Coordination, ATB and Ellipsis *

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1. Introduction

Standard assumptions about the syntax of coordinate structures in generative grammar include the "small conjunct hypothesis" (1), constrained by the parallelism hypothesis (2):

1) A conjunct can be any category

2) Only like categories can be coordinated

Following Williams (1978), rules relating terms inside and outside the coordinate structure are assumed to apply in "Across-The-Board" fashion. In an ATB-structure, small conjuncts "share" a single constituent which is outside the coordination domain, and linked to a trace in each conjunct, in accordance with the Coordinate Structure Constraint (CSC):

3) a. What did John lose and Mary find?
b. Wh- ... [[... t ...] & [... t ...]]

4) CSC: If α binds a trace in one conjunct, α must bind a trace in every conjunct.

ATB-movement analyses presuppose "small conjuncts" - i.e. depend on (1) - with the conjoined structure embedded inside a single root CP and shared constituents outside the conjoined structure.

In what follows, I present reasons for rejecting this conception of the syntax of coordination. I argue that the small conjunct hypothesis (1) should be replaced with (5a.), possibly strengthened to (5b).

5) a. Conjuncts are extended projections (CPs, DPs, ...)
b. Conjuncts are root CPs (exception: DPs)

"Shared constituents" such as what, did in (3) are then to be handled in terms of ellipsis. In short, I advocate a return to the "large-conjunct-plus-reduction" conception of coordinations associated with early generative grammar (Chomsky 1957) - although with reduction understood as "ellipsis" of terminals (PF-material) and not as deletion of syntactic structure.

If (1/2) is replaced by (5b.), conjunctions uniting clauses can be seen as "discourse connectives", heads that take root clauses as their arguments. This conception fits most naturally with the idea that coordinate structures should not be treated as symmetrical, n-ary branching, and multi-headed exceptions to X'-theory (in particular, to the binary branching hypothesis of Kayne (1984), and the antisymmetry hypothesis of Kayne (1993)).

However, it may be necessary to allow for "embedded" coordination - DP-coordination seems a pretty clear case, motivated on syntactic grounds. But I see no reason for assuming conjuncts can be any smaller than complete "extended projections" in the sense of Grimshaw (1991). If correct, then the rationale for assuming ATB-rule application disappears.

Further argumentation builds on the following points:

i) The ATB-formalism is a conceptually unattractive extension in a theory utilizing two-dimensional phrase-structures and buinique relations.

ii) Ellipsis over large conjuncts is independently necessary (Gapping), unless "3-dimensional" phrase structure - i.e. multiple dominance - is to be countenanced.

iii) "Left-peripheral" ellipsis, which is the operation that derives effects of the "small conjunct hypothesis" and "ATB-extraction", shares important properties with Gapping, such that the two can be reduced to a single operation (FWD / "ForWard Deletion").

iv) Asymmetric coordinations cannot be handled by the ATB-formalism, so that the coordination data have to be split into symmetric (ATB-relevant) and asymmetric (ATB does not apply); a move which is not motivated by independent considerations.

I do not do justice to the full range of arguments against an approach in terms of large conjuncts and reduction, which can be used used to justify (1,2,4), and most of which concern interpretative properties. I sketch a concept of "ellipsis chain" as a possible means of coming to grips with the problem; but I am sure to have left many crucial interpretational aspects unaddressed.

2. The standard approach

A basic premise shared by most work is (6):

6) Conjuncts are constituents

If a conjunct string does not correspond to a syntactic constituent, this may reflect the presence of empty elements inside a constituent - partial ellipsis. Ellipsis sites may arise through base-generation of empty elements, or deletion of phonological material. Gapping is an uncontroversial instance. The second conjunct in (7) is clausal, the gap corresponds to drank in the first (also clausal) conjunct:

7) [John drank wine] and [Mary __ beer]

Approaches differ as to whether and if so how far (6) can be further restricted. The most restrictive hypothesis is (8):

8) Only root clauses can be conjoined

(8) is seriously defended virtually nowhere. But the discussion of coordination since Chomsky (1957) revolves in part around the issue of whether (6), (8), or some intermediate position, is the correct one. This goes hand in hand with debate over the scope of "deletion" in coordinate structures: the closer one gets to (8), the more one attributes to "deletion".

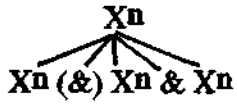
2.1 Small conjuncts

A birds-eye view of the literature reveals the view (9) to be the standard:

9) a. Conjuncts can be of any category

b. Conjuncts are of same syntactic category (Like-and-Like).

c. The node dominating the conjuncts is a projection of every conjunct:
- each conjunct is head of the coordination, conjunctions are non-heads.



I shall refer to the assumptions in (9) collectively as the "SCH" (small conjunct hypothesis), although strictly speaking (9b,c) could be maintained in a theory assuming some more restricted version of (9a).

The import of (9a.) is not only that any phrasal category can, in principle, be coordinated, but also any non-maximal - intermediate or zero-level - projection of any category. The following give representative examples:

- Embedded phrasal coordination:

10) a. DP & DP: [[John] and [Mary]] are coming
b. NP & NP: we still need the [[bat] and [ball]]
c. PP & PP: [[in London] and [in Berlin]], it is still cold
d. AP & AP: the [[red] and [blue]] flag
e. VP & VP: Mary has [[left] and [gone to England]]
f. IP & IP: I don't know if [[Mary left] and [Peter returned]]

- Intermediate projections:

11) a. I' & I': John [[has left] and [will return]]
b. I' & I': it would be unfortunate for him [[to leave] and [to fail to return]]
c. C' & C': who [[has Mary invited] and [does Bill want to see]] ?

Especially the V2-case (11c.) shows the necessity of allowing sub-phrasal coordination, since the account of the V2-effect depends on the assumption that the finite verb occupies the head-position of the phrase whose specifier hosts the initial constituent.

The possibility of conjoining heads is more controversial. Examples suggesting this possibility involve functional heads such as auxiliaries in I and C or determiners and quantifier words, as well as lexical heads (V,N,A,P):

12) a. I° & I°: We both [[can] and [will]] visit her
b. C° & C°: [[Can] and [will]] you do this?
c. D° & D°: ... both [[this] and [that]] book ...
d. D° & D°: ... [[one] or [two]] books ...

e. V° & V°: He has [[read] and [re-read]] the article
f. N° & N°: He is both the [[father] and [employer]] of my friend
g. A° & A°: ... both [[glad] and [sad]] about this ...
h. P° & P°: ... either [[under] or [beside]] the bed ...

The Like-and-Like constraint (9b) excludes examples like (13):

13) a. * John Infl [$_{VP}$ came in] and [$_{AP}$ sick]
b. * I ate [$_{DP}$ the cake] and [$_{CP}$ whether it is raining]

But such examples are independently excluded by the need for each conjunct to individually meet external selection requirements, i.e. for the same reasons as (14):

14) a. * John Infl [$_{AP}$ sick]
b. * I ate [$_{CP}$ whether it is raining]

The real value of (9b.) lies in the exclusion of cases with unlike conjuncts that may combine individually with the external structure to form a well-formed clause:

15) a. * He read [$_{DP}$ the book] and [$_{PP}$ on Sunday]
b. He read the book
c. He read on Sunday

(16) illustrates a well-known problem for the formulation of the notion of "identity" relevant for (9b.):

16) John is [NP a Republican] and [AP proud of it]

We return to this case below. Also problematic for (09b) is that examples of the type (15a), although generally bad in English, are possible in German (for example), under a certain reading which is licensed by the appearance of the particle zwar in the second conjunct:

17) Er las das Buch, und zwar am Sonntag
he read the book and PRT on Sunday
"He read the book, and, to be more specific, (he read the book) on Sunday"

2.2 CSC and Across-The-Board rule application

It should be possible *a priori* for derivational operations apply in sentences containing coordinated substructures just as in the context of any other substructure. Wh-movement, for instance, should be able to relate positions inside and outside of the coordination domain. As originally pointed out by Ross (1967), this seems to be possible only when movement applies in a special fashion, such that all conjuncts are simultaneously affected . So wh-movement may not remove a constituent from just one conjunct and place it in a position outside the coordinate substructure (18b,19b from Burton & Grimshaw 1992):

18) a. * What did John [VP show the book to Mary] and
[VP say that she should read *t*] ?

b. * Which book did he say that [IP the boys wrote *t*] and
[IP the girls did the illustrations] ?

Instead, the examples are only well-formed if movement to the external landing site is from sites in both (all) conjuncts:

19) a. What did John [VP show *t* to Mary] and
[VP say that she should read *t*] ?

b. Which book did he say that [IP the boys wrote *t*] and
[IP the girls illustrated *t*] ?

The relevant generalization seems not to pay attention to exactly where in the conjuncts movement is from. So in (20a), the wh-phrase started from one level deeper in the second conjunct than in the first. [1] As long as regular constraints on movement (Subjacency etc.) are respected, extraction of constituents out of coordinations seems to apply freely, subject to this additional constraint, which Ross termed the Coordinate Structure Constraint.

The CSC can be formulated as a constraint on output representations:

20) Coordinate Structure Constraint (CSC)
If a constituent α external to a coordinate structure binds a trace in one conjunct C_1, then α must bind a trace in every conjunct C_n.

In derivational terms, movement out of conjuncts applies in a "simultaneous", "across-the-board" (ATB) fashion.

Williams (1978) proposed to derive the effect of the CSC by assuming that a transformational rule applying to a domain including a coordinate node must apply in a special way, which he terms the "ATB-mode". I do not go into the technical details of Williams' proposal, but simply sketch key aspects of the idea:

i) Conjuncts are "written in ATB-format".

Written as a labelled bracketing string, a phrase marker is a simple sequence of symbols. In "ATB-format", several such strings are arranged in a vertical array. Conjuncts are written "one

under another", while material inside each conjunct, and outside the coordinate structure, is arranged horizontally (much as in (18-19).

Substrings standing in a vertical relation instead of the usual horizontal relation, can be thought of as "parallel" substructures between which no precedence relation is determined. In terms of trees (two-dimensional representations), the ATB-format can be conceived of as introducing a third dimension, in which subtrees appear superimposed on one another in the 2D representation of the page, but are actually separately arranged along a third dimension othogonal to the plane of the page.

ii) When a derivational operation targets a domain including a coordinate node, it must apply to each conjunct simultaneously.

This means that the operation simultaneously targets a constituent in each conjunct and moves them all to the same landing site. The constituents that are targeted are treated by the operation as a single term, and are moved "in parallel". The effect is that a set of constituents - $\{ \alpha_1 \ldots \alpha_n \}$ - is moved from many starting positions to one landing site. In terms of the additional dimension introduced by (i), the conjuncts inside the domain targeted by the movement operation count, together, as a single unit. The operation cannot "see" the conjuncts individually, since all conjuncts are simultaneously represented in the dimension which counts for defining the landing site.

iii) ATB-format is used obligatorily for coordinate structures, and only for coordinate structures.

The assumptions (i-iii) derive the effects of the CSC.

