

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 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_{t₁} did John [buy t₁] and [read t₁]?
 b. *What_{t₁} did John [buy t₁] and [read the magazine]?

A fairly well-known type of coordination that is found in some Germanic languages apparently contradicts this generalization. The present paper is concerned with this phenomenon in its German variety, which has been called *Subjektücke 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. Coordinates are in brackets. We depart from this convention only if it could be misleading. For simplicity's sake, we will mainly consider structures with 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_{t₁} [hat **er** t₁ 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_{t₁} hat er geglaubt [habe **sie** t₁ 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 element con-

tained 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 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 Obj₁ [C' V_{fin} ... [vP Subj ... t₁ ...]]] & [C' V_{fin} ... [vP 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 Hund₁ hat er geglaubt [habe sie t₁ 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:

(7) AE is dependent on the presence of a subject gap in C2.

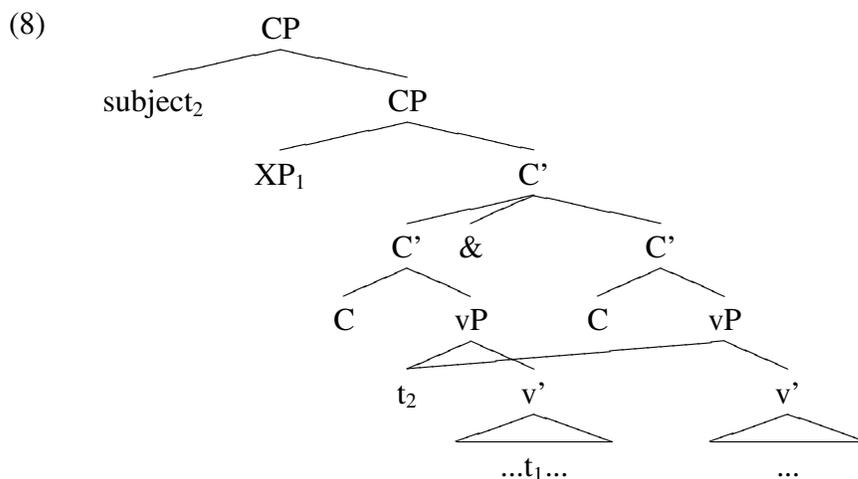
This conjecture will be reinforced by the finding that AE and ATB-movement are dependent on the presence or absence of a subject gap in C2. In essence they are in complementary

distribution, as we will see.

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 multi-dominance (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 (8).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



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 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 with respect to each other. This, in turn, determines 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 here is a constraint on movement that manipulates order alone. We present 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-movement are in complementary distribution

The preceding section showed that AE is only possible if C2 does not have an overt subject. Let us now further investigate the empirical issues regarding AE. (9) and (10) show that AE and ATB are in complementary distribution in German. Non-SLF cases only allow ATB-movement (9a), but not AE (9b). SLF-constructions, on the other hand, allow only AE (10b), but not ATB-movement (10a).⁸

- (9) a. Dieses Brot₁ [hat er t₁ gebacken] und [werde ich t₁ essen]
 this bread has he baked and will I eat
 'This bread, he baked it and I will eat it.'
- b. *Dieses Brot₁ [hat er t₁ gebacken] und [werde ich die Suppe kochen]
 this bread has he baked and will I the soup cook
- (10) a. *Dieses Brot₁ [hat er t₁ gebacken] und [wird __ t₁ essen]
 this bread has he baked and will eat
- b. Dieses Brot₁ [hat er t₁ 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 (11) exhibits this behavior. (11) allows a reading, where John and Bill did not kiss the same girl.

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

In the case of SLF, however, an indefinite subject such as *einer* 'someone' in (12a) can never be interpreted independently in C1 and C2. Sentence (12a) does not allow the reading in

(12b). 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.⁹

- (12) a. Die Katze₁ [hat **einer** t₁ gestreichelt] und [wird __ den Hund treten]
 the cat has someone stroked and will the dog 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.

Reconsider 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 (13).

- (13) [CP Obj₁ [C' V_{fin} ... [vP Subj ... t₁ ...]]] & [C' V_{fin} ... [vP 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 (13) does not arise.

For the present discussion we take the structure in (14) 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.

(14) [CP Obj₁ [C' V_{fin} [XP Subj_i [VP [VP ... x_i ... t₁ ...] & [C₂ V_{fin} ... x_i ...]]]]]

If (14) 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.¹⁰ Consider (15), 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.

(15) *Den Hund₁ hat₂ [TP **der Hans** t₁ geschlagen t₂ [C₂ und wird die Katze quälen]]
the dog has the Hans beaten and will the cat torture
und [TP der Peter t₁/ das Pferd gebürstet t₂]
and the Peter the horse brushed

One might object that the ungrammaticality in (15) is due to the ATB-movement of the finite verb or a constraint that does not allow coordination of TPs. But as (16) shows,

coordination of C's above VP is as impossible as (15). Again, both ATB-movement from both C's and no movement from the second C' result in ungrammaticality.

- (16) *Den Hund₁ [_{C'} hat **der Hans** t₁ geschlagen [_{C2} und wird die Katze quälen]] und
the dog has the Hans beaten and will the cat torture and
[_{C'} hat der Peter t₁/ das Pferd gebürstet]
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 (15) and (16) sufficient to rule out low coordination approaches and maintain that SLF involve coordination of C'-coordinates.¹¹ This leaves us with the puzzle in (13).

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 by Büring and Hartmann (1998) and Sauerland (2001), object quantifiers in C1 of SLF-coordinations may scope over the coordination. The object quantifier in C1 of (17), for instance, can scope over the disjunction and bind a variable in C2, yielding the reading in (18).¹²

- (17) Heute hat **er** keinen Berg₁ bestiegen oder hat ihn₁ fotografiert
today has he no mountain climbed or has him photographed
'Today, he climbed no mountain and photographed it.'

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

At first sight, (18) 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 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 (17) 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 all coordinates. This requirement is fulfilled in (17). In (19), on the other hand (modeled after Sauerland's 2001 (16)), which forms a minimal pair with (17) 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 (20).

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

(20) $\neg(\text{he climbed a mountain}) \vee (\text{he took a picture of the K2})$

The contrast between (17) and (19) shows that the wide scope of the quantifier must be derived by movement, since movement restrictions are observed.¹³ 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 (20) 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.¹⁴

(17) and (19) are also relevant regarding the second important property of SLF, namely, the violation of the CSC. Buring 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.¹⁵

The first argument against such an analysis is that the contrast between (17) and (19) shows that covert movement from SLF adheres to restrictions typical of coordinate structures (cf. 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 (21). (21) shows that material can in fact move from the clause embedded by C2, as the object *das Pferd* is moved from the embedded clause in ATB-fashion with the object of matrix C1.¹⁶ Note that so far we have only seen AE from C1. Under certain circumstances ATB-movement is apparently an option.

- (21) Das Pferd₁ [_{C1} hat **er** t₁ gekauft] und [_{C2} meinte __ [hätte ich t₁ gequält]]
 the horse has he bought and said have I tortured
 'The horse, he bought it and said that I tortured it.'

The fact that the clause embedded by C2 in (21) 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 needs to be pointed out that (21) 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.¹⁷

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 thereof. The German anaphor *sich* must be bound from an A-position by a local *syntactic* subject.¹⁸ Since in (22) 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.

