesetsky 1996)). It was shown that this is a more wide-spread phenomenon: Once its strict locality is taken into account, object gaps can be found as well.

We claimed that the input to ATB-movement involves sharing of the moved material by all coordinates and assumed that shared material must always move out of the coordination, either overtly or covertly. Especially the case of covert ATB-movement of non-quantified phrases is unmotivated in the present theory, since this movement will be covert, yet vacuous for LF. We have no explanation to offer, just the mere speculation that for some reason identity can only expressed by variable binding and that therefore shared material must move to a position that allows for it to bind variables in all coordinates.

Further we put forth that covert ATB-movement and the connected linearization *in situ* will yield ordering of the coordinates. The CSC for overt movement, in turn, was formulated as a condition sensitive to whether the coordinates are ordered or not, such that whenever the former holds, overt AE is licensed. The CSC, as formulated in this paper, is therefore a constraint that is sensitive to interface information. This conception contradicts assumptions about modularity. In particular, the following assumption, which is part of most generative theories, must be rethought, if our claims are correct.

(100) *Order Blindness Hypothesis*
The generative system is blind to order relations between the elements that stand in dominance relations to each other.

Our formulation of the CSC for overt movement is embedded in a strictly derivational system where information relevant for the interfaces is established in parallel to syntactic operations. In particular, each step of merge will establish the order and scope relations that hold of the merged elements. The assumption that different types of interface information are present in the syntax, allowed us to propose that movement from coordinate structures is checked for its impact on each type of information. If movement changes order, it will be subject to the condition that it must move out of all ordered coordinates. If movement changes scope, it will have to fulfill the requirement that it binds variables in all coordinates.

S-O, in this system, simply fixes the statements derived during the syntactic derivation. We further proposed that cyclic and non-cyclic movement are distinguished by the fact that only the latter occurs from positions that have already undergone S-O. This latter proposal proved to be necessary for capturing the conditions on ATB-movement. As ATB-movement is no longer expressed by the CSC in our system, its restrictions must be captured separately. We put forth that ATB-movement adheres to a sharing condition, that must hold of each intermediate landing site and is sensitive to whether or not S-O has already fixed order relations.

Apart from conceptual questions, this paper also raises some empirical issues. A few of those are discussed in the following subsections. Due to space limitations we can only provide a cursory overview of the problems that are left for future research.

6.1 Cross-linguistic distribution of SLF

The first question concerns the cross-linguistic distribution of SLF. We would like to concentrate on the contrast between German and English. The only contexts in English where subject gaps are expected to be visible are those that are maximally similar to German with respect to word order, namely, inversion configurations.

Here, the subject is preceded by either an auxiliary or the finite verb itself. Two such constructions exist: *Wh*-movement with *do*-support and locative inversion. Given that *wh*-movement always manipulates scope, the theory outlined in section 5.2 predicts that AE should be impossible in those cases. This is indeed what we find:[31]

(101) *Who$_1$ [did **John** t$_1$ kiss] and [has __ gone to sleep]

Locative inversion, on the other hand, exhibits an obvious subject gap and also licenses AE, as shown in (102). The locative PP *down the hill* must be related to C1 alone.

(102) Down the hill$_1$ [rolled **the ball** t$_1$] and [hit __ Mary on the head]

The fact that subject gaps are obvious only in inversion contexts does not rule out their existence in non-inversion contexts. That is, we should find non-inversion contexts with only one subject that license AE.[32] Yet, these cases do not seem to exist. The example in (103), for instance, could be analyzed as TP-coordination, with the subject being shared in Spec,TP. Topicalization would then be predicted to be possible by means of AE, contrary to fact.