The CSC-effect is observed for dependencies created by movement, such as wh-movement, but not for instance with interpretive dependencies such as anaphor-binding, commonly assumed not to involve movement: [3]

21) a. John$_j$ has [$_{VP}$ fallen] and [$_{VP}$ hurt himself$_j$]

b. Mary$_j$ will [$_{VP}$ buy herself$_j$ a car] and [$_{VP}$ learn to drive]

Two recent developments - the VP-internal subject hypothesis, and Larson's (1988) account of the internal structure of VP (the "VP-shell" hypothesis) have permitted the extension of the ATB-account to A- and X°-movement.

Sentences like (22) involving conjoined active and passive predicates appear to indicate that NP-movement does not to have to obey the CSC:

22) a. The boys will [write a book] and [be awarded *t* a prize for it]
b. The criminal will [be arrested *t*] and [confess to the crime]

This asymmetry between NP-movement and Wh-movement remained a long-standing puzzle, until it became apparent that the VP-internal subject hypothesis permits derivations consistent with the small conjunct hypothesis and CSC (cf. Burton and Grimshaw 1992, McNally 1992, and references cited there).

Given that SPEC,IP is always a derived postion for subjects, coordinations of I' or VP will uniformly involve ATB-raising of the subject, regardless of whether an unaccusative predicate is involved or not:

23) a. John [$_{I'}$ has often [*t* drunk beer]] and [$_{I'}$ has seldom [*t* drunk wine]] — I' & I'

b. John has [$_{VP}$ often [*t* drunk beer]] and [$_{VP}$ seldom [*t* drunk wine]] — VP & VP

c. John has often [$_{VP}$ *t* drunk beer] and [$_{VP}$ *t* eaten chips] — VP & VP

VP-coordinations may also involve ATB V-raising to I.

Another long-standing puzzle concerns so-called "non-constituent coordination": multiple VP-daughters - complements and/or adjuncts - forming conjuncts excluding the verb:

24) John drinks [$_{\alpha}$ beer at lunchtime] and [$_{\alpha}$ wine in the evening]

(24) is problematic for the small conjunct hypothesis under a traditional view of the internal structure of VP, since there is no single constituent corresponding to α. Larson (1988) points out that under the "VP-shell" theory, α corresponds to a constituent, an inner VP. The verb preceding the first conjunct has undergone ATB-raising to the higher V-node heading the outer VP-shell:

25) John I° [$_{VP}$ t drinks [$_{VP}$ beer [t_V at lunchtime]] and
[$_{VP}$ wine [t_V in the evening]]]

A more articulated theory of clause structure also offers a potential solution to the "Like-and-Like" problem posed by predicate coordinations. Assuming that the conjuncts are not the predicate phrases themselves but VPs headed by the governing copula, (16) can be analyzed as involving ATB-raising of the verb:

26) John is [[$_{VP}$ t_V [$_{NP}$ a Republican]] and
[$_{VP}$ t_V [$_{AP}$ proud of it]]]

Likewise, "unlike complements" (27) may be analyzed as V-projection coordination (entailing that V has raised to some higher head in (27b)):

27) a. He told me [[$_{V'}$ t_V [$_{NP}$ his story]] and
[$_{V'}$ t_V [$_{CP}$ why he was upset]]]

b. He explained [[$_{V'}$ t_V [$_{NP}$ his problem]] and
[$_{V'}$ t_V [$_{CP}$ why he was upset]]]

However, to extend this solution to small clause contexts, and cases where conjoined modifiers of NP have different categories, may involve otherwise unwarranted assumptions concerning "invisible projections" in (28):

28) a. I consider this [[$_{\alpha}$ [$_{AP}$ uninteresting]] and
[$_{\alpha}$ [$_{NP}$ a waste of time]]]

b. Someone [[$_{\alpha}$ [$_{AP}$ rather difficult to talk to]] and
[$_{\alpha}$ [$_{CP}$ who I don't really like]]] (...just walked in)

3. Problems

I turn now to some conceptual and empirical problems that attach to the approach sketched in §2.

3.1 X'-Theory

The coordinate structures of (9c) are n-ary branching and endocentric structures. They have three properties that set them apart from other phrase structure types:

29) a. Conjuncts are "symmetrical sisters"
b. Conjuncts are interchangeable (linear order only relevant at PF)
c. All conjuncts have equal claim to "head" status: the label of node dominating the coordinate structure is identical to (or non-distinct from) that borne by all conjuncts.

Sister constituents participating in head-complement, head-specifier, head-adjunct substructures, have "asymmetric" properties (see especially Kayne 1993), they are not interchangeable (sequence is relevant in syntax), and only one member projects to the mother node (i.e. is head). In other words, under the conception (9c), coordinate structures are exceptions for principles governing phrase structure.

As discussed below, these problems disappear if coordinations are treated as projections of the conjunction word itself, while conjuncts are treated as non-heads (cf. Munn 1987 and others).

3.2 Exceptions to biunique relations

The exceptional behaviour of coordination under the SCH, is not restricted to X'-theory. Coordinate structures are exceptions to a range of other principles governing representations.

The basic entities that are interpreted in LF-representations are chains. A chain consists of an expression α and its traces, if any, forming a set whose members are ordered by c-command:

30) $\{ \alpha , t_1 , \ldots , t_n \}$

Thus each chain has a unique "head" α (c-commanding all other members) and a unique "foot" t_n (c-commanded by all other members).

Coordinate structures are unique in supplying LF with "forking chains", some of whose members are not ordered by c-command:

31) { what $\left\{ \begin{matrix} t_n \\ t'_n \end{matrix} \right.$ }

This type of chain has a unique "head", but more than one "foot" (where a foot c-commands no other member, but is itself c-commanded by the "head" and a subset of the other members).

It has been claimed that parasitic gap structures provide another case of "forking chain". If in (32), the "real gap" t_n and the "parasitic gap" t'_n are members of one chain, then that chain has the structure (31):

32) What did he say [before buying t'_n] that he really needed t_n ?

For Chomsky (1986), a parasitic gap foots a chain headed by a null operator, and is so (formally) independent of the licensing A'-chain. Brody (1993) has argued that parasitic gaps should be considered to be single, hence forking, chains. Williams (1990) defends an analysis of parasitic gaps in terms of coordination and ATB-rule application which implies a similar view of the resulting chain.

However parasitic gap constructions are restricted to certain A'-movement constructions. Explicit ATB-treatment of coordinations involving shared subjects and verbs (cf. 23-25 above) under recent treatments result in forking A-chains and forking head-chains in LF-representations. These constructs are needed in no other environment apart from coordinate structures (there are no "parasitic A-gap" or "parasitic head gap" constructions). So the forking chains that are produced by ATB-rule application constitute a fundamental extension of the basic repertoire of elements, only needed for coordinate structures.

This extension is accompanied by a series of further coordination-specific extensions to linguistic theory. (33) lists some syntactic relations generally considered to be biunique in the Principles-and-Parameters framework:

33) Biunique relations (exception - coordination structures):
- a. Case-assignment (checking)
- b. Subject-verb Agreement
- c. Theta-role assignment
- d. Operator-variable relation (Bijection)

Case-assignment (or checking) is considered to be a relation between a unique Case-assigning category (a verb, a preposition, Infl) and a unique Case recipient (DP, or A-chain). A finite verb enters an agreement relation with a unique DP (A-chain). An argument-chain may contain at most one theta-position. The Bijection principle (Koopman & Sportiche 1982) states that each operator must locally bind exactly one variable, and each variable must be locally bound by exactly one operator. The biunique nature of these relations is systematically violated in coordinations, treated as in §2.

While various proposals have been made in various places to loosen one or the other biuniqueness relation, such refinements generally have no bearing on the way in which they are all systematically violated by coordination structures: rather, the exceptional behaviour of coordination remains constant as the theory evolves.

The exceptional behaviour of coordination with respect to chains can be traced back to the assumption of the ATB-mode for rule application. With respect to the relations in (04), it can be traced back even further, to the small conjunct hypothesis. If there are no small conjuncts, then it is not be necessary to permit movement operations to relating positions inside conjuncts to a position external to the coordinate structure; and the exceptions to clause-internal biuniqueness relations disappear. The proposal made below (§ 5.) comes close to this goal.

3.3 LF-Raising

Current proposals concerning the operation of move-α in the LF-component are not compatible with the SCH/ATB theory of "shared constituents" in coordination. The fundamental problem is that while ATB-movement targets only identical constituents in the overt syntax, it appears able to target non-identical constituent in the covert syntax. This conclusion is forced, if the SCH is applied in the usual way, since conjuncts contain constituents that raise after S-Structure to a landing site outside the coordinated constituents.

3.3.1 Non-identical heads

The small conjunct analysis of (34), in terms of coordinated VPs embedded in a structure containing single Infl-heads, is not compatible with the Chomsky's (1992) treatment of the verb-Infl relation in terms of head-raising at LF.

34) John I° [[VP sang] and [VP danced]]

In English, inflected main verbs that are in VP in Spell-Out are assumed to raise to Infl by LF to check inflectional features. So (35a) has the LF-representation (35b):

35) a. John I° [VP sang]

b. John sang+I° [VP t_V] = LF

If an example like (34) involves coordinated VPs, V-raising must apply ATB: two verbs, one in each conjunct, move to a single landing site (Infl):

36) John | sang | +I° [[VP t_V] and [VP t_V]]
| danced |

Assuming that ATB-raising can only apply to identical elements, we must conclude either the LF V-raising hypothesis is false, or that the coordination domain in this and analogous cases encompasses the domain of head-raising.

It is worth considering what is involved in a bit more detail. Applying in ATB-mode, move- α targets n (n>1) constituents { α_1 ... α_n } in the input tree and maps this tree onto a tree containing a single constituent α in the landing site. Where α_1 ... α_n in the input tree are identical to each other, the output representation contains a single constituent α. This is the usual case for overt movement. Where α_1 ... α_n in the input tree are not all identical, the question arises as to what the output tree can/should contain.

Taking the original sense of ATB, we must say that the output tree contains only one element α_j of the input set. In (36), we can think of this as follows: one verb is adjoined to Infl, then the other verb is adjoined to Infl, overwriting or erasing the first. This of course is nonsense: one of the verbs will be missing from the LF-representation and so will not be interpreted - its content will not be "recoverable".

Alternatives require a different interpretation of the ATB-idea. One possibility is to allow ATB-raising to perform multiple adjunction: the two verbs in (36) each adjoins to Infl, so both are available for LF-interpretation. But this clearly violates the original sense of ATB-application. Additionally, if this option is available for LF-raising, it is unclear why it is not possible in overt syntax.

A second possibility is to suppose that ATB-raising of non-identical verbs creates a "derived coordination" of the two verbs, so (36) is replaced with (37):

37) John [[$_V$ sang] & [$_V$ danced]] +I° [[$_{VP}$ t_V] and [$_{VP}$ t_V]]

However, this would mean introducing a new LF-specific structure-building operation: no conjoined V-constituent exists in the Spell-Out representation (34).

If instead, the original sense of ATB is retained and the representation (36) is assumed to be well-formed, then it must be be that both verbs can occupy the same position in an LF-representation - in a way distinct from multiple adjunction, which involves two separate positions. We might understand this as meaning that the moved verbs are multiple daughters of Infl that are not ordered by the precedence relation - the "third dimension" of the ATB-format is inherited at the landing site. Then, it may be possible to attribute the absence of this option in overt syntax to some requirement for PF-representations be linearizable, in the spirit of Williams (1978) (cf. also Goodall 1987).