- (22) Den Hund₂ [hat **keiner**₁ t₂ gebürstet] und [wird x₁ sich₁ Tollwutmittel kaufen]
the dog has no one brushed and will REFL rabies-medicine buy
'No one brushed the dog and will buy some rabies medicine for himself.'

We showed above 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 (Sauerland 2001).

If the subject in C2 is analyzed as pro (Van Valin 1986) bound by the subject in C1 from its derived position after QR, 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)). (23) shows that for instance objects cannot function as antecedents.

- (23) Den Carsten₁ [hat **sie**₂ t₁ angerufen] und [musste ___ sich_{*1/2} dann betrinken]
the Carsten has she called and must REFL then get-drunk

'She called Carsten and then had to get drunk.'

That is, given (23) it would have to be ensured under an analysis employing *pro* that it is the “parallel” element in C1 that acts as antecedent for *pro*. But it is hard to see why this should be the case. Second, it is unclear why *pro* would have to be silent. Normally, one would expect that the pronoun in the subject position in C2 can have phonological features. But as we have seen, AE is not allowed in this situation. Because of these problems, we do not identify the gap with *pro*. Rather, we argue that the gap in C2 is the result of covert ATB-movement, i.e. some sort of trace of the subject. This hypothesis immediately explains the bound reading, as the gap in C2 will now be a bound variable, namely, a trace of covert movement. Further, we argue in the following that it explains why the antecedent must be the parallel element in C1 and why it must be phonologically null. Most importantly, we will finally establish covert ATB-movement as the link between the subject gap and the possibility of AE. In the following subsection, we present evidence for the ATB-assumption. Subsequently, we devise a theory that makes sure that the subject is always pronounced in C1 and never in C2.

3.2 Covert ATB-movement

The hypothesis we argue for is that the subject in SLF moves covertly from all coordinates to a place outside of the coordinate structure. (24) gives the LF-structure after covert ATB-movement of an SLF-subject.

(24) Subj $\lambda_1[[\dots t_1 \dots]]$ and $[\dots t_1 \dots]$

In this subsection, we establish that (24) is the correct structure for SLF. We first present evidence that the subject moves covertly to a position outside the coordination in SLF and

then go on to show that this covert movement can also target other elements, namely, objects, once the severe locality restrictions of covert ATB-movement are taken into account. We further present data that indicate that movement takes place from all coordinates. Finally, we point out the fact that covert ATB-movement is similar to overt ATB-movement in that it exhibits parallelism constraints. It must be noted at this point that the restriction of why the subject can appear in C1 only does not follow from covert ATB-movement automatically. We defer discussion of this problem to section 4.

3.2.1 Covert movement of the subject in SLF

(25) gives the LF for (22) above, where the subject has ATB-moved covertly to a position above the coordination.

(25) keiner λ_1 [den Hund hat t_1 gebürstet und wird t_1 sich₁ Tollwutmittel kaufen]

(24) predicts that quantificational subjects in SLF always outscope inert quantifiers, such as adverbs.¹⁹ This prediction is borne out, as can be shown by examples where wide scope of the subject above an adverb is independently unavailable, as in the following case. Existential subjects in German cannot scope over a c-commanding universal adverbial, as shown in (26). This makes the strong prediction that in SLF-coordinations, ungrammaticality should arise, if such an adverb c-commands the subject in C1. (27) confirms this: The universal adverb blocks QR of the subject from C1. Thus the SLF-construction becomes ungrammatical.²⁰

(26) Kuchen₁ backt immer einer der Köche t_1
 cake bakes always one of-the cooks
 'Some cook always bakes a cake.'

(always < \exists), *(\exists < always)

- (27) *Kuchen₁ [backt immer **einer der Köche** t₁] und [darf __ dann abwaschen]
 cake bakes always one of-the cooks and will __ then do-the-dishes

Hence, we have established that the subject in SLF moves covertly from C1. However, in order to show that we are in fact dealing with ATB-movement, it will be necessary to show that movement takes place from all coordinates. Note, however, that movement from the subject of C2 is impossible to test: It is crucial for examples such as (27) that the adverb occurs above the subject. Since the subject in C2 is not overt and since adverbs may occur in various positions, we have no way of establishing that the adverb in C2 is in the relevant position. We will therefore defer the proof for movement from all coordinates to the discussion of object gaps in subsection 3.2.4. Before the latter are introduced, however, we need to introduce the particular locality conditions found for covert ATB-movement.

3.2.2 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 up to the next CP-node, which means that coordination must not be higher than this CP. In (28) 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 obtain ATB-movement from both C1 and the embedded part of C2. This movement is too long.

- (28) *Das Buch₁ [hat **er** t₁ gelesen], aber [hat sie gesagt [hatte __ Mühe damit]]
 the book has he read but has she said had __ trouble with-it

Similarly, in (29), ATB-movement from two embedded subject positions would have to be across matrix vP to CP. Ungrammaticality ensues. In (30), which resembles (3), on the other hand, ATB-movement need only be above the embedded C', which is grammatical.

(29) *Das Buch₁ [hat sie behauptet, [habe **er** t₁ gelesen]], aber [hast du gesagt [habe
the book has she claimed have he read but have you said have
__ Mühe damit gehabt]]
trouble with-it had

(30) Das Buch₁ hat sie behauptet, [habe **er** t₁ gelesen], aber [habe __ Mühe damit
the book has she claimed have he read but have trouble with-it
gehabt]
had
'She claimed that he read the book, but that he had problems with it.'

3.2.3 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 (31) 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, as one would expect given our claims. The indefinite in (31) can only be interpreted as binding a variable in C2.²¹

(31) Hans hat [dem Peter **einen Ring** gezeigt], aber [dem Heinz __ geschenkt]
Hans has the Peter a ring shown and the Heinz 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:

(32) Gestern hat der Hans **einen Ring** verloren] und [der Fritz __ gefunden]
yesterday has the Hans a ring lost and the Fritz found

'Hans lost a ring yesterday, and Fritz found it.'

The structures that are expected and also observable once the phase-boundness of covert ATB-movement is taken into account, are summarized in (33).

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

3.2.4 Movement from all coordinates with object gaps

According to the present 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 3.2.1 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 (34). As has been shown by Beck (1996), negative quantifiers act as interveners for covert movement in German. Correspondingly the quantifier *kein Hund* acts as an intervener for QR of *jeden Briefträger* in (34). I.e. the object cannot move covertly across the subject.

- (34) 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 in-

intervener occurs in any coordinate, the result is expected to be ungrammatical. (35)-(36) are object gap configurations, where the quantified object *jeden Briefträger* moves covertly from all coordinates. The subject *kein Hund*, just as in (34), acts as intervener. (35) shows that if the intervener occurs in C1, ungrammaticality ensues. (36) shows the same for C2. This means that covert ATB-movement requires movement from both C1 and C2.

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

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

3.2.5 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.²² ATB-moved material cannot function as subject in C1 and as object in C2, as in (37).²³

(37) *I know a man [who₁ [Bill saw t₁] and [t₁ likes Mary]]
 (Williams 1978:34)

Covert ATB-movement also exhibits such parallelism constraints. In (38), *die Maria* cannot be interpreted as subject in C1 and as object in C2, and vice versa in (39).²⁴

(38) *Das Buch₁ hat [**die Maria** t₁ ausgelesen] und [der Hans __ bewundert]
 the book has the Maria out-read and the Hans admired

(39) *Der Hans₁ hat[t₁ **die Maria** getroffen] und [__ das Buch ausgelesen]
 the Hans has the Maria met and the book finished

3.2.6 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 (1998:189f.) argue that there is an interpretative difference between the sentence in (40), which involves overt ATB-movement of the subject, and (41), which exhibits a subject gap and therefore, in our proposal, covert ATB-movement. They claim that both (40) and (41) can have the bound variable interpretation in (42b), but only (40) can have the independent construal of the existential for each conjunct (42a).