(103) *The cat$_1$ [**John** kissed t$_1$] and [__ went to sleep]

We would like to suggest that in locative inversion contexts the subject is allowed to stay in Spec,vP (and possibly in *wh*-contexts as well). In all other environments English subjects move to Spec,TP. Given that in our theory non-A'-elements do not move to edge positions, the subject is part of S-O(vP). Therefore, an order statement is established for the subject at S-O(vP). Although subsequent movement to Spec,TP will not contradict any previously established order statements and thus should be fine for non-shared subjects, such movement will not be be allowed for shared ones. Movement of a shared subject to Spec, TP will violate the ATB-input condition (85), because the coordinates are relatively ordered at S-O(vP), due to the fact that the shared subject is part of S-O(vP).

We thus predict SLF to be possible only in those languages that do not require the subject to move to Spec, TP. We have to leave a detailed investigation of this claim for future research.

[31] It should also be pointed out that C'-coordination, where both coordinates are headed by auxiliaries is judged to be bad by most speakers, no matter whether or not movement of any kind has taken place. To the best of our knowlegde, no account has been offered for this restriction.

[32] We do not address the examples of AE found in English noted by Lakoff (1986), and Culicover and Jackendoff (1997) as they are not obviously related to the constructions discussed in the present paper.

6.2 Conjunction Reduction

Another difference between German and English is the (non-)availability of object gaps, i.e. covert ATB-movement of objects in our proposal. Whereas they are licensed in German (if the locality requirements are fulfilled), they are strictly ungrammatical in English, as shown in (104).

(104) *John [hit **the cat**] and [beat __]

We want to propose that the unavailability of (104) arises because of an inconsistent order of the object with respect to the verbs, due to the VO order of the English VP. When an object is shared and linearized *in situ* in one of the coordinates in German, a maximally consistent order is easily available. Since German is OV in VP, the object can strictly precede one verb and relatively precede the others. In English, on the other hand, VO requires that the verb precedes the object in both cases. In (104), this order is violated, since the object is preceded by the verb in C1 but not preceded by the verb in C2. The maximally consistent order could only be achieved by linearizing the object in C2, as in (105). (105) is indistinguishable from *right-node-raising* (RNR).

(105) John [hit __] and [beat **the cat**]

If (105) is indeed the English equivalent of German object gaps we would expect it to behave like the latter in two relevant respects. First, cases like (105) should license AE, which is falsified by (106).

(106) *His father$_1$ [John showed t$_1$ __] and [Bill gave his mother **the dog**]

However, AE in RNR contexts is also ungrammatical in German:

(107) *Dem Fritz$_1$ zeigte [Hans t$_1$ gestern __] und [Kai der Maria heute **das Haus**]
the Fritz showed Hans yesterday and Kai the Maria today the house

Further, RNR does not adhere to the strict locality conditions, i.e. phase-boundness (108). We thereby have to leave open the question, whether RNR is an instance of object gaps. But see Bachrach and Katzir (2009), McCawley (1982), Wilder (1999) for proposals viewing RNR as involving MD.

(108) [John has hit __] and [Peter has fed **the cat**]

We want to briefly address the relation between the constructions discussed above and gapping. Gapping closely resembles subject and object gaps. First, similar locality conditions have been observed. It is well known that no finite verb (109) (modified from Hartmann (2000)) and no complementizer are allowed in C2.

(109) Peter had caught an eel in the Charles River and John (*had) ~~caught~~ a flounder in the Missisquoi.

The locality conditions are also shown by the fact that negation can scope over the coordination in gapping (Johnson (2003), Oehrle (1987), Siegel (1984, 1987)). The result is an ambiguous sentence as in (110), which has the interpretations in (111). If coordination must be at the vP-level, this follows immediately.

(110) Ward can't eat caviar, and Sue, beans.
(Siegel 1984:524)

(111) a. Ward can't eat caviar, and Sue can't eat beans.
b. Ward can't eat caviar or Sue can't eat beans.

The property of low coordination has actually been argued to show that gapping involves AE of the subject from C1 to Spec,TP (Johnson 2003, to appear). Evidence for this comes from McCawley's 1993 observation that subjects in C1 can bind into C2, as in (112) (modified from (Johnson 2003:30) to fit our conventions). We have seen that QR out of a coordination is restricted by scope economy in English. Since no scope-bearing element is c-commanding the subject, which would allow for scope interaction, the subject cannot be assumed to QR out of the coordination and bind into C2. Hence, coordination cannot be higher than at vP, and the subject undergoes AE to Spec, TP. (113) shows that when there is no gapping, binding into C2 is unacceptable.