The third interpretation seems most promising, if the goal is to make the ATB-formalism compatible with LF-raising. I do not pursue this option here, as it offers no solution to the problem of asymmetric coordinations, discussed in §3.4.

3.3.2 Non-identical phrases

An analogous problem arises for constructions involving NP-movement in the LF-component. In Chomsky's analysis of there-constructions, the NP associate of the expletive is raised to the position of there in LF:

38) a. There is a man in the garden

b. [a man+there] is *t* in the garden = LF

In (39), the expletive is a shared constituent, associated with a nominative inside two conjuncts. If the coordinate structure is the complement of seem in this example (say, conjoined infinitival IPs), and the LF NP-movement hypothesis is adopted, then ATB-raising of non-identical NPs ensues.

39) a. there seemed [to be a man in the kitchen] and
[to be a cat in the bathroom]

b. | a man | + there seemed [to be *t* in the kitchen] and = LF
| a cat | [to be *t* in the bathroom]

The same remarks as above apply to the representation (39b). [3]

A similar problem arises with respect to wh-movement, under the assumption that wh-phrases that appear "in situ" in Spell-Out representations of multiple constituent questions (40) raise in LF to adjoin to the overtly raised wh-phrase:

40) a. Which boy did she persuade to see which film?
b. which boy$_x$+which film$_y$ she PAST persuade x to see y

In (41), the target for LF-raising of wh-phrases located in separate conjuncts in Spell-Out is a shared constituent, outside the coordination domain. Once again, wh-movement in the LF-component will apply to non-identical phrases (underlined):

41) a. which boy did she persuade to see which film or read which book?

b. | which film | + which boy did she persuade to [see *t*] or [read *t*]
| which book |

This type of example may seem not to present such a problem. LF-wh-movement is commonly conceived of as adjunction - so we might assume multiple adjunction of which film and which book to which boy. This seems to describe the right sort of reading. But multiple adjunction presupposes multiple operations of move- α. The basic problem of ATB-raising of non-identical α remains.

3.3.3 CSC vs ATB?

All these examples involving LF-raising present a technical problem for the ATB-formalism. But recall that the ATB-formalism was introduced to account for CSC-effects. In each case of LF-raising, at least the CSC is respected. LF-raising applies equally to each conjunct. Examples in which this is not so are still correctly excluded by the CSC. Where Infl outside of the coordinated VPs is not of the correct type for a V-form in one conjunct, ungrammaticality arises:

42) * John danced and sung (cf.: John danced and has sung)

Supposing that participles do not raise at LF (but see Wilder & Cavar (1993) for the opposite view), then the example might be attributed to a CSC-violation at LF - V raises out of one conjunct but not the second.

Similarly, where LF-NP-movement takes place out of one conjunct, it must take place out of all other conjuncts, as shown by the (43):

43) a. * there was [$_{VP}$ thought to be a man in the garden] and
[$_{VP}$ believed that a cat was in the bathroom]

b. there was [$_{VP}$ thought to be a man in the garden] and
[$_{VP}$ believed to be a cat in the bathroom]

A VP headed by the passive participle believed but containing no associate for there cannot survive as the second conjunct. (43a.) can conceivably be ruled out as a violation of CSC at LF (NP-raises from the first but not the second conjunct).

Brody has pointed out that wh-in situ in examples also seem to underly a constraint reminiscent of the CSC: examples like (44), where the one conjunct does not contain an in situ wh-phrase are judged bad (Brody 1993:48):

44) * Who required that Mary call John or that I visit who?

So it may be that the ATB-approach is not itself false, but simply that some technical adjustments of the sort discussed above are needed to handle LF-raising (but see note 2).

I shall argue below that such (CSC-type) effects involving LF-movement constructions should receive an independent account in a theory treating "shared constituents" as products of ellipsis. A more immediate problem for the ATB-theory is the fact that the CSC, whose effects it derives, is itself systematically violated in a range of coordinations, to be discussed next.

3.4 Asymmetric Coordination

The existence of coordinate structures with asymmetric properties is an empirical problem for the theory based on the "small conjunct hypothesis" and ATB-rule application. This model makes two predictions that are systematically falsified:

45) a. Symmetry/interchangeability of conjuncts
b. CSC-effects in sentences containing coordinate structures

If they stand in a structurally symmetrical relation, conjuncts should be interchangeable without loss of grammaticality or change in grammatically determined meaning. Examples can be found where this is by and large true - consider (46):

46) a. Paris is the capital of France and Rome is the capital of Italy.
b. Rome is the capital of Italy and Paris is the capital of France.

Certain types of coordinate structures, as is well known, display asymmetric interpretative properties. For example, tensed VPs conjoined by and are interpreted as denoting events taking place in a temporal sequence which is determined by the linear order of the conjuncts. As a result, reversal of the order of conjuncts changes the interpretation:

47) a. He lay down and died
b. He died and lay down

In this case, conjuncts may be interchanged without affecting grammaticality, but the truth-conditional content of the expression is altered thereby. The extent to which this type of interpretative asymmetry is a matter of linguistically determined meaning is a subject of much debate.

Asymmetrical properties appear also when different clause types are conjoined. Conjunction of an imperative and a declarative with and or or yields an interpretation representable as a logical implication:

48) a. Do that and I'll give you $10 $P \Rightarrow Q$
b. Be there or I'll get angry $\neg P \Rightarrow Q$

This interpretation disappears when the order of conjuncts is reversed: in fact, resulting examples are difficult to interpret at all, and it is not clear whether they should be considered grammatical:

49) a. ?? I'll give you $10 and do that
b. ?? I'll get angry or be there

In these cases, it seems that the conjuncts are simply not interchangeable.

The second problem is more direct, affecting both predictions in (45). Coordinations are found in various languages which systematically violate the CSC. (50) illustrates such a construction of English. The German example (51) has somewhat different properties. But in both, under a small conjunct analysis, extraction takes place out of one conjunct, not the other.

50) What did he turn round and say to you?

51) In den Wald ging der Jäger und fing einen Hasen.
in the wood went the hunter and caught a hare

In (50), the auxiliary and subject (did he) are both "shared" constituents, entering a grammatical relation with each of the bracketed VPs while the wh-phrase (what) only enters a relation - trace-binding - with the second VP:

52) What did he [[turn round] and [say t to you]]

A general response to this construction is to "exempt" it from ATB-rule application (cf. Williams (1990)). There are certain features which correlate with the possibility of the extraction pattern violating CSC, such as requiring a shared subject and receiving a temporally ordered interpretation of the sort illustrated in (47).

However, the construction can also display properties that indicate the necessity of ATB-treatment under a small conjunct analysis. If the verbs like fall or slip in (53) are unaccusatives, then it seem that an ATB-extraction analysis for the shared subject is unavoidable:

53) a. What did he fall down and break?
b. Which chair did she slip over and hit her head against?

So the the construction simultaneously satisfies and violates CSC.

This property of asymmetric coordination is more striking in (51), an example from German of a type of coordination found in all the Germanic V2-languages and which has been much discussed in recent work. [4] The subject in (der Jäger) is a shared constituent. But neither the initial phrase (the PP in den Wald) nor the initial verb (ging), which both precede the shared subject, are shared constituents. The PP has been topicalised, and binds a trace only in the initial conjunct (this is a directional PP licensed by the motion-verb ging: it makes no sense to assume it to be interpreted in the second conjunct).

The problems this construction raises stem from the assumption that the shared subject must have an ATB-derivation. The particular form these problems take depends to a certain extent on assumptions concerning the analysis of V2. ATB-analyses of the shared subject inevitably violate either the "like-and-like" constraint or the c-command requirement on the subject trace in the second conjunct. In addition, such analyses violate the CSC at least with respect to the fronted (topicalized) PP in den Wald, and maybe also with respect to the initial finite verb (ging).

Adopting the standard assumption that fronted finite verbs are located in C, (51) represents a coordination of C'-constituents, as in (54). The fronted PP occupies the SPEC,CP position, but binds a trace only in the first conjunct:

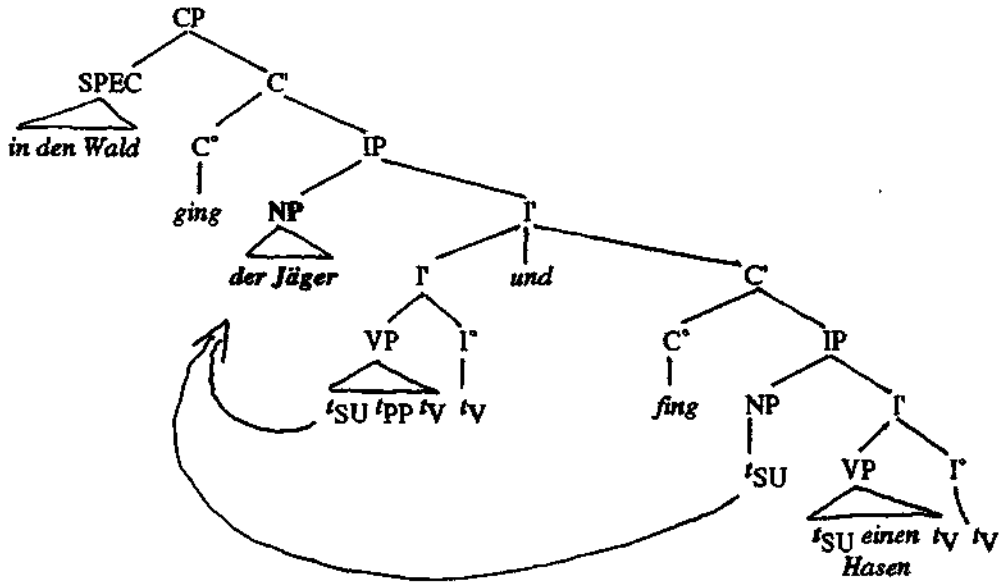
54) In den Wald [[$_{C'}$ ging der Jäger t] und [$_{C'}$ fing einen Hasen]]

At the same time, the subject is located inside the first conjunct. Its position immediately following the finite verb in C is usually taken to be SPEC,IP. So there is a failure of c-command between the shared subject and the trace in VP inside the second conjunct that it is supposed to bind:

55) In den Wald [$_{C'}$ ging der Jäger] und [$_{C'}$ fing [$_{VP}$ t einen Hasen]]

Heycock & Kroch (1993) make a proposal which seems to solve this problem of c-command. They suggest that the coordination in this type of example actually unites an initial conjunct of the category I' with the C' of the second conjunct, in a representation like (56), in which the subject (NP in bold) outside the coordinate structure c-commands a trace in each conjunct:

56)



The assumption that C' can coordinate with an intial I' constituent, which allows a solution to the c-command problem, is made at the cost of a violation of the "Like-and-Like" condition. The authors suggest that in the case at hand, coordination of I' & C' is an instance of coordination of predicates of unlike category, and so can be assimilated to cases such as (16) (repeated here):

16) John is [NP a Republican] and [AP proud of it]

In their view, C' of a subject-initial V2-sentence will count as a predicate predicated of the subject in SPEC,CP, while in non-subject initial declaratives, this function is fullfilled by I' but not C'. [6]

More importantly, the ATB-solution for the shared subject brings with it a violation of the CSC with respect to extraction of both the topic-PP and the finite verb out of the initial conjunct. Surprisingly, these authors do not consider this a defect of their proposal, citing "similar violations" with respect to topicalization in English:

57) The bag, he dropped and __ ran to the exit

In fact, this type of "asymmetric" example is more widespread in English than may at first appear. "Shared subject" coordination is also possible where the initial conjunct involves VP-topicalization, locative inversion, and (more marginally) only-preposing:

58) a. Kiss her, I didn't, and __ will probably regret it.

b. In came John and __ sat down.

c. Only John did we lend money to, and __ never expected it back.