- (40) Eine Frau₁ [ist t₁ in Amerika Außenministerin] und [bekleidet t₁ 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
- (41) In Amerika [ist **eine Frau** Außenministerin] und [bekleidet __ in Deutschland in America is a woman foreign-secretary and has in Germany sogar das zweithöchste Amt des Staates] even the second-highest position in-the state
- (42) a. $\exists x(x \text{ is a woman} \wedge x \text{ is secretary of state in the U.S.}) \wedge \exists y(y \text{ is a woman} \wedge y \text{ has the second-highest office of state in Germany})$
- b. $\exists x(x \text{ is a woman} \wedge x \text{ is secretary of state in the U.S.} \wedge x \text{ has the second-highest office of state in Germany})$

Büring and Hartmann (1998) assume that (40) can get the reading in (42a) through re-

construction of the existential quantifier in each coordinate. (41) 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 (42) becomes possible in SLF, if no AE occurs as in (43). 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 (40) and (41).²⁵

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

3.3 Multi-dominance

If an element a moves ATB from the coordinates c_1, \dots, 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.²⁶

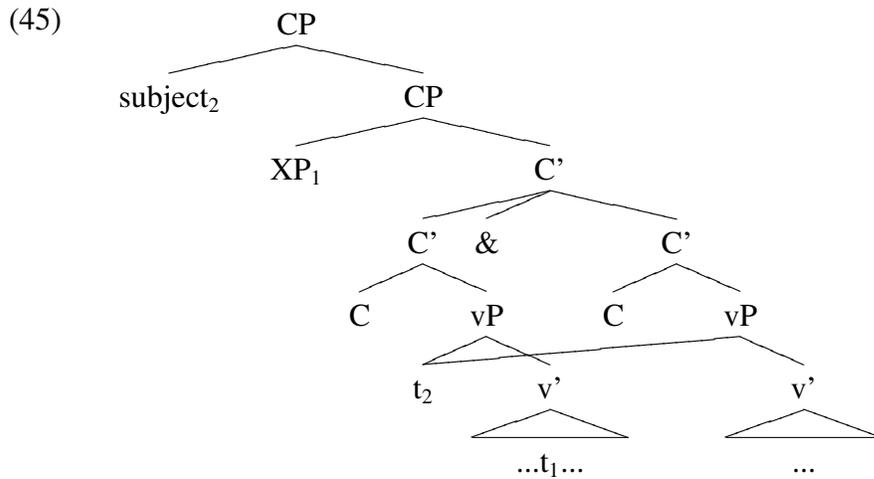
There are at least three possible answers to this question. First, it could be assumed that ATB-movement of a involves movement of a only from c_1 and that movement in all other coordinates is in fact movement of an operator co-indexed with a (Munn 1992), as shown in (44a). Another possibility is an 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 (44b), where boldface indicates phonological deletion. Both approaches yield the linearization facts and at least (44a) also semantic identity.

- (44) a. [...XP₁...] and [...Op₁...]
b. [...XP₁...] 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.²⁷ In other words, if ATB-movement could be analyzed as in either (44a) or (44b), 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) (henceforth, if an element is immediately dominated by nodes α , β , we will refer to it as being *shared* by these nodes). 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)) and thus identity comes for free.

For SLF, we take the subject to be immediately dominated by vP in C1 and vP in C2 (45). 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, as there is only one subject in (45), it should also have only one exponent after linearization, if one makes the assumption that after linearization at most one element α' may correspond to an element α in the syntax, as we will do in section 4.



Semantic identity will follow immediately. More importantly, however, (45), as opposed to (44a) and (44b) 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 (45). 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 an ATB-input condition – in a nutshell, sharing may occur only if the coordinates do not stand in an order relation with respect to each other (see section 5.1 around (85) 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 (44a)-(44b), it must still stipulate that, in the case of ATB-movement, this operation has special properties. In this sense – as the reader will be able to see, once we have made our assumptions explicit – our approach is not more stipulative than others.

4 The proposal

Before proceeding to the proposal, let us briefly recapitulate the problem at hand. In German, the possibility of AE from C1 is tied to the presence of a subject gap in C2. Importantly, AE is strictly ungrammatical if C2 does *not* contain a subject gap. In this case, elements can only move from the coordinate structure if they move ATB. The correct representation of the subject gap should therefore also explain why AE in SLF is possible and does not violate the CSC.

In the preceding section we argued that the subject gap should be analyzed as an instance of covert ATB-movement of the subject. We further argued that ATB-movement involves MD of the element that moves, which means that SLF-constructions contain *one* subject which is dominated by nodes in both C1 and C2. This subject then moves covertly in ATB-fashion and binds variables in both C1 and C2 at LF. The possibility of AE in SLF thus must have something to do with this particular behavior of the subject. More precisely, it must be linked to the fact that the subject does not ATB-move overtly from the coordinate structure, but rather remains *in situ*. In the following, we argue that the linearization procedure for MD-structures in these cases has a crucial impact on the possibility of AE.

Note that the question of how covert ATB-movement is to be linearized has not yet been addressed and that nothing we have said so far predicts that the subject must be spelled out in C1, i.e., that the subject gap is necessarily in C2. We submit that if an element is immediately dominated by more than one node, this element may correspond to only one object after linearization, (46). (45) above, when linearized, can thus have only one exponent of the subject. This assumption will provide the crucial link between linearization of the subject in SLF and the possibility of AE.

(46) One syntactic object α corresponds to at most one phonological object α' .

The fundamental idea behind the analysis we propose is the following: The particular linearization of the subject in SLF introduces an asymmetry which is visible for the CSC. We assume that the CSC standardly requires that movement be from all *distinct* coordinates, where the notion of distinctness is left at an intuitive level for the moment. This requirement is voided in the case of SLF-constructions. Linearization of the subject in such cases prevents the coordinates from being counted as distinct structures from which movement must take place.

The argumentative line we pursue can be sketched as follows: In a standard case of coordination where no covert ATB-movement takes place, the coordinates are built in parallel before they are merged at the point of coordination. There is no pre-determined order between the coordinates. As a consequence, the coordinates count as distinct for the CSC, and any kind of movement out of the coordinate structure must be ATB. If, on the other hand, an element α is shared by nodes in the two coordinates and does not move out of the coordination overtly, the linearization requirements will impose an inferred order on the coordinates between which α is shared. This order, we argue, is crucial for the possibility of AE: The CSC as a condition on overt movement from coordinate structures is sensitive to order, namely, order between the coordinates. In particular, we propose that once the coordinates have a fixed inferred order, the CSC no longer regards them as distinct coordinates, or parallel structures, but rather as one structure, i.e., one coordinate. Simple movement, AE, from this structure will satisfy the requirement of the CSC that movement be from all distinct coordinates. Hence, AE becomes a subcase of ATB-movement. This, then, is the crucial link between subject and object gaps and the possibility of AE.