(112) a. Not every girl$_i$ **ate** a GREEN banana and her$_i$ mother ___ a RIPE one.
b. No boy$_i$ **joined** the navy and his$_i$ mother ___ the army.

(113) a. *Not every girl$_i$ ate a green banana and her$_i$ mother sold a ripe one.
b. *Not every girl$_i$ joined the navy and his$_i$ mother headed the army.

We take all of this to be circumstantial evidence that subject and object gaps and gapping might, in the end, be the same phenomenon.[33] But, again, this is left for future research.

[33]noftnotefalse Pesetsky (1996) outlines a proposal in which gapping is the result of covert ATB-movement. This account for gapping is similar to our analysis of subject and object gaps

6.3 Problems with V2 and CP-coordination

Even though the proposal we made makes some generalizations regarding locality of covert ATB-movement, two important restrictions cannot be captured.

First, recall that covert ATB-movement of the subject can take place from C'-coordinations. However, it is impossible to covertly move the subject out of a CP-coordination (114).[34] Given that we treat coordinated S-O domains as one single S-O domain, the subject should be able to covertly ATB-move from its *in situ* position to adjoin to the CP formed by coordination, hence the ungrammaticality of (114) is not predicted.

(114) *[Die Katze$_1$ hat **er** t_1 gestreichelt] und [den Hund$_2$ wird __ t_2 füttern]
the cat has he stroked and the dog will feed

We do not have an explanation for this behavior, but we want to point out that covert movement generally behaves in this way. Only C'-coordinations as in (115a) allow QR from C1 to bind into C2, but not CP-coordinations (115b). Hence, a solution to the problem in (115) will likely solve the one in (114), too.

(115) a. Einmal [hat Hans jeden$_1$ Berg bestiegen] und [hat Michael
once has Hans every mountain climbed and has Michael
ihn$_1$ photographiert]
him photographed
'Once, Hans climbed every mountain and Michael photographed it'

b. *[Einmal hat Hans jeden$_1$ Berg bestiegen] und [einmal hat
once has Hans every mountain climbed and once has
Michael ihn$_1$ photographiert]
Michael him photographed

The question is whether and how the latter observation might carry over to the following problem. While subject gaps occur in environments where C is occupied by the finite verb (i.e. V2), they are excluded whenever C is occupied by a complementizer (in C2), as shown by (116). Since in our proposal the only difference between the grammatical cases discussed above and (116) is the element that occupies the C-position, the difference in grammaticality cannot be accounted for.

(116) *Die Katze$_1$ hat Kai gesagt [dass **sie** t_1 gestreichelt hat] und [dass __
the cat has Kai said that she stroked has and that
den Hund füttern wird]
the dog feed will

[34] We thank Edwin Williams (personal communication) who raised this relevant question.

Again, it should be noted that covert movement in general, i.e. even if it is not ATB, cannot move out of a C'-coordination, where both C's are headed by complementizers. This is shown by (117), which forms a minimal pair with (116). The quantifier in subject position of C1 cannot bind the variable in C2.

(117) *Kai hat gesagt [dass **keiner**$_1$ die Katze gestreichelt hat] und [dass
Kai has said that noone the cat stroked has and that
Martin seinen$_1$ Hund füttern wird]
he the dog feed will

We do not understand these restrictions on covert movement, therefore, we must leave them to future research.

References

Bachrach, Asaf, and Roni Katzir. 2009. Right node raising and delayed spell-out. In *InterPhases: Phase-Theoretic Investigations of Linguistic Interfaces* ., ed. Kleanthes K. Grohmann. Oxford University Press.