Under an analysis in terms of small conjuncts, necessary to ensure an ATB-derivation for the shared subject, the first conjunct violates the CSC with respect to the fronted phrase in (57) and (58), and also the fronted verb in (58b,c), just as in the German examples. Why should an ATB-solution for the shared subject be insisted on, if other constituents violate the CSC in any case?

Recall that in order to derive CSC-effects, the ATB-mechanism must apply to coordinate structures (and only coordinate structures). And the option of declaring certain "coordinations" not to be genuine coordinations, mentioned above in connection with the English construction (50), is clearly not possible here. The ATB-mechanism must be invoked (by hypothesis) to account for the shared subject. To allow CSC-violations with respect to other constituents, the ATB mechanism must be assumed to apply in one and the same structure in selective fashion.

The very existence of asymmetric coordinations such as these is a major empirical argument against the ATB-movement theory, and the "small conjuncts" approach on which it is based.

4. Ellipsis in coordinations

The claim here is that the small conjunct hypothesis is false. A secondary claim is that this might allow us to dispense with ATB-rule application. If this we can dispense with ATB-rule application, then we have a more constrained linguistic theory (granted that no additional assumptions need to be put in its place).

4.1 "Small conjuncts" as ellipsis remants

I propose to treat the effect of shared constituents and ATB-extraction as byproducts of ellipsis in non-initial conjuncts. There are two types of ellipsis that affect non-initial conjuncts. The "ellipsis operation" responsible for the effect of small conjuncts and ATB-extraction I term Left-Peripheral Deletion (see Zwart (1991). LPD corresponds to "forward deletion", or "forward conjunction reduction"). Left-peripheral (strings of) constituents of non-initial conjuncts are "deleted" under identity with corresponding constituents of the initial conjunct. By "deletion" is meant merely the absence of PF-information. This may arise through "deletion" of PF-material introduced earlier in a derivation, or through base-generated empty categories. Crucially, syntactic structure is present. (59) illustrates the analysis of some of the examples discussed above in terms of LPD:

59) a. [John [I' has often drunk beer]] and
[~~John~~ [I' has seldom drunk wine]]

b. [John has [VP often drunk beer]] and
[~~John has~~ [VP seldom drunk wine]]

c. [John has often [VP drunk beer]] and
[~~John has often~~ [VP eaten crisps]]

d. [John has often drunk [VP beer at lunchtime]] and
[~~John has often drunk~~ [VP wine in the evening]]

e. [John is [NP a republican]] and
[~~John is~~ [AP proud of it]]

Under this approach, conjuncts are "large", generally root CPs. When like clause types are conjoined, then ellipsis generally results in "symmetrical coordination" (declarative + declarative in (59)). The like-and-like constraint is now simply a generalization about "remnants" - usually a remnant is of the same category as the corresponding part of the initial conjunct (i.e. the part of the initial conjunct that does not serve as the antecedent for ellipsis sites in further conjuncts). This is not always the case - as in (59e.).

When unlike clause types are conjoined, LPD may affect left-periphery of non-initial conjuncts, giving rise to "asymmetric coordinations", as when a declarative topicalization is coordinated with an unmarked subject-initial declarative:

60) a. [kiss her, I didn't] and [I will probably regret it]

b. [in came John] and [~~John~~ sat down]

c. [only John did we lend money to] and [we never expected it back]

61) [in den Wald ging der Jäger] und [~~der Jäger~~ fing einen Hasen]

To the extent that they hold true, ATB-effects should be attributed to two factors: what is (can be) conjoined with what; and constraints on ellipsis. In general, the effect of ATB

extraction - the second conjunct contains a trace if the first one does - is a consequence of the ellipsis in the second conjunct, which conceals the moved antecedent to the trace in the overt remnant. This concealed antecedent corresponds to the overt antecedent of the first conjunct. Examples (62-63) reinterpret (18-19) in this light:

62) a. * [what did John [$_{VP}$ show the book to Mary]] and
[~~what did John~~ [$_{VP}$ say that she should read *t*]] ?

b. * [which book did he say that [$_{IP}$ the boys wrote *t*]] and
[~~which book did he say that~~ [$_{IP}$ the girls did the illustrations]] ?

Both examples (62) are ill-formed with respect to the absence of a trace for a wh-phrase: (62a) - in the initial conjunct; (62b) - in the second conjunct. In the well-formed examples (63), a trace is bound by a wh-phrase in each conjunct:

63) a. [what did John [$_{VP}$ show *t* to Mary]] and
[~~what did John~~ [$_{VP}$ say that she should read *t*]] ?

b. Which book did he say that [$_{IP}$ the boys wrote *t*]] and
[~~which book did he say that~~ [$_{IP}$ the girls illustrated *t*]] ?

The asymmetric examples (60-61) demonstrate that the antecedent of the ellipsis site need not be left-peripheral in the initial conjunct. So the ill-formedness of examples like (62b) must be demonstrated also for the ellipsis pattern in (64):

64) * [which book did he say that [$_{IP}$ the boys wrote *t*]] and
[~~he said that~~ [$_{IP}$ the girls did the illustrations]] ?

The contrast between (64) and (60) can be traced back to the general impossibility of coordinating questions with declaratives (compared with other, possible, asymmetric types: imperative and simple declarative, topicalization and simple declarative, etc.):

65) * [What did he say] and [he left the room]

Clearly more needs to be said, for instance with respect to (50). The logic of the approach suggests that this construction involves coordinated questions - so that the trace in the second conjunct is bound by a "deleted" wh-phrase in its conjunct:

66) [what did he turn round] and [~~what did he~~ say to you]

If this is true, we can account for the fact that the verb of the second conjunct cannot have independent tense:

67) * [what did he turn round] and [he said *t* to you]

Under this view, the problem that the construction poses turns on presence of the wh-phrase of the initial conjunct,which fails to bind a trace, in violation of Bijection.

4.2 Typology of "coordination-specific deletions"

Even under the weakest assumption about the syntactic nature of conjuncts (68), the existence of ellipsis operations must be recognized:

68) Conjuncts are constituents.

Apparent non-constituents are derived by specific PF-ellipsis rules - i.e. a conjunct string that appears not to correspond to a syntactic constituent is assumed to be the result of the presence of empty elements resulting from "deletion".

Deletions in coordination fall into three types (see also Wesche (1992)). I ignore language-specific phenomena like English VP-deletion here:

69) Typology of Coordination deletions:

a. Backward Deletion (right-to-left): BWD
b. Forward Deletion (left-to-right): (i) LPD
(ii) GAPPING

What I call Backward Deletion (BWD), also known as "Right-Peripheral Deletion" (RPD) is illustrated in (70). It affects a right-peripheral string in non-final conjuncts under identity with an overt right-peripheral string in the final conjunct. BWD is often analysed as an ATB-movement operation (Right Node Raising):

70) [John bought __] and [Mary read today's copy of the Times]

Gapping is a generally recognised instance of Forward Deletion (FWD), affecting a finite verb and medial constituents in non-initial conjuncts:

71) [John is drinking beer], and [Mary ___ wine]

I group Left-Peripheral Deletion together with Gapping as forward deletion:

72) [John has left] and [___ __ gone back to England]

LPD differs from RPD / Gapping, in that it generally leaves constituents as "remnants". Hence the output of LPD lends itself to analysis in terms of "small conjuncts". I try and unify LPD and Gapping under one and the same operation "FWD" below (§5.3).

Evidence suggesting that it is correct to draw a primary distinction between forward and backward deletions (rather than between "peripheral" (RPD,LPD) and "medial" deletions (Gapping)) comes from the fact that forward deletions differ from backward deletions with respect to two further major properties:

73)

	Forward	Backward
PF-identity required	no	yes
Can cut across constituent boundaries	no	yes

I illustrate these in the following.

4.3 Backward Deletion

Although Backward Deletion often affects major constituents (so lending itself to a rightward movement analysis), it may also affects non-constituent strings. In the German example (74) (Wesche 1992), a final verb is deleted along with the final part of a relative clause modifying its object:

74) a. Er hat einen Mann, der drei [ ] und
he has a man who three *and*

sie hat eine Frau, die vier Katzen besitzt, gekannt
she has a woman who four cats owns known

b. "He knew a man who owns three cats, and she knew a man who owns four"

. . . [VP [NP ... [CP die vier Katzen besitzt CP] NP] gekannt]
------- *Deleted material* ----------

As indicated, deletion cuts deep, taking out part of the object of the verb inside the relative clause. Any attempt to treat the deletion site as a (single) constituent targetable by movement

operations seems doomed to failure. The strict right-peripherality property illustrated holds for English "RNR" (70) holds of this construction, too, which supports treating them as instances of the same process.

BWD can also delete word-internal constituents (Höhle 1991):

75) [sie sucht den Ein__] und [er sucht den Ausgang]
she seeks the in- and he seeks the outway
"She's looking for the entry and he's looking for the exit"

An RNR-approach would need to permit movement to target the right-hand part of P-N compound.

Similar effects can be shown for English. (76) illustrates the BWD in a DP-coordination. The pre-nominal adjective does not form a constituent with the N-head that excludes the adjectival modifier negatively:

76) a. [a positively __] and [a negatively charged electrode]

b. [$_{DP}$ a [$_{AP}$ positively ~~charged~~] [$_{NP}$ ~~electrode~~]]]

Even deletion into words - in coordinated DPs (77a) and CPs (77b) - seems possible, though not perfect:

77) a. ? [the in-__] and [the output] of this machine ...
b. ? [His theory under-___] and [my theory overgenerates]

4.4 Forward Deletion

4.4.1 Gapping

Generally, a main verb cannot be gapped unless INFL has also been gapped:

78) a. Mary has seen Bill and Anna ___ ____ John
b. * Mary has seen Bill and Anna has ____ John

(78b) is marginally possible, as "pseudo-gapping", which I ignore here. In German, the contrast is absolute (79b vs. 79d):

79) a. Er trinkt Bier und sie __ Wein
he drinks beer and she wine

b. Er hat Bier getrunken und sie __ Wein __
he has beer drunk and she wine

c. Er hat Bier getrunken und du __ Wein geschlürft
he has beer drunk and you wine slurped

d. * [Er hat Bier getrunken] und [du hast Wein __]

What is sometimes mistaken for backward Gapping of a participle in an initial conjunct in the presence of the finite auxiliary is in reality a case of BWD:

80) [er hat Bier __] und [du hast Wein getrunken] <- BWD

(81) illustrates that Gapping cannot cut across major constituent boundaries:

81) a. Peter was invited by Mary and John ~~was invited~~ [by Judy]
b. * Peter was invited by Mary and John ~~was invited [by~~ Judy]

The possibility of Gapping a verb carrying different inflection from its antecedent illustrates that it is not form-identity that is required:

82) They live in London and Peter __ in Berlin (Peter lives in B.)