In the following, we will give a detailed account of this proposal. We will start with a discussion of how we take syntactic structures to be linked to linear order statements and how shared elements are linearized. We then proceed to give our formulation of the CSC. Note that this account omits two issues: On the one hand, the complementarity of

ATB-movement and AE is not accounted for. The formulation of the CSC given here does not rule out ATB-movement in SLF. In section 5 we argue that this is in fact desired, as covert ATB-movement does not generally block overt ATB-movement. We show that the impossibility of overt ATB-movement in SLF is due to conditions on ATB-movement in general. Further, the CSC, as formulated here, only holds for overt movement from coordinate structures. The restrictions on covert movement from coordinate structures and their relation to what is discussed here will also be investigated in section 5.

4.1 Spell-Out

Let us first turn to some assumptions about S-O that we adopt in the following. 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).

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 . The present discussion will deal with PF-relevant information only, an analogous discussion for LF is given in section 5.

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's 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 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*

All elements $\alpha_1, \dots, \alpha_n$ 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.

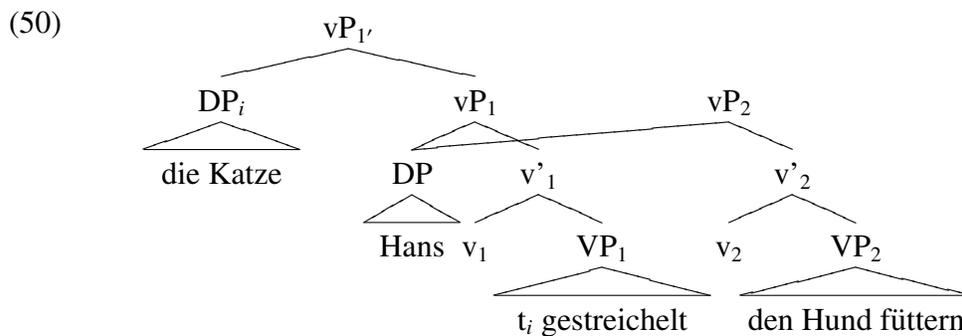
In a sense, the present paper unites the view of Chomsky (2001) and Fox and Pesetsky (2004), since overt movement from a phase can proceed either from the cyclic edge, which is not part of the S-O domain, or from the leftmost position inside the S-O domain. We show below that these two types of movement differ in one respect: Whereas movement from positions that have not yet undergone S-O according to (47) directly manipulates order and makes the previous order relations unrecoverable, this does not apply to movement from positions that have been targeted by S-O. In this case, previous order relations are recoverable. *Unrecoverable* means that the order established before movement is not visible anymore after movement. One can think of this as the phonological features of the lower copy being deleted.²⁸

In the following subsection, we illustrate the relevance of these assumptions and further specify the mechanism by going through a sample derivation.

4.2 A sample derivation of an AE-construction

(49) is an example where AE occurs in the presence of a subject gap. (50) is the tree at the point where the first S-O applies. Let us go through a detailed derivation leading to an order for (50).

- (49) Die Katze_{*i*} [hat **Hans** *t*_{*i*} 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.'



First we have to make our assumptions with respect to merge and linearization clear. Upon merge of *a* and *b*, order statements are established for these elements. Order statements thus hold of sisters, as in (51). 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.

- (51) 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*, where

$d(X)$ is the image of X under dominance – i.e. the order of all terminals dominated by X .

(52) If $A < B$, then $d(A) < d(B)$.

Order statements are derived upon merge, following (51). Coordinates are built in parallel. As a first step, the determiners and the NPs in object position are merged in (53). As the German DP is head-initial, the determiners precede their complements, we get the order statements for C1 and C2 in (53) (< stands for 'precedes').

(53) $Det_{die} < d(NP_{[Katze]}) \mid Det_{den} < d(NP_{[Hund]})$

After merge of the verb in both coordinates, the order statements in (54) are obtained. As German is head-final in VP, the verb follows its complements. According to (52), (54) corresponds to (55).

(54) $d(DP_{[die Katze]}) < V_{[gestreichelt]} \mid d(DP_{[den Hund]}) < V_{[füttern]}$

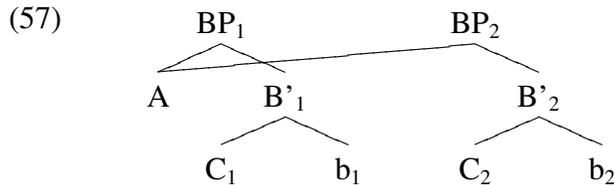
(55) $die < Katze < gestreichelt \mid den < Hund < füttern$

Merging silent v does not alter the order. The subject is merged in parallel into Spec,vP₁ and Spec,vP₂. Since specifiers in German precede their sisters, the subject precedes both of them (56).

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

We want to argue that the system of linearization establishes some sort of order between the two v 's in (56). To see how this works, let us become a little bit more abstract before returning to the actual example. Consider the MD-structure in (57), where b_1 and b_2 are

phase-heads, C_1 and C_2 their respective complements, and A the shared base-generated specifier.(51) will generate the set of orders in (58) upon merge, if the tree is to reflect order directly.



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

We assume that there is an inference system running in parallel to the syntactic derivation and the linearization procedure. This inference system gets order statements like the ones in (58) as input and deduces a maximally consistent overall order set, whenever possible. “Maximally consistent” means that the overall order derived is unambiguous, i.e., there are no order statements that contradict each other. We formulate this as in (59).

- (59)
- a. In language X , give parallel structures containing shared material order statements that do not violate any linearization rule particular to X .
 - b. The linear edges of two parallel structures A and B which are not merged with each other must be maximally consistent.

(59a) says that in the present case A must precede both its sisters, because this is consistent with the language particular requirements. (59b) says that the left edge of BP_1 must precede the left edge of BP_2 and the right edge of BP_1 must precede the right edge of BP_2 .²⁹

For (57) 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 (60a) A is not directly ordered before B'_2 anymore. This set of order relations corresponds to the overall order in

(60b), even though the coordinates have not been merged with each other yet. The parallel structures in (57) thus count as ordered, in that it has been determined which coordinate precedes the other, which is, in this case, reflected by the tree. Note that an inferred order statement \ll is different from a non-inferred one $<$ in the following sense: The former reflects order between elements that have not been merged with each other yet. MD can bring such an inferred order about. If there is no MD between coordinates, no inferred order can be derived. Also the assumptions that there is an inference system running in parallel to the syntactic derivation and linearization procedure and that shared material is linearized only once, is essential for this to work. Non-inferred order, on the other hand, is strictly dependent on merge.

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

Coming back to (56), what has just been said has the following consequences. The inference system computes the maximally consistent order, adhering to (59). It has to choose one sister, in this case v'_1 *die Katze gestreichelt*, as preceding the other (61). The subject, *Hans* is linearized only once and moreover as directly preceding v'_1 . This corresponds to the overall order in (62). I.e. vP_1 and vP_2 count as ordered, but only so through inference.