Beck, Sigrid. 1996. Wh-Constructions and Transparent Logical Form. Doctoral Dissertation, Universität Tübingen, Tübingen.

den Besten, Hans. 1983. On the interaction of root transformations and lexical deletive rules. In *On the Formal Syntax of the Westgermania*, ed. W. Abraham. Amsterdam, The Netherlands: John Benjamins Publishing Company.

Blevins, James P. 1990. Syntactic Complexity: Evidence for Discontinuity and Multidomination. Doctoral Dissertation, UMass at Amherst.

Bošković, Željko, and Steven Franks. 2000. Across-the-Board movement and LF. *Syntax* 3:107–128.

Büring, Daniel, and Katharina Hartmann. 1998. Asymmetrische Koordination. *Linguistische Berichte* 174:172–201.

Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge, Massachusetts: MIT Press.

Chomsky, Noam. 2001. Derivation by phase. In *Ken Hale: A Life in Linguistics*, ed. Michael Kenstowicz, 1–52. Cambridge, Massachusetts: MIT Press.

Citko, Barbara. 2003. ATB Wh-questions and the nature of merge. In *Proceedings of NELS 33*. Amherst, MA: GLSA.

Citko, Barbara. 2005. On the nature of merge: External merge, internal merge, and parallel merge. *Linguistic Inquiry* 36:475–496.

Culicover, Peter W., and Ray Jackendoff. 1997. Semantic subordination despite syntactic coordination. *Linguistic Inquiry* 28:195–217.

Engdahl, Elisabet. 1986. *Constituent Questions*. Dordrecht, The Netherlands: D. Reidel Publishing Company.

Fox, Danny. 2000. *Economy and semantic interpretation*. Cambridge, Massachusetts: MIT Press.

Fox, Danny. 2002. Antecedent-contained deletion and the copy theory of movement. *Linguistic Inquiry* 33:63–96.

Fox, Danny, and David Pesetsky. 2004. Cyclic linearization of syntactic structure. *Theoretical Linguistics* 31:1–46.

Gärtner, Hans-Martin. 2002. *Generalized Transformations and Beyond: Reflections on minimalist Syntax*. Akademie Verlag.

Gazdar, G., I. Kein, G. Pullum, and I. Sag. 1985. *Generalized Phrase Structure Grammar*. Cambridge, Massachusetts: Harvard University Press.

Hallman, Peter. 2004. On the derivation of verb-final and its relation to verb-second. Ms. McGill University.

Hartmann, Katharina. 2000. *Right Node Raising and Gapping: Interfaces Conditions on Prosodic Deletion*. Philadelphia, Pennsylvania: John Benjamins.

Höhle, Tilman N. 1983. Subjektlücken in Koordinationen. Ms. Universität Köln.

Höhle, Tilman N. 1990. Assumptions about asymmetric coordination in German. In *Grammar in Progress: GLOW essays for Henk van Riemsdijk*, ed. Joan Mascaró and Marina Nespor, 221–235. Foris Publications.

Johnson, Kyle. 2002. Restoring exotic coordinations to normalcy. *Linguistic Inquiry* 33:97–156.

Johnson, Kyle. 2003. In search of the English middle field .

Johnson, Kyle. to appear. Gapping isn't (VP) ellipsis. *Linguistic Inquiry* .

Kayne, Richard S. 1994. *The Antisymmetry of Syntax*. Cambridge, Massachusetts: M.I.T. Press.

Lakoff, George. 1986. Frame semantic control of the Coordinate Structure Constraint. In *Papers from the Parasession on Pragmatics and Grammatical Theory, Chicago Linguistic Society 22*, ed. Anne Farley, Peter Farley, and Karl-Erik McCullough. Chicago University Press.

Lechner, Winfried. 2000. Asymmetric and bivalent coordination in German. Blago summerschool.

May, Robert. 1985. *Logical Form: Its Structure and Derivation*. Cambridge, Massachusetts: MIT Press.

Mayr, Clemens, and Viola Schmitt. 2008. On extending the application-domain of the CSC. In *Proceedings of 27th West Coast Conference on Formal Linguistics*, ed. Natasha Abner and Jason Bishop, 318–325. Somerville, Massachusetts: Cascadilla Proceedings Project.