83) [ich trinke das Bier] und [du __ den Wein] (trinkst)
I drink-1SG the beer and you the wine drink-2SG

In this, forward deletion differs from backward deletion, for which form identity is required (Eisenberg 1973). In German (84a), the 3.pl. form of sind "are" does not license deletion of the 1.sg form bin. Syncretisms show that form-identity (not morphosyntactic identity) is required. The present tense form sind not only marks 3.pl. but also 1.pl agreement. In (84b), the 3.pl form licenses deletion of the 1.pl form:

84) a. * nicht nur daß ich ~~krank bin~~ sondern auch daß sie krank sind
not only that I sick be.1.sg but also that they sick be-3.pl.

b. nicht nur daß wir ~~krank sind~~ sondern auch daß Sie krank sind
be.1.pl be.3.pl
"not only that we, but also that you are sick"

The same pattern occurs in English - is does not license deletion of am, whereas was in a clause with 3.sg subject licenses deletion of was with 1.sg subject:

85) a. * John said that I _____ and Mary said that she is the best swimmer

b. * John said that I [is the best swimmer]

86) a. John said that I _____ and Mary said that she was the best swimmer

b. John said that I [was the best swimmer]

4.4.2 Left-Peripheral Deletion

Like Gapping, LPD is a forward deletion operation. LPD also shares with Gapping that it can only target major constituents. The examples in (87) cannot be interpreted as indicated, with deletion of (left-peripheral) subparts of the initial DP, or of the initial PP:

87) a. * [[the three men] ate the cheese] and
[[__ ___ women] drank the wine]

b. * [[on the table] sat the cat] and
[[__ __ chair] sat the mouse]

Also like Gapping, there is evidence to suggest that LPD does not underlie a PF-identity requirement. An argument for the absence of phonetic identity condition on LPD comes from "Quirky Case" subjects in Icelandic, discussed in Rögnvaldsson (1982). As is well known, some verbs in this language take Dative subjects. In such sentences, the finite verb does not agree with the subject but takes a "default" agreement (3.sg). However, in conjoined SVO sentences, a dative subject can be deleted under identity with a nominative subject (88a), and a nominative subject under identity with a DAT subject (89a):

88) a. [Þeir sjá stúlkuna] og [___ finnst hún álitleg]
they see-3PL the-girl and find-3SG her attractive

b. Þeim (*Þeir) finnst hún álitleg
*them-DAT (*they) find-3SG her attractive*

89) a. [Þeim líkar maturinn] og [___ borðar mikið]
them-DAT like-3SG the-food and eat-3PL much

b. Þeir (*Þeim) borðar mikið
they (them-DAT) eat-3PL much

The (b)-examples show that form of the subject of the first conjunct cannot be simply substituted into the gap in the second.

This sketch suffices for present purposes. At least for BWD and Gapping, these ellipsis processes are well-motivated, even under the "weak" hypothesis (68). LPD is a more debated case, which competes with the small conjunct analysis. I discuss FWD in more detail in §5.3.

It is worth noting that most cases of "small conjuncts" are susceptible to analysis in terms of the interaction of FWD and BWD in the same conjunct. In an extreme case, the interaction of BWD and FWD over clausal conjuncts can yield the effect of X°-coordination (cf. (12) above):

90) a. [we can ~~visit her~~] and
[we will visit her]

b. [we are sad ~~about this~~] and
[~~we are~~ glad about this]

5. A restrictive approach to the syntax of coordinations

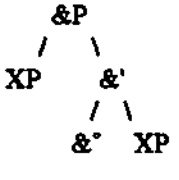
5.1 Conjunctions as heads

As noted at the outset, the assumption of ellipsis in coordinations allows the weak hypothesis about the syntax of coordinations (91) to be strengthened, at least to (92), which no longer permits subphrasal conjuncts:

91) Conjuncts are constituents

92) Conjuncts are maximal projections

(92) is the minimum necessary to be able to pursue the idea (Munn 1987, Larson 1990) that conjunctions are heads, projecting structure in accordance with X'-theory - conjuncts, being non-heads, must be phrasal:

93)


This move presents a radically different picture of the structure of coordinations from that presented in (9c) above; their problematic exceptional status with respect to phrase-structural principles, mentioned in §3.1, dissolves. Conjuncts are no longer (multiple) heads. Coordinate structures are no longer n-ary branching structures. The "three dimensional" idea implicit in the ATB-formalism loses its motivation in terms of the special status of the coordinate nexus: instead, coordinations appear as like ordinary two-dimensional branching structures; and they take on the asymmetric properties of other binary branching structures. This structure removes the fundamental structural divide between coordination and subordination: conjuncts now stand in specifier / complement relations, just as other phrasal constituents in phrase markers generally.

Ross (1967) originally pointed out that the relation of a conjunction to its preceding and following conjuncts is asymmetric: the contrast in (94) suggests a closer relation to exist between the conjunction and the following conjunct:

94) a. John came. And Paul left.
b. * John came and. Paul left.

Evidence for the asymmetric c-command relation between conjuncts imposed by (93) can be found in the DP-coordinations (95):

95) a. [no metals] or [any other solids] (... were found)
b. * [any metals] or [no other solids]
c. [every dog] and [its owner] (...has been checked)
d * [its owner] and [every dog]

The polarity item in (95a), but not (95b) is c-commanded by the negative phrase that licenses it. Likewise, the pronoun in the second conjunct in (95c.) is c-commanded by the quantifier in the first, licensing a bound variable interpretation, while the QP in the second conjunct in (95d) fails to c-command the pronoun in the first conjunct, as predicted.

The assumption of (93) is incompatible with the ATB-analysis of shared subject coordinations, assuming that non-heads cannot be intermediate projections. The German example (96b.) is particularly persuasive, since the analysis of the V2-constraint rests on the assumption that the initial phrasal constituent occupies the specifier of the projection whose head hosts the finite verb:

96) a. John [$_{I'}$ has left] and [$_{I'}$ will return shortly]

b. Hans [$_{C/I'}$ ist weggegangen] und [$_{C/I'}$ wird bald wieder da sein]
H. is away-gone and will soon again there be

5.2 DP-coordination

There is one sense in which the representation of coordinations as projections of the conjunction, rather than of the conjuncts, creates a new problem. If coordinate structures can be embedded, then treating the coordinate node as &P, rather than as a projection of the conjuncts, raises questions concerning selection. For instance, if a head H selects a DP-complement, under the old theory, the possibility for a coordination of DPs to act as complement to H follows automatically. Under the new approach, it must be the case that H selects DP or &P. But then it is unclear what prevents &P, complement to H, from dominating PP conjuncts, leading to an incorrect structure. The introduction of &P threatens the hypothesis that selection is strictly local.

This problem would not arise, if it were the case that conjuncts cannot be embedded. Since conjuncts may be root CPs, and since what look like smaller conjuncts can in principle be viewed as root CPs containing ellipsis sites, the null hypothesis is that all conjuncts are root CPs. This would allow minimal assumptions to be made about the argument structure of conjunctions (and, or, etc.) - namely, that these are heads taking root CPs as arguments.

However, further considerations force the assumption that there is at least one type of coordination that can be embedded inside root clauses, namely, DP-coordinations. One concerns data like (95) - c-command would not obtain between the DPs if they were embedded in CPs. Agreement facts also point this way. A conjoined DP in preverbal subject position triggers plural agreement on the finite verb. This is not expected if the example involves ellipsis over clausal conjuncts:

97) John and Mary are/*is coming.

However, facts concerning DP-internal agreement suggest there are no coordinations of nominal projections (small conjuncts) inside DP. If we assume that this is so, then (98a) involves ellipsis in the second conjunct (98b). We can attribute the impossibility of (98a) to a violation of D-N-agreement inside both DP-conjuncts, parallel to the violation in (98c).

98) a. * those man and woman are in love.
b. [[those man] and [those woman]] are in love.

c. * those man and those woman are in love.

(99a), on the other hand, raises problems if we assume that small conjuncts do exist inside DP. Then, the form of the determiner head of the (single) DP indicates that this is a singular DP. As such, it should not permit agreement with the plural form of the verb. Assuming DP-conjuncts, with forward ellipsis into the second conjunct, the plural subject that agrees with the verb is a regular coordination of singular DPs. And there is no D-N-agreement violation inside DP:

99) a. That man and woman are in love.
b. [[that man] and [~~that~~ woman]] are in love.

The assumption of a conjoined DP source is also necessary to explain why LPD inside DP is allowed. As we saw above, LPD cannot cut into major constituents of conjuncts:

100) * [that woman is Paula] and [~~that~~ man is her husband]

If (99a) were based on CP-conjuncts, then the possibility for parts of the DP to undergo ellipsis would be unexpected. If the second conjunct is DP, however, the determiner that counts as a major constituent of the conjunct, and the possibility for ellipsis is expected.

For these reasons, I suppose that DP-coordinations exist, and so, that coordinate structures can be embedded. I leave the issue of selection of &P open. [4]

5.3 Root CPs as conjuncts

The arguments from §3. directed against ATB-representations have consequences for what counts as a possible conjunct. In order to ensure that LF-head movement does not apply to non-identical heads "across the board", any conjunct that contains a (finite) verb must be at least as large as the domain of LF-head raising (CP in the model of Wilder & Cavar 1993, where it is assumed that V raises to C). Similarly, if N raises to D at LF, we derive the consequence just proposed, that there are no NP-conjuncts inside DP. In general, it becomes possible to tighten the notion of what counts as a possible conjunct from (92) to (101):

101) Conjuncts are extended projections (in the sense of Grimshaw 1991)

Adopting (101) excludes the possibility of "small conjuncts", hence of ATB-derivations, inside single clauses. But the question still arises of whether "long" phrasal movements can apply in ATB-fashion out of (embedded) clausal (or: DP-) conjuncts:

102) a. wh- ..... [$_{CP}$ ... t ....] & [$_{CP}$ ... t ....]

b. Who did Mary say [Bill saw *t*] and
[John met *t*] ?

The issue is bound up with the extent to which ellipsis may apply in complex structures. In principle, the syntax of all examples of "long ATB-extraction" can be represented in terms of conjuncts encompassing the domain of extraction, with non-initial conjuncts containing "massive" peripheral deletions:

103) [who did Mary say that Bill saw *t*] and
[~~who did Mary say that~~ John met *t*] <-LPD

Long NP-movement likewise seems to permit analysis via ATB-extraction or "massive" ellipsis:

104) John seems to be drunk or to have toothache.

105) a. John seems [*t* to be drunk] or
[*t* to have toothache]

b. [John seems to be drunk] or
[~~John seems~~ to have toothache] <-LPD

Cases of LF phrasal movement provide an argument for the availability of an analysis in terms of massive ellipsis. By the argument made in §3., the second conjunct must be large enough to contain the domain of LF-raising of the relevant phrase contained in it.