(61) $d(DP_{Hans}) < d(v'_{[[die\ Katze]\ gestreichelt]}) \ll d(v'_{[[den\ Hund]\ f\u00fcttern]})$

(62) $Hans < die < Katze < gestreichelt \ll den < Hund < f\u00fcttern$

The next step in the derivation is that the object *die Katze* moves and adjoins to vP_1 in order to escape the phase. How does overt movement interact with our claim that structure building proceeds in parallel with linearization? 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:

(63) *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 (63) 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 are fixed after S-O, in the sense that they are recoverable. This implies that only the element that is linearized leftmost in S-O(P_i) may move after S-O, contra Fox and Pesetsky (2004), where in principle every element can move. Movement of more than one element would necessarily create order statements contradicting those established at S-O(P_i).³⁰

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. Overt movement of any kind from a position that has not yet been targeted by S-O will manipulate the order statements by making the pre-movement order unrecoverable, as formulated in (63). Since an edge created will not be in

the S-O-domain once S-O applies, no order statements involving the element in question will be fixed by S-O. Non-cyclic movement cannot feed cyclic movement. It is local and applies, for instance, if subjects move from Spec,vP to Spec,TP.

For our derivation this means that when *die Katze* moves and adjoins to vP₁, the order statements in (64) are derived: The object is ordered before its sister, vP₁, in which the subject is linearized. It is thus also ordered before vP₂, which is inferred to be preceded by vP₁, as in (63) above.

$$(64) \quad d(DP_{[die\ Katze]}) < d(vP_{[Hans\ [t_i\ gestreichelt]])} \ll d(vP_{[Hans\ [[den\ Hund]\ f\u00fcttern]])$$

According to (63), overt movement of the object directly manipulates the order statements for v'₁ in (64), such that d(v'₁) now corresponds to (65).

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

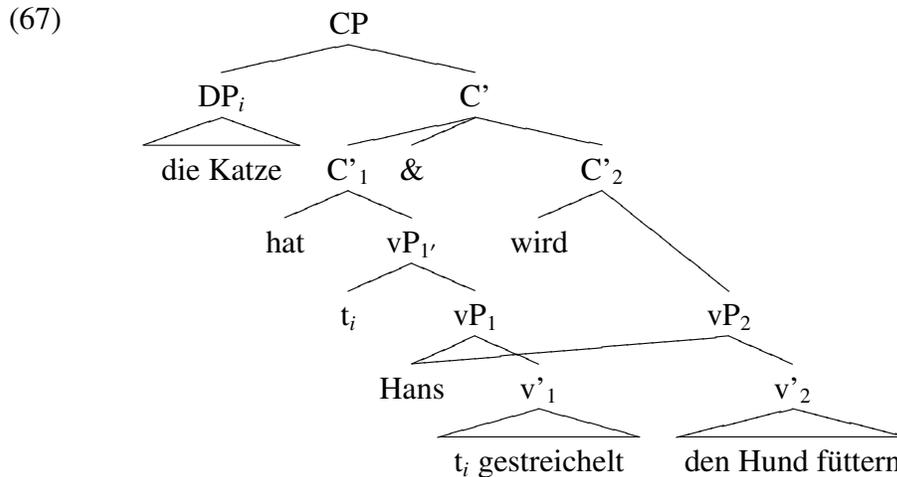
After movement of the object *die Katze* to Spec,vP₁, S-O applies to both vPs. It targets the maximal projection of v, excluding cyclic positions. The object *die Katze* is thus not contained in S-O(vP₁'). The covertly ATB-moved subject, on the other hand, does not pass through the cyclic edges of the vPs. It is base-generated in these edges and therefore by assumption (47) part of S-O(vP₁') and S-O(vP₂). The order in (66), which is inferred from the order statements of S-O(vP₁') and S-O(vP₂) is sent to PF.

$$(66) \quad Hans < gestreichelt \ll den < Hund < f\u00fcttern$$

The information in (66) 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. In other words, whereas the the order in S-O(*P*) is visible for further computation, the dominance relations in S-O(*P*) are not. For (50) this means that after S-O(vP₁) and S-O(vP₂) the fact that the subject is

dominated not only by vP_1 , but also by vP_2 is irrelevant at subsequent phases, as the subject is linearized in $S-O(vP_1)$ only. The left edge of vP_2 , after $S-O(vP_2)$, is thus not constituted by the subject anymore, but by the left edge of v'_2 .

At the next phase we get the tree in (67).



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

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

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 of 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.

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

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 order between them.

Finally, the object *die Katze* moves out of the coordinate structure to Spec,CP. Why this movement is not prohibited by the CSC, is explained in subsection 4.3. Before this, we must address the point that AE in SLF can only take place from the first coordinate, as illustrated by (70).³¹

$$(70) \quad * \text{Den Hund}_1 [\text{hat } \mathbf{Hans} \text{ die Katze gestreichelt}] \text{ und } [\text{wird } _ t_1 \text{ füttern}]$$

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 vP₂ moves to Spec,vP₂. Its sister is vP₂, hence it must be ordered with respect to d(vP₂). Since d(vP₂) contains the shared 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 (59b) above, according to which the linear edges of parallel structures must be maximally consistent: The left edge of vP₂, *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.

$$(71) \quad d(DP_{[den\ Hund]}) < d(vP_{[Hans\ [[die\ Katze]\ gestreichelt]])} \ll d(vP_{[Hans\ [t\ f\u00fcttern]])}$$

4.3 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-constructions 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 an inferred order between C1 and C2. The central claim of this paper is that an inferred order of the coordinates has consequences for the CSC. In particular, the inferred order will cause the coordinates to not be visible as such by the CSC. Ordered coordinates allow AE from them, because the CSC treats them as “one” structure.³²

(72) *Coordinate Structure Constraint*

Let C be a coordinate structure with coordinates c_1, \dots, 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 $c_i | c_j$).

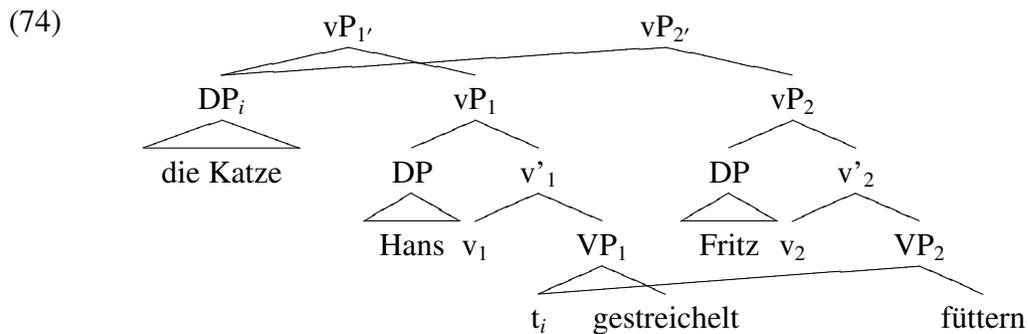
In order for (72) to be useful, the CSC must apply before S-O of the phase that the coordinate structure is contained in. The generalization can be paraphrased as follows: If, at the point where the CSC applies, no inferred order between the coordinates exist movement must be ATB. If the coordinates are ordered, as in the case of SLF, they are not distinct according to (72). AE from that structure thus satisfies the CSC.

It now becomes clear, why AE is allowed in example (49) above. 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.

4.4 Overt ATB-movement

We now show how the CSC works for cases of overt ATB-movement and that it correctly rules out AE in non-SLF cases such as (73). We concentrate on the aspects that differentiate between (73) and SLF in section 4.2. The first phase has the structure in (74).

- (73) Die Katze₁ [hat Hans t₁ gestreichelt] und [wird Fritz t₁ füttern]
 the cat has Hans stroked and will Fritz feed
 'Hans stroked the cat and Fritz will feed it.'