McCawley, James D. 1982. Parentheticals and discontinuous constituent structure. *Linguistic Inquiry* 13:91–106.

McCawley, James D. 1993. Gapping with shared operators. In *Berkeley Linguistics Society*, ed. David A. Peterson, 245–253. Berkeley, California.

Munn, Alan. 1992. A null operator analysis of ATB gaps. *The Linguistic Review* 9:1–26.

Munn, Alan. 1993. Topics in the syntax and semantics of coordinate structures. Doctoral Dissertation, The University of Maryland.

Munn, Alan. 1999. On the identity requirement of ATB extraction. *Natural Language Semantics* 7:421–425.

Oehrle, Richard T. 1987. Boolean properties in the analysis of gapping. In *Syntax and semantics: discontinuous constituency(20)*, ed. Geoffrey J. Huck and Almerindo E. Ojeda, 203–240. San Diego, California: Academic Press, Inc.

Pesetsky, David. 1996. An ATB theory of gapping: Johnson (1996). Handout MIT.

Reich, Ingo. 2007. "Asymmetrische Koordination" im Deutschen. Habilitation, University of Tübingen.

Ross, John. 1967. Constraints on variables in syntax. Doctoral Dissertation, Massachusetts Institute of Technology.

Ruys, E. G. 1992. The scope of indefinites. Doctoral Dissertation, LEd, Utrecht.

Sauerland, Uli. 2000. The content of pronouns: Evidence from focus. In *Proceedings of SALT X*, ed. Brendan Jackson and Tanya Matthews, 167–184. Cornell University, Ithaca, NY: CLC Publications.

Sauerland, Uli. 2001. On quantifier raising in German. Ms. Universität Tübingen.

Sauerland, Uli. 2004. The interpretation of traces. *Natural Language Semantics* 12:63–127.

Schwarz, Bernhard. 1998. On odd coordinations in German. *The Journal of Comparative Germanic Linguistics* 2:191–219.

Siegel, Muffy E. A. 1984. Gapping and interpretation. *Linguistic Inquiry* 15:523–530.

Siegel, Muffy E. A. 1987. Compositionality, case, and the scope of auxiliaries. *Linguistics and philosophy* 10:53–76.

von Stechow, Arnim. 2005. LF in einem Phasenmodell: Bemerkungen anhand von Fischers Bindungstheorie. handout GGS 2005.

Thiersch, Craig. 2005. A note on asymmetric coordination and subject gaps. In *Organizing Grammar: Linguistics Studies in Honor of Henk van Riemsdijk*, ed. Hans Broekhuis, Norbert Corver, and Riny Huybregts. Mouton.

Travis, Lisa. 1984. Parameters and Effects of Word Order Variation. Doctoral Dissertation, Massachusetts Institute of Technology.

Van Valin, Robert D. 1986. An empty category as the subject of a tensed S in English. *Linguistic Inquiry* 17:581–586.

Wilder, Chris. 1997. Some properties of ellipsis in coordination. In *Studies on Universal Grammar and Typological Variation*, ed. Artemis Alexiadou and T. Hall, 59–107. Amsterdam: Benjamins.

Wilder, Chris. 1999. Right-node raising and the LCA. In *Proceedings of WCCFL 18*, ed. Sonya Bird, Andrew Carnie, Jason D. Haugen, and Peter Norquest.

Williams, Edwin. 1978. Across-the-board rule application. *Linguistic Inquiry* 9:31–43.

Zwart, C. Jan-Wouter. 1991. Subject deletion in Dutch: A difference between subjects and topics. In *Language and Cognition*, ed. M. Kas, Eric Reuland, and C. Vet, volume 1, 333–350. University of Groningen.

Zwart, C. Jan-Wouter. 1997. *Morphosyntax of Verb Movement: A Minimalist Approach to the Syntax of Dutch*. Dordrecht: Kluwer Academic Publishers.

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