In principle, this domain can be as large as a root clause, now matter how deeply embedded the phrase in question. The "smaller" the surface conjunct, the larger the domain of ellipsis (in terms of an ellipsis account), and the more deeply embedded the overt remnant.

In constructions involving NP-movement in LF, where an expletive is included in the domain of forward ellipsis, its associate NP can be arbitrarily far away from its LF-landing site, the position of the expletive:

106) a. there seems [to be a man in the kitchen] and
~~there seems~~ [to be a cat in the bathroom]

b. there seems [to be believed [to be a man in the kitchen] and
~~there seems [to be believed~~ [to be a cat in the bathroom]

c. there seems [to be believed [to have been reported [to be a man in ...] and
~~there seems [to be believed [to have been reported~~ [to be a cat in ...]

Corresponding examples of multiple questions are easily constructed:

107) Which students did Mary say [she ordered t [to see which doctor] and
~~which students did Mary say [she ordered t [to~~ avoid which patient] ?

In principle, then, analysis of "embedded" conjuncts in terms of root clauses undergoing massive ellipsis, is required. The possibility arises then, that all non-DP-conjuncts are root CPs.

5.4 Shared constituents in the German "Mittelfeld"

Coordinations in German subordinate clauses (with verb final order) also confound ATB-analyses. Constituent-sharing in the "Mittelfeld" displays properties which lend support to analysis in terms of forward ellipsis.

In (108) , except for the verb complex, all constituents are shared - subject, indirect object, direct object:

108) . . . daß Hans mir ein Buch gekauft (hat) und gegeben hat
that H. me-DAT a book-ACC bought (has) and given has

Suppose that this example involves small conjuncts - say conjoined VPs. The shared constituents will result from ATB-subject-raising and maybe ATB-scrambling of objects out of VP, schematically (109):

109) daß SU XP XP [VP t t t V] und
[VP t t t V]

The ATB-approach predicts that all shared phrasal constituents will precede all non-shared constituents. Hence, it is problematic for this approach that non-shared constituents may be mixed among, and precede, shared constituents. (110) involves a non-shared Dative object preceding a shared Accusative object:

110) . . . daß Hans mir ein Buch gekauft und ihr gegeben hat
that H. me-DAT a book-ACC bought and her-DAT given has

The Accusative NP ein Buch is a "shared constituent", hence it must have been extracted (ATB) out of both conjuncts:

111) daß Hans mir ein Buch [VP t t t gekauft ø] und
[VP t ihr t gegeben hat]

The pronoun mir belongs to the first conjunct, but precedes the direct object, and therefore must be situated outside of the coordinate structure. Hence it must have been extracted from the first conjunct. It does not belong to second conjunct - the dative object of the second verb is contained inside its own conjunct. Hence the extraction of mir from the first conjunct represents a CSC-violation.

A second problem with this analysis is that the order of the dative pronoun of the second conjunct with respect to the extracted object yields a deviant string in isolation:

112) *? daß Hans ein Buch ihr gegeben hat

Another such example involves a non-shared Adverbial preceding a shared Accusative object:

113) ...daß ich gestern ein Buch von der UB geholt habe und morgen dort wieder
that I yesterday a book from the UB fetched have and tomorrow there again
abgeben muß
up-give must

"...that I borrowed a book from the university library yesterday and have to give it back tomorrow"

Here, the small-conjunct / ATB analysis is unclear. The adverbial gestern"yesterday", which precedes the shared object, cannot be a shared constituent - the second conjunct is in the future tense and contains a contrary adverbial morgen "tomorrow":

114) daß ich gestern ein Buch [VP t... geholt habe] und
[VP morgen t... abgeben muß]

To preserve an extraction analysis for the shared object, the adverb must be assumed to have undergone extraction from the first conjunct (CSC-violation). On the other hand, if temporal adverbials such as this one do not undergo scrambling movements (as frequently assumed), then the overt expression identifying the shared object must be assumed to be located inside the initial conjunct:

115) daß ich [VP gestern ein Buch von der UB geholt habe] und
[VP morgen ? dort wieder abgeben muß]

The problem then concerns the representation of the object that is interpreted in the second conjunct. German hardly allows null objects ("object *pro*-drop") in this context:

116) (*?) ... daß ich [VP morgen ___ dort wieder abgeben muß]

These examples speak for an ellipsis approach. The shared object in (108,113) can be viewed as a case of FWD - in particular, of "Gapping", since this is "medial" rather than "peripheral" deletion. Assuming conjuncts no smaller than CP (i.e. the conjuncts are at least as big as the subordinate CP), the examples have representations like (117):

117) a. [CP .. daß Hans mir ein Buch gekauft ___] und
[CP .. ___ ___ ihr _____ gegeben hat]

b. [CP .. daß ich gestern ein Buch von der UB geholt habe] und
[CP .. ___ ___ morgen _____ dort wieder abgeben muß]

The complementizer and subject undergoes (peripheral) deletion in the second conjunct, the object is the target of "medial" deletion. In this way, a natural order of constituents can be assumed for non-initial conjuncts. The problem represented by (112) can be avoided, and the contrast (113) vs. (116) can be attributed to the non-licensing of ellipsis in (116).

5.4 Gapping and Left-Peripheral Deletion

This type of "medial" ellipsis is impossible in V2-conjuncts (118a.), but if the fronted finite verb has been Gapped, the pattern of V-final clauses re-emerges:

118) a. * [ich habe gestern ein Buch geholt] und
[__ werde heute _____ zurückgeben]

b. [ich habe gestern ein Buch geholt] und
[__ ____ heute _____ zurückgegeben]

(118b.) looks like a simple case of Gapping - the finite Verb has deleted, allowing further selective deletion of phrasal constituents in the following string.

Usually, finite verb deletion is viewed as a prerequisite for Gapping (understood as medial deletion) of further phrasal constituents. However, the parallel with respect to medial phrasal deletion between V-final clauses without gapping of the finite verb, and V-initial clauses with gapped finite verb suggests that the factor responsible for permitting medial phrasal deletion is not deletion of the finite verb, but rather, absence of an overt finite verb in a position preceding (or c-commanding) medial deletion sites in the string.

Traditionally, Gapping and "Left peripheral deletion" have been treated as independent phenomena. Left-peripheral deletion phenomena - subject-deletion in root declaratives, for instance - is usually considered a different phenomenon, since it does not require deletion of the finite verb. And of course, LPD is also the controversial deletion-type otherwise analyzed in terms of small conjuncts.

However, as indicated above, LPD and Gapping share important properties which motivate grouping them under a more general deletion type FWD. FWD is forward-directional, affects major constituents only, and seems not to require form-identity (only identity of grammatical relation and content). Notice also that the two types do not differ in the nature of their targets: subjects, for instance, usually targets of LPD, can also form targets of medial deletion:

119) Who did you meet today, and who __ __ ___ yesterday?

The conditions distinguishing Gapping (medial deletion) from LPD are given in (120):

120) a. Gapping (medial deletion) requires deletion of the finite verb.
b. LPD requires its target to be left-peripheral in its conjunct.

The data presented here motivate removal of the condition on Gapping. Medial deletion is possible in German clauses where the finite verb is in final position. In its place, I propose (121):

121) Forward-deleted material may not be c-commanded by an overt (non-deleted) head.

This allows Gapping and LPD to be handled as instances of the same deletion process: FWD. Both the left-peripherality condition on LPD (120b.) and the condition on Gapping (120a.) - where it holds - reduce to (121). This condition (which of course requires explanation itself) has wide empirical support.

Consider German subordinate (V-final) clauses. Firstly, if the complementizer of a non-initial conjunct is not deleted, nothing can be deleted inside that conjunct (phrasal or "head" (verbal) constituent:

122) a. * [daß Hans mir ein Buch gekauft ø] und
[daß ____ ihr eine Blume gegeben hat]

b. * [daß Hans mir ein Buch gekauft hat] und
[daß Maria ihr eine Blume gegeben __]

If the complementizer is deleted, phrasal deletion is possible even if the finite verb is present:

123) a. [daß Hans mir ein Buch gekauft ø] und
[___ ____ ihr eine Blume gegeben hat]

b. [daß Hans mir ein Buch gekauft ø] und
[___ ____ ihr _____ gegeben hat]

Deletion of the finite verb (here: auxiliary) is possible if the complementizer is deleted:

124) [daß Hans mir ein Buch gekauft hat] und
[___ Peter ihr eine Blume gegeben __]

Deletion of a finite verb is only possible if both complementizer and finite auxiliary have been deleted:

125) a. * [daß Hans mir ein Buch gekauft hat] und
[daß Hans ihr eine Blume _____ hat]

b. * [daß Hans mir ein Buch gekauft hat] und
[___ Peter ihr eine Blume _____ hat]

c. [daß Hans mir ein Buch gekauft hat] und
[___ ____ ihr eine Blume _____ ___]

"Extraposed" clauses provide evidence for (121), assuming they are in the c-command domain of "final" verbs (Zwart 1992, Kayne 1993). In (126), an asymmetry between preverbal (nominal) and postverbal (clausal) complements becomes apparent. (126a-b) illustrate the possibility for deletion of a preverbal NP (die Nachricht) in the presence of a final verb. As shown in (126c-d), this is impossible for a postverbal clausal complement (daß sie schwanger ist), unless, as in (126e), all final verbs have also been deleted ((126') displays the paradigm more graphically):

126) a. Es scheint, daß er die Nachricht gehört hat und nicht wahrhaben wollte
it seems that he the news heard has and not accept wanted
"It seems that he heard the news and didn't want to accept it"

b. Es scheint, daß er die Nachricht gehört hat und nicht verkraftet
it seems that he the news heard has and not withstood
"It seems that he heard the news and couldn't cope with it"

c. * Es scheint, daß er gehört hat, daß sie schwanger ist, und nicht glauben wollte.
it seems that he heard has that she pregnant is and not believe wanted

d. * Es scheint, daß er gehört hat, daß sie schwanger ist, und nicht geglaubt.
it seems that he heard has that she pregnant is and not believed

e. Es scheint, daß er gehört hat, daß sie schwanger ist, und sie nicht
it seems that he heard has that she pregnant is and she not

126') a. [daß er die Nachricht gehört hat] und
[__ __ _____ nicht [wahrhaben wollte]]

b. [daß er die Nachricht gehört hat] und
[__ __ _____ nicht [verkraftet __]]

b. * [daß er gehört hat, daß sie schwanger ist,] und
[__ __ nicht [glauben wollte _____]]

c. * [daß er gehört hat, daß sie schwanger ist,] und
[__ __ nicht [geglaubt __ _____]]

d. [daß er gehört hat, daß sie schwanger ist] und
[__ sie nicht ____ __ _____]

English subordinate clauses display a similar pattern: presence of an overt complementizer prevents ellipsis of any constituent in its c-command domain:

127) a. . . . that John often eats cakes but (*that) ____ seldom drinks tea
b. . . . that John often eats cakes but (*that) ____ seldom ____ cheese

The English-German contrast in (128) also falls out as a simple consequence of the V2-parameter. Subject deletion is possible in English topicalizations but not in German, since V-to-C in German blocks postverbal subject deletion:

128) a. The rabbit, the hunter sought and caught
b. * Den Hasen suchte der Jäger und fing

129) a. [the rabbit the hunter sought t_{NP}] and
[~~the rabbit~~ ~~the hunter~~ [caught t_{NP}]] < FWD

b. [den Hasen suchte der Jäger t_{NP} t_V] und
[~~den Hasen~~ [fing ~~der Jäger~~ t_{NP} t_V]] * FWD

To summarize: it seems possible to formulate conditions on a general forward deletion operation (FWD) in such a way that LPD and Gapping fall out as subcases.