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

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

(75) is unreadable by 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.

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

The derivation then proceeds to build up vP, maintaining the inferred order of the coordinates. Finally, the object overtly 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 (63) above. I.e. the lower copy is disregarded for order. Thus the inferred order between the coordinates, (76), does not hold anymore. Order between VP₁ and VP₂ is no longer available, as in (77).

$$(77) \quad gestreichelt \mid füttern$$

In its new position, however, the object is again merged with two sisters, vP₁ and vP₂, which yields the order statement in (78).

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

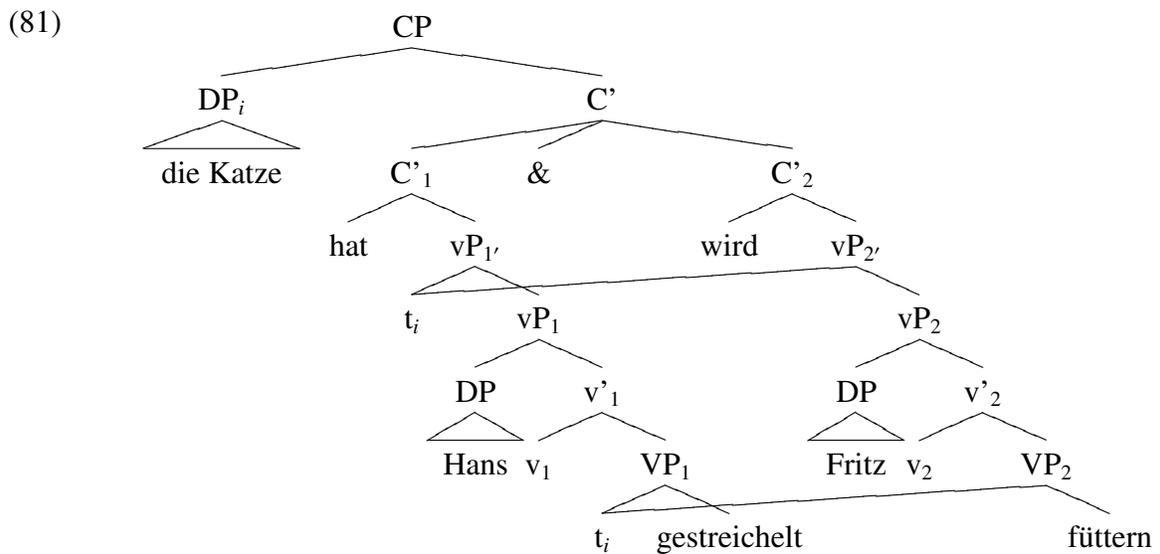
As argued above, the inference system determines that one sister of the moved object must precede the other. Assume that the order in (79) is determined. As a next step, S-O(vP)

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. In other words, the inferred 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 ≪ Fritz < füttern*

(80) *Hans < gestreichelt | 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. Hence, no order is determined between the coordinates. 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. Order between the coordinates will only be established after the CSC has applied, at S-O(CP). Since both orders are possible, either order can be chosen.

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 a separate 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 Katze₁ [hat Hans t₁ 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 Hund₁ hat die Leine₂ [der Hans t₁ t₂ angelegt] und [der Kai t₁ t₂
the dog has the leash the Hans on-put and the Kai
abgenommen]
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, \dots, 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, \dots, c_n (Williams 1978). For us this means that a must be shared by all coordinates c_1, \dots, c_n .

Note that this requirement, in combination with the assumption that the subject in SLF undergoes covert ATB-movement explains why (16), 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.³³

- (84) *Den Hund₁ [_C hat **der Hans** t₁ geschlagen] und [_C wird __ die Katze quälen]
the dog has the Hans beaten and will the cat torture
und [_C hat der Peter t₁/ das Pferd gebürstet]
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 3.2.5, we

formulate a condition when sharing may occur. We propose that the necessary configuration for sharing involves the absence of order between the structures c_1, \dots, 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, \dots, c_n , then

- a. a can be shared by c_1, \dots, c_n if no S-O within c_1, \dots, c_n has frozen an order between c_1, \dots, c_n , and
- b. if a is to ATB-move out of C , a must be shared by c_1, \dots, 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, the ATB-input condition does not allow sharing of any material that c-commands the spelled out pieces of structure.

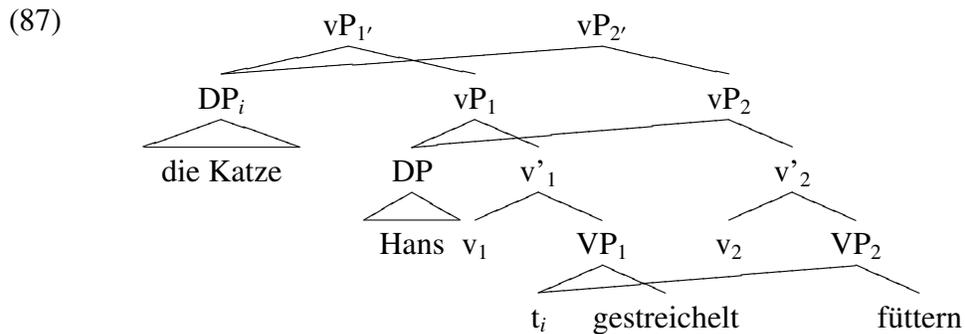
Once (85) is assumed, two seemingly unrelated problems that were discussed above can be accounted for. The first is that even though the CSC in (72) correctly predicts AE in non-SLFs to be impossible, it does not exclude ATB-movement in SLFs, which was shown to be unavailable. Further we have not determined 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_i [hat **Hans** t₁ gestreichelt] und [wird __ t₁ 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.



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 vP₁ and vP₂ are ordered to each other, which also gets spelled out that way. The object, which moves overtly to the Spec,vPs, is not in S-O(vP_{1'}) and S-O(vP_{2'}). But (85) will not allow the configuration in (87) after S-O of the vPs, 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 by the shared object in the Spec,vPs.³⁴

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.³⁵

- (88) Die Katze₁ hat [er **der Maria** t₁ gezeigt] aber [der Fritz __ t₁ 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 Ring₁ hat [der Hans **der Maria** t₁ gezeigt] aber [der Fritz __ die Kette
the ring has the Hans the Maria shown but the Fritz the necklace
geschenkt]
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.

- (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 order relations in the sister node of the remerged specifier are frozen. 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 discuss this claim by investigating 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 binds a variable in each coordinate (cf. 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 binding configuration in (93).

(91) *Covert movement from coordinate structures*

Let C be a coordinate structure with coordinates c_1, \dots, c_n , then, if a moves out of C , it must bind a variable in c_1, \dots, c_n .

(92) a. $X_1 [\dots t_1 \dots] \& [\dots t_1 \dots]$

b. $X_1 [\dots t_1 \dots] \& [\dots \text{pro}_1 \dots]$

(93) $X \lambda_1 [\dots x_1 \dots] \& [\dots x_1 \dots]$

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. Given these traditional cases, however, variable binding as in (91) could still be considered a necessary condition on all movement from coordinate structures. In this paper, our focus is on data that do not seem to pattern with either (92a) or (92b), because they exhibit the surface structure in (94) where X is asymmetrically extracted. (91) does not hold of such cases. In the following discussion the notion of AE is only used for sentences of the form in (94).