More investigation is needed. As is well-known, Gapping is a "local" operation, in that multiple remnants of medial deletion may not be too far away from each other. While FWD may create delete over an unbounded distance between the root of the conjunct up to the first remnant (LPD), the distance between the first and second remnants (Gapping) is restricted. It remains to be seen whether this constitutes a further substantial difference between LPD and Gapping beyond those mentioned and eliminated above.

Gapping-type ellipsis is subject to further restrictions: for instance, in German, medial deletion between a subject and a final verb (as opposed to deletion between an object and a final verb, as above) does not produce particularly good results:

130) a. ?? Peter hat die Einladung angenommen und Maria ~~hat die Einladung~~ abgelehnt
P. has the invitation accepted and M. declined

b. ?? daß Peter die Einladung angenommen und Maria ~~die Einladung~~ abgelehnt hat

It is not clear to me why this is so.

6. Ellipsis and interpretation

Many of the considerations which argue against the restrictive theory and motivate small conjunct/ATB representations relate to semantic interpretation. If shared constituents result from PF-deletion, then the LF-representation of an example with PF-deletion should be identical to the LF of the corresponding example without PF-deletion (modulo assumptions about the specific effects of PF-deletion on LF-representations). However, examples with shared constituents differ systematically in their interpretation from corresponding examples with non-shared constituents.

In this section, I illustrate the problem with shared subject DPs and shared relative clauses. I present arguments against the idea that "null subjects" in non-initial conjuncts of

shared subject coordinations in English and German are null pronominals (*pro*). Instead, I suggest that ellipsis sites be treated as syntactic copies of the antecedent phrase. As such, they resemble the "layered traces" that arise if movement is viewed as a "copy-and-deletion" process. Finally, I sketch a way of accounting for intepretative asymmetries induced by ellipsis, based on the idea that the antecedent-ellipsis site relation creates discontinuous objects like movement chains, that count as single entities for interpretation in LF-representations.

6.1 Shared subject coordination

The interpretative asymmetry can be illustrated by considering the behaviour of examples of conjoined finite declaratives with shared subjects. As pointed out for example by Höhle (1991), if the shared subject is an indefinite DP, then a single referent is introduced (1a). In the corresponding example without deletion, the second occurrence of the indefinite introduces a new referent:

131) a. A man came in and sat down. - *1 man*
b. A man came in and a man sat down - *2 men / ?? 1 man*

If (131a) is equivalent to (131b) at LF, then it is difficult to see what causes the difference in interpretation.

An alternative that has been suggested by several authors is that the "deleted subject" is actually a null pronominal - *pro* (Van Valin 1986, Brandner & Fanselow 1992, Hartmann 1993). If this were so, LF equivalence could be claimed for (132a&b) - and the readings seem to be identical in the required sense:

132) a. A man came in and *pro* sat down - *1 man*
b. A man came in and he sat down - *1 man*

Questions arise immediately concerning the licensing of *pro* in tensed clause subject position in languages otherwise negatively specified for the *pro*-drop property. Independent of such questions, however, the assumption of a pronominal null subject fails to solve the problem of interpretative asymmetry for all subject-DP-types.

It has been pointed out by Godard (1989) and Höhle (1991) that coordinations whose shared subject is a quantified NP are not interpreted as if the second conjunct has a pronominal subject. Godard (whose concern is to argue against the analysis of "shared subject coordination" in terms of *pro*) illustrates the asymmetry with <u>few</u> in (133):

133) a. Few congressmen admire Kennedy and are very junior
b. Few congressmen admire Kennedy and they are very junior

In (133a), the "deleted" subject receives a "bound variable" reading - the second conjunct, including its subject-argument position. is interpreted as if in the scope of the quantifier denoted by the subject of the first conjunct. This can be represented as (134):

134) not many x: x = congressman [admire K. (x) & very junior (x)]

In (133b), the overt pronominal subject cannot receive a bound variable reading; instead, it is interpreted as referring to the set introduced by the result of quantification over the first conjunct. This type of reading is an "E-type"-reading (135), and indicates that the subject of the second conjunct is not interpreted inside the scope of the quantifier introduced by the subject NP of the first conjunct:

135) "few congressmen admire Kennedy, and they (the members of the set of congressmen that admire Kennedy) are very junior"

An analogous asymmetry arises with <u>every</u> (136):

136) a. Every student is hungry and wants to eat lunch
b. (*) Every student is hungry and he wants to eat lunch

137) every x: x = student [is-hungry (x) & wants-to-eat-lunch (x)]

While a bound variable reading (137) is available for the (grammatically singular) "deleted" subject in (136a), neither a bound-variable nor an E-type reading is available for the example with a (singular) overt pronoun (136b). The singular pronoun simply cannot be interpreted as dependent on the subject of the first conjunct. This is only possible for a plural pronoun, and then an E-type reading results:

138) a. Every student is hungry and they (all) want to eat lunch
b. "every student is hungry, and they (the set of hungry students just referred to) all want to eat lunch"

These data indicate that shared-subject coordinations with quantified NP subjects are not interpreted as if they contained a silent pronoun, but as if they contained two variables bound by a single quantifier. Godard and Höhle consider such facts to speak strongly in favour of ATB-representations. I return to their argument below.

6.2 Relative clauses with split antecedents

A relative clause following a final conjunct can have split antecedents distributed across all conjuncts (cf. Perlmutter & Ross (1970)):

139) Mary met a man and John met a woman [who knew each other well]

The construction is characterized by three properties:

(i) It is (more or less) restricted to coordinate structures - a subject and an object of a simple clause cannot provide mulitple antecedents fort an extraposed relative:

140) *A man saw a woman [who had danced together]

(ii) Both antecedents must be capable of licensing a relative clause. Pronouns cannot normally act as head of a restrictive relative clause, nor can a pronoun form part of a collective antecedent. The deviance of (141a) is analogous to the deviance of (141b):

141) a. * Mary met him and John met a woman [who knew each other well]

b. * Mary met him [who knew her well])

(iii) A relative clause associated with a non-final conjunct cannot take "split antecedents":

142) * Mary met a man [who knew each other well] and John met a woman

These three properties can all be captured under the assumption that the phenomenon is the result of BWD of peripheral (extraposed) relative clauses in non-initial conjuncts.

Under an BWD analysis, the restriction to coordinate structures is expected. Supposing that one relative clause is generated in each clause, each associated with the respective direct object, then the ungrammaticality of (17a.) reduces to the ungrammaticality of (17b). The BWD analysis requires that each relative clause must occupy the right-peripheral position in its conjunct. This placement will result from "relative clause extraposition" (RCE). If right-peripheral relative clauses are form-identical, then BWD may apply to all non-final relative clauses. So (139) has the analysis (143):

143) [Mary met a man [~~who knew each other well~~]] and < BWD
[John met a woman [who knew each other well]]

(142) has no analysis in terms of backward deletion; and conditions on forward deletion would not license ellipsis of the relative clause in the final conjunct.

Under this deletion analysis, the problem of interpretative asymmetry arises in rather dramatic form. At LF, the example with deletion (143) does not have the same intepretative possiblities as the LF of the corresponding example without deletion - (144) is of course hopelessly unacceptable:

144) * Mary met a man [who knew each other well] and
John met a woman [who knew each other well]

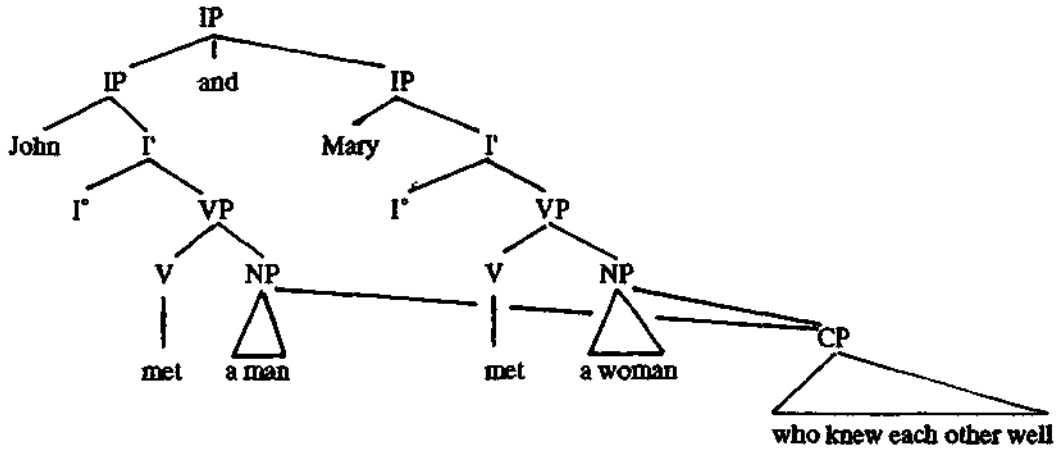
This construction has an obvious parallel analysis in terms of "ATB-extraposition of the relative clause - extraposition construed as rightward raising:

145) Mary met [a man *t*] and John met [a woman *t*] who knew each other well

ATB-extraposition could be considered as an instance of Right-Node-Raising - rightward movement out of sites in each conjunct and adjunction to some node containing coordination.

Moltmann (1992) offers another variant of the same approach, this time based on the view that coordinate structures are represented syntactically as "3-dimensional phrase structures" (cf. also Goodall 1987) in which multiple dominance is allowed. In this analysis, the relative clause has multiple mother nodes, one in each conjunct (the NPs which it modifies):

146)



These variants both fail to resolve the dilemma which poses itself for the deletion analysis in the guise of (143). In the ATB-extraposition model, the relative clause is not licensed in its base positions; in the 3-dimensional model, the relative clause is not licensed in individual "planes" in the tree (on the notion of planes in "3D"-representations, see Muadz (1991) and Moltmann (1992)).

The problem is not only an interpretive one. There is an agreement relation between an N-head and the relative pronoun of a relative clause, which manifests itself indirectly in English, but more directly in languages like German whose relative pronouns are overtly marked for gender and number:

147) Der Junge [den / * das ich sah]
the boy REL.masc REL.neut I saw

This relation is commonly assumed to be formal (relevant for syntactic well-formedness): the choice of a neuter relative pronoun in a relative clause modifying a masculine noun like Junge yields a feature mismatch, automatically leading to syntactic ill-formedness (thanks to D. Wunderlich for pointing this out to me).