(94) $X_1 [\dots t_1 \dots] \& [\dots]$

The general idea we want to propose is that the CSC is sensitive to the manipulation of

interface information through movement. In section 4.1 above we claimed that interface information is established parallel to merge, i.e. that syntactic operations manipulate this information. Since this is the case, movement out of the coordinate structure will manipulate either PF-information (order) or LF-information (scope), or both. Once an element moves out of a coordinate structure, the CSC evaluates whether this movement adheres to its requirements.³⁶ As soon as order is manipulated, (72) must hold. We follow Fox (2000) and others in assuming that as soon as movement manipulates scope, (91) must hold.³⁷ How is scope manipulation defined? Although much more is to be said about this issue, the following is assumed: The scope of an element a is manipulated, if a is moved and via that movement obtains scope that would be unavailable without movement. In other words, if the denotation of the moved a takes the denotation of the sister – the derived predicate – as its argument, rather than vice versa, scope is manipulated. At each step of merge scope information is established, as was the case with order information. I.e., scope statements such as $a > b$, meaning a scopes over b , are established.³⁸ The CSC for all types of movement must thus look like (95).

(95) *The General Coordinate Structure Constraint*

Let C be a coordinate structure with coordinates c_1, \dots, 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 variables be bound 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 and Peter brushed

(97) Gestern hat [Hans keine Katze_i gefüttert] und [Peter sie_i gebürstet]
 yesterday has Hans no cat fed and Peter her brushed

(98) a. $\neg\exists x (\text{cat}(x) \wedge (\text{Hans fed } x) \wedge (\text{Peter brushed } x))$
 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. If the coordinates are unordered, the only configuration possible is (92a). If the coordinates are ordered, AE from C1 is predicted to be possible only if either it does not alter the scope relations, or if it binds a variable, namely, a pronoun, in the other coordinates. (99) meets the former prediction: AE from C1 of the *wh*-element will change the scope relations, yet the *wh*-element does not bind a variable in all coordinates. The result is ungrammatical. The reason is that a *wh*-element necessarily takes scope over the derived predicate created through movement (Karttunen 1977). Scope is thus manipulated.

(99) *Wen₁ [hat **Hans** t₁ getroffen] und [wollte __ eine Suppe essen]
 who has Hans met and wanted a soup eat

If, on the other, the *wh*-element binds a variable in C2, the structure becomes grammatical, as predicted:

(100) Wen₁ [hat **Hans** t₁ getroffen] und [wollte __ seine₁ Suppe essen]
 who has Hans met and wanted his soup eat
 'Who did Hans meet and wanted to eat that person's soup?'

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. This rules in AE of non-*wh*-elements from SLF. In these cases scope is not necessarily manipulated, because the denotation of the moved element can function as the argument of the derived predicate. It was already shown that ATB-movement is blocked for independent reasons in such a situation. Much more needs to be said about scope manipulation in our system. We hope the present sketch suffices to give an idea. We leave the question whether the predictions made by (95) are correct 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 further showed that there is no straightforward account for this gap, 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 it is in fact 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. We further assumed that shared material must always move out of the coordination, either overtly or covertly.³⁹ 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 be expressed by variable binding and that therefore shared material must move to a position that allows for it to bind variables in all coordinates.

We further put forth that covert ATB-movement and its linearization *in situ* will yield an inferred order between the coordinates. The CSC for overt movement 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 version of the CSC that we proposed 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 many generative theories, must be rethought, if our claims are correct.

(101) *Order Blindness Hypothesis*

The generative system is blind to order relations.

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 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:⁴⁰

(102) *Who₁ [did **John** t₁ kiss] and [has __ gone to sleep]

Locative inversion, on the other hand, exhibits an obvious subject gap and also licenses AE, as shown in (103). The locative PP *down the hill* must be related to C1 alone.

(103) Down the hill₁ [rolled **the ball** t₁] 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.⁴¹ Yet, these cases do not seem to exist. The example in (104), 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.

(104) *The cat_i [**John** kissed t_i] and [__ went to sleep]

We would like to suggest that in locative inversion contexts (and possibly also in *wh*-contexts) the subject is allowed to stay in Spec,vP. 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). Subsequent movement of the subject to Spec,TP will not contradict any previously established order statements and thus is fine for non-shared subjects. If a shared subject undergoes such movement, however, it will violate the ATB-input condition (85), because the coordinates have an inferred order 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.

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 (105).

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

We want to propose that the unavailability of (105) 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 available. Since German is OV in VP, the object can strictly precede one verb and is inferred to precede the others. In English, on the other hand, VO requires that the verb precedes the object in both cases. In (105), 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 (106). (106) is indistinguishable from *right-node-raising* (RNR).

(106) John [hit ___] and [beat **the cat**]

If (106) 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 (106) should license AE, which is falsified by (107).

(107) *His father₁ [John showed t₁ ___] and [Bill gave his mother **the dog**]

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

(108) *Dem Fritz₁ zeigte [Hans t₁ 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 (109). 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.

(109) [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 (110) (modified from (Hartmann 2000:156)) and no complementizer are allowed in C2.

(110) Peter had caught an eel in the Charles River and John (*had) ~~ea~~ught 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 (111), which has the interpretations in (112). If coordination must be at the vP-level, this follows immediately.

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

(Siegel 1984:524)

(112) 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, 2009). Evidence for this comes from McCawley's 1993 observation that subjects in C1 can bind into C2, as in (113) (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. (114) shows that when there is no gapping, binding into C2 is unacceptable.

- (113) 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.
- (114) 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.⁴² But, again, this is left for future research.

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 (115).⁴³ 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 (115) is not predicted.

- (115) *[Die Katze₁ hat **er** t₁ gestreichelt] und [den Hund₂ wird ___ t₂ 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 (116a) allow QR

from C1 to bind into C2, but not CP-coordinations (116b). Hence, a solution to the problem in (116) will likely solve the one in (115), too.

- (116) a. Einmal [hat Hans jeden₁ Berg bestiegen] und [hat Michael ihn₁
 once has Hans every mountain climbed and has Michael him
 fotografiert]
 photographed
 'Once, Hans climbed every mountain and Michael photographed it'
- b. *[Einmal hat Hans jeden₁ Berg bestiegen] und [einmal hat Michael
 once has Hans every mountain climbed and once has Michael
 ihn₁ fotografiert]
 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 (117). Since in our proposal the only difference between the grammatical cases discussed above and (117) is the element that occupies the C-position, the difference in grammaticality cannot be accounted for.

- (117) *Die Katze₁ hat Kai gesagt [dass **sie** t₁ gestreichelt hat] und [dass __ den Hund
 the cat has Kai said that she stroked has and that the dog
 füttern wird]
 feed will

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 (118), which forms a minimal pair with (117). The quantifier in subject position of C1 cannot bind the variable in C2.

- (118) *Kai hat gesagt [dass **keiner**₁ die Katze gestreichelt hat] und [dass Martin
 Kai has said that no one the cat stroked has and that he

seinen₁ Hund füttern wird]
the dog feed will

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

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Notes

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

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

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

⁴It 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 Katze₁ hat **Hans** t₁ gestreichelt und barfuß wird __ den Hund treten
the cat has Hans stroked and barefoot will the dog kick
- b. *Die Katze₁ hat **Hans** t₁ gestreichelt und den Hund₂ wird __ t₂ treten
the cat has Hans stroked and the dog will kick

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

⁶We assume a ternary branching parallel structure as in (8). 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 will make.

⁷The 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.

⁸See also Buring and Hartmann (1998) and Reich (2007) for related observations.

⁹But see subsection 3.2.6 for discussion of data that at first sight seem to contradict the generalization established here and for a reason why they actually are not problematic for the theory to be developed.

¹⁰The present argument evolved from an original observation due to Dominique Sportiche

(personal communication) and criticism by Kyle Johnson (personal communication).

¹¹In addition to the data discussed above, a selectional restriction exists for SLF-structures, as observed by 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.

¹²We note that other quantifiers behave in parallel. Consider the upward-entailing quantifier in (119), for instance, where *oder* is replaced with *and* to make interpretation easier.

- (i) Heute hat **er** mehr als zwei Berge₁ bestiegen und hat sie₁ fotografiert
today has he more than two mountains climbed and has them photographed
'Today, he climbed more than two mountains and photographed them.'

¹³Fox (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 (cf. Sauerland (2001).) For discussion of the relation between Fox's theory and the one to be developed below cf. subsection 5.2.

¹⁴Another piece of evidence that has been used in support of low coordination concerns the scope of quantificational heads. Buring 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 Hund₁ hat sie nicht t₁ gefüttert und wird Peter t₁ schlagen
 the dog has she not fed and will Peter hit
 'Neither did she feed the dog, nor will Peter hit it.'

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 (14) 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 Hund₁ muss **Hans** t₁ 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.'

¹⁵An anonymous reviewer correctly notes that this conclusion is only valid, if the configuration under discussion does not license a Parasitic Gap in what Buring and Hartmann (1998) treat as an adjunct. However, German does not exhibit Parasitic Gaps in adjuncts with finite verbs, as shown by (i) in fn. 16.

¹⁶ Adjunct clauses will prohibit extraction in this context, as shown by (i).

- (i) *Das Pferd_i hat er t₁ gekauft [denn er meinte [hätte ich t_i gequält]]
 the horse has he bought because he said have I tortured

¹⁷In light of the proposal presented in this paper, the formulation of the CSC in Mayr and Schmitt (2008) would have to be slightly modified.

¹⁸As (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 sich₁ von Hans₁ 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. (23) shows straightforwardly that an A'-element in Spec,CP cannot serve as A-binder for an anaphor in C2.

¹⁹Modal verbs are another such case and they behave according to the prediction. It has been observed that negative indefinites in the context of modal verbs as (119) exhibit so-called split-scope readings (ia), where the quantificational part of the negative quantifier does not move across the modal (cf. Penka (2007) for instance). These readings exist alongside those in (ib) where the existential is QR-ed above the modal.

- (i) Den Hund muss keiner füttern.
 The dog must noone feed
 'Noone must feed the dog.'
- a. $\neg > \square > \exists$ = It is not required that someone feed the dog.
 b. $\neg > \exists > \square$ = There is no one who is required to feed the dog.

The prediction of the hypothesis made in this section is that in SLF only the reading involving QR, i.e. (ib) should be observable, as QR out of the coordinate structure, and therefore above the modal, is required. This prediction is correct, as (ii) shows.

- (ii) Den Hund muss keiner füttern und soll die Katze streicheln.
 The dog must noone feed and should the cat stroke
 'Noone must feed the dog and should stroke the cat.'
- $\neg > \exists > \square, \# \neg > \square > \exists$

Note that this test can only be employed for movement from C1: Even though (iii) indicates that the same restriction holds if the modal is located in C2, the relevant reading could be obtained trivially by movement from C1 alone, which would immediately outscope the modal in C2.

- (iii) Den Hund hat keiner ausgeführt und musste die Katze streicheln.
 The dog has noone walked and had-to the cat stroke
 ‘Noone walked the dog and had to stroke the cat.’

$\neg > \exists > \text{must}, \# \neg > \text{must} > \exists$

²⁰Hans-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
 this-way bakes always one of-the cooks a cake and must then
 abwaschen]
 do-the-dishes
 ‘Some cook always bakes a cake this way and must then do the dishes.’

*(always < \exists), (\exists < always)

²¹We 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

²²In 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.

²³It 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 [who₁ [John likes t₁] and [we hope t₁ will win]]
(Williams 1978:34)

²⁴Note 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.

²⁵The reading in question is also only available for existential quantifiers and only in copula constructions, which adds to the suspicion that Buring and Hartmann's 1998 data are not a deep fact distinguishing between SLF and non-SLFs.

²⁶Bošković 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.

²⁷Operator 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.

²⁸We use the copy theory of movement for reasons of simplicity. Of course, it is possible

to characterize movement as a form of MD, as well. The reader should bear in mind that whenever a term like *copy* or *movement* is used, the dependency could also be characterized as MD.

²⁹Bachrach and Katzir (2009) also make use of the notion of linear edge when linearizing shared material. Comparing the two proposals, however, would go beyond the confines of this article.

³⁰A reviewer asks why we do not follow Fox and Pesetsky (2004) more closely in allowing any movement, as long as no contradicting order statements obtain. In fact, we do follow Fox and Pesetsky very closely in this respect. It just so happens that the system we propose has the consequence that when combined with their proposal, only the leftmost element can undergo movement. This is so, because order statements are derived upon merge. Thus moving *b* over *a*, where *a* has been ordered before *b*, will be necessarily contradictory, even if *a* is moved still higher than *b*. In Fox and Pesetsky's system this is not the case, because order statements are only established upon S-O.

³¹We thank Gennaro Chierchia (personal communication) for pointing out a problem with a previous version of our theory regarding this property of SLF.

³²An anonymous reviewer raises the question what prevents a derivation from establishing an order in cases where no element is shared between the coordinates. Note that in the present proposal, order statements are established parallel to merge. If no element is merged in both coordinates, no order will be inferred to hold between the coordinates.

³³The same rationale applies in the case of (15) in section 2.2 above. However, this example also raises a question regarding the size of the third coordinate. In the present proposal, it can either be analyzed as vP or as C'. In both cases, covert ATB-movement of the subject should have targeted all coordinates.

³⁴Covert 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 an inferred 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.

³⁵The 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.'

³⁶We 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.

³⁷See von Stechow (2005) for a possible approach to the semantic interpretation of a phase model.

³⁸We assume that moving *a* over *b* is only possible if that does not contradict previous scope information. There are delicate questions related to this assumption. To keep the system parallel to the PF-side, we make the following assumption: The lower instance of the moved element *a* will immediately undergo trace conversion (Fox (2002), Sauerland (2004)). Moreover we assume that movement directly manipulates scope if it takes place pre-S-O, i.e. in cases of intra-phasal or cyclic movement. It is only in these cases that previous scope relations are unrecoverable. However, for the discussion in the text these assumptions are not essential.

³⁹This generalization captures all the data discussed in this paper. If, as an anonymous reviewer points out, constructions like RNR are analyzed as involving sharing, it has to be

given up. It could either be claimed that RNR and the cases discussed here both involve sharing but differ fundamentally in some other respect – which we remain agnostic about or that one of the two does not involve sharing at all. To compare the arguments put forth for a sharing account in both cases is left for future research.

⁴⁰It should also be pointed out that C'-coordination in English, 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 knowledge, no account has been offered for this restriction.

⁴¹We do not address the examples of AE 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.

⁴²Pesetsky (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

⁴³We thank Edwin Williams (personal communication) who raised this relevant question.