However, the German equivalent of (139) is well-formed (148). The relative pronoun takes split antecedents, each in a separate clausal conjunct. The relative pronoun is not only interpreted as plural, but is formally plural, as shown by the non-singular agreement on the finite verb in its clause:

148) Ich sah ein Mädchen, und Peter sah einen Jungen, [die einander gut kannten]
I saw a girl and P. saw a boy who each-other well knew-pl

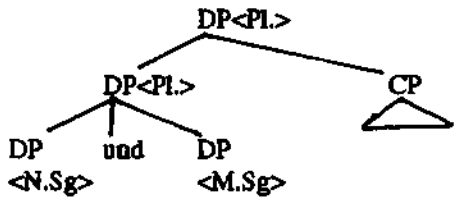
The relative pronoun does not therefore agree with either of its antecedents individually (Mädchen - neuter singular, Jungen - masculine singular) but only with the (plural) conjunction of the two DPs.

Ordinary DP-coordinations may also be modified by relative clauses (called multiple-headed relatives or "hydras" by Link (1984)). Here also, the plural relative pronoun fails to agree formally with one head noun:

149) Das Mädchen und der Junge [die einander gut kannten] . . .saßen lange zusammen
the girl and the boy who each-other well knew sat long together

In this case, the agreement issue may be side-stepped by assuming the relative to be attached outside the coordination domain, at a level at which a formally plural DP-projection exists: [7]

150)



In the split-antecedent construction, however, there is no justification for the existence of such a formally plural conjoined DP, in any linguistic representation of the clause. (151) has approximately the same interpretation as (139) / (148), but it differs radically in its syntactic representation:

151) The man (who Mary met) and the woman (who John met) ... knew each other well

I see no evidence for a syntactic operation that creates a conjoined DP from the objects of two independent clausal conjuncts, to yield an LF like (151) for (139/148).

I conclude from this that agreement between a relative pronoun and the head of the relative is not a formal matching relation. Rather, the agreement relation is "semantically" determined. So examples like (152) can be syntactically well-formed. In Chomsky's (1992) terminology, the example has a convergent derivation, but receives an interpretation as "gibberish":

152) John met a man [who knew each other well]

Determination of agreement with antecedent of the relative pronoun in the split-antecedent construction is not formal. Instead, a special interpretative mechanism is must be assumed - summation of object referents to serve as "collective" antecedent. This notion might be implemented in terms of the generation of Discourse Referents in Discourse

Representations constructed from LF-representations (in the DRT-model of H. Kamp). The assumption of such an interpretive mechanism is necessary irrespective of whether the syntactic representation is a 3D-tree, an ATB-structure, or one containing ellipsis sites.

All three models provide a syntactic basis for the summation of DP-referents. In the 3D-model and the ATB-model, both DPs are syntactically linked to the single relative clause. In the ellipsis model, each DP is linked to a single relative clause, and these are linked to one another by the ellipsis site - overt antecedent relation. Notice also that RPD of relative clauses obligatorily induces summation of referents. I believe it is impossible to interpret the relative clause in (153a.) as modifying DP-objects of both clauses, as in (153b):

153) a. Mary met a professor and John met a student [who admires himself]

b. (*) Mary met a professor [~~who admires himself~~] and
John met a student [who admires himself]

The ellipsis model is faced with an additional question - how to we account for the different interpretations of (139) - with ellipsis, and (144) - without ellipsis. The intuition I pursue is that the creation of an ellipsis-antecedent relation has the effect that the two syntactic objects form a discontinuous entity for interpretation. The deleted relative clause in (139/143) receives no interpretation independent of its antecedent, and vice versa. One "relative clause denotation" is induced by two relative clauses.

Where two relative clauses are not linked by ellipsis (144), then each relative clause receives an interpretation independently of the other. Hence, two "relative clause denotations" are induced by two relative clauses. In this case, each relative needs its own head to make sense. This is what happens in (154), where the relative pronouns each take singular antecedents:

154) Mary met a man [who admires himself] and
John met a woman [who admires herself]

The deviance of (144) (repeated here) can therefore be reduced to the deviance of (152). Both are well-formed (have a convergent derivation), but receive an interpretation as "gibberish":

144) Mary met a man [who knew each other well] and
John met a woman [who knew each other well]

6.3 Ellipsis as "deletion" of a syntactic copy

Further consideration of relative clause extraposition in coordinations provides additional insights into the nature of ellipsis. A relative clause following a final conjunct can be associated with the subject in a shared subject coordination. This construction is possible in both English and German:

155) a. A man came in and left again [who the police were looking for]

b. Eine Frau kommt ins Zimmer und fängt an zu erzählen, [die ich noch nie in
a woman comes into the room and starts to speak who I never in
meinem Leben gesehen habe]
my life seen have

This fact is considered to provide an argument against any deletion approach by Heycock & Kroch (1993). Actually, it merely provides an argument against the claim that the ellipsis site is occupied by a zero pronominal (*pro*). An overt pronoun blocks RCE:

156) a. * A man came in and he left again [who the police were looking for]

b. * Eine Frau kommt ins Zimmer und sie fängt an zu erzählen, [die ich noch nie in meinem Leben gesehen habe].

I propose that (155) is a variant of the "split antecedent" construction, with RCE from the subjects of both conjuncts, and backward deletion of relative clauses in non-final conjuncts.

In examples with two overt subjects, the relative clause is interpreted with respect to both subjects:

157) a. Nobody came in and nobody left [who I knew]

b, Keiner kam rein und keiner ging fort, [den ich kannte]

In these examples, the split antecedent effect is not conspicuous. This is understandable - the summation of referents of negative existential quantifiers yields the same referent. The effect of split antecedents becomes noticeable where the subjects of the conjunct clauses are indefinite DPs:

158) a. A man came in and a woman left [who were wanted by the police]

b. Ein Mann kam rein und eine Frau ging fort, [die von der Polizei gesucht wurden]

The construction in (155-158) has the same properties identified for (139) and can be analysed in the same way: RPD of an extraposed relative clause in non-final conjuncts. The deviance of (156) reduces to the deviance of RCE from a pronominal subject. At the same time, we have evidence that the zero subject of the non-initial conjunct in (155) is not *pro* - assuming that RCE from a null pronominal is impossible. (In genuine *pro*-drop languages, *pro* does not support relative clauses, extraposed or not).

Instead, to account for the possibility of RCE from the "deleted" subject, we must assume that this element has syntactic properties enabling it to support RCE. I make the simplest assumption:

159) Ellipsis sites contain syntactic copies of their antecedents.

(155a.) then has the analysis (160):

160) A man came in ~~[who the police were looking for]~~ and < BWD
~~a man~~ left again [who the police were looking for] < FWD

In conjunction with forward deletion, backward deletion of a peripheral relative clause in the first conjunct gives the impression that RCE takes place from the subject of the initial conjunct to the right periphery of the final conjunct.

(159) is also an improvement over the *pro*-hypothesis for examples where the "shared subject" is a quantifier. The presence of grammatically singular agreement in (136a) (repeated here) is expected (recall that a "coreferent pronoun" is grammatically plural) :

136) a. Every student is hungry and wants to eat lunch

The assumption of a silent copy in the second conjunct provides a syntactic basis for accounting for the fact that a pronoun embedded in the second conjunct may receive a bound variable reading:

161) [every student is hungry] and [~~every student~~ wants to eat his lunch]

If this is clausal coordination, the pronoun is not c-commanded by the quantified NP in the first conjunct, although c-command is a precondition for bound variable interpretation. But it is c-commanded by the silent QNP-copy in the second conjunct. The interpretive dependence of the silent copy on its overt antecedent yields the effect of the pronoun being bound to the overt QNP.

6.4 Interpretation: insufficiency of the ATB-account

Let us return to the original problem of interpretative asymmetry:

162) Interpretative properties of "reduced" examples differ systematically from those of "unreduced" examples in a way favouring a single representation of shared constituents.

Example (163) neatly illustrates the point:

163) a. Nothing is round and square
b. Nothing is round and nothing is square

The meanings of the two expressions can be expressed as formulae of predicate logic:

164) a. $\neg\exists x(round(x) \,\&\, square(x))$
b. $\neg\exists x(round(x)) \,\&\, \neg\exists y(square(y))$

If (163a.) involves small conjuncts (AP&AP), with an ATB-derivation of the subject, then the syntactic (LF) representations (165) correspond in a natural way to the predicate logic representations (164):

165) a. nothing is $[_{AP}\,[_{AP}\,t$ round] and $[_{AP}\,t$ square]]

b. $[_{IP}$ nothing is $[_{AP}\,t$ round]] and $[_{IP}$ nothing is $[_{AP}\,t$ square]]

(165a.) contains a single instance of the QP nothing, (corresponding to the negative existential quantifier in (164a)) binding two traces (variables occupying argument positions of the predicates in (164a)). In (165b), there are two instances of nothing ($\neg\exists x$), each binding its own trace (variable).[8]

However, it is important to bear in mind that there is no reason to believe *a priori* that the shape of LF-representations corresponds in any direct fashion to the shape of standard predicate logic representations. The SCH-ATB-theory has no prior claim of correctness on the basis of the special correspondence between (164) and (165).

The interpretation of indefinite and quantified subjects is used by Godard and Höhle to argue that ATB-extraction gives the only adequate account of shared subject coordination (single representation of NP at LF). But there is evidence suggesting that ATB-movement is insufficient to account for the interpretation of "shared constituents". These authors only discuss examples corresponding to "left-peripheral deletion". Yet the same effects also characterize examples in which "shared constituents" arise through other deletion types - Gapping and backward deletion - for which no ATB-movement analysis is available.

Gapping (medial deletion) can result in deletion of a subject, for example in conjoined topicalizations (English and German):

166) a. The letter, he gave to me, and the copy, ___ ___ to the secretary.

b. Den Brief hat er mir gegeben und die Kopie ___ der Sekretärin ___.
the letter has he to-me given and the copy to-the secretary

With pronominal subject, there is no particular asymmetry between examples with and without ellipsis:

167) a. The letter, he gave to me, and the copy, he gave to the secretary.

b. Den Brief hat er mir gegeben und die Kopie hat er der Sekretärin gegeben.

With indefinite subjects, the same interpretative asymmetry appears in Gapping sentences, as that found in LPD-examples:

168) a. At three, a man bought a watch , and at four, a bottle of whisky.

b. Um drei kaufte ein Mann eine Uhr und um vier ___ ____eine Flasche Whisky.
at 3 bought a man a watch and at 4 a bottle whisky

169) a. At three, a man bought a watch , and at four, a man bought a bottle of whisky.

b. Um drei kaufte ein Mann eine Uhr und um vier kaufte ein Mann eine Flasche Whisky.

In (169), the second instance of a man (ein Mann) introduces a new referent. Two purchasing events involved two different purchasers. In (168), this is not the case. The effect can be clearly seen in (170) - it is impossible to read the sentence with different men as antecedents to the possessive pronouns:

170) At three, a man bought a watch for his sister, and at four, a bottle of whisky for his brother.

Assuming that the temporal PP is topic (in SPEC,CP) in the second conjunct in the Gapping examples, the shared subject has no ATB-movement derivation. So there must exist an account for the obligatory "single-referent" reading for shared indefinite subjects that does not refer to ATB-extraction.

Coordinations involving backward deletion of postverbal indefinite subjects also have this interpretative property. I have argued above against an ATB-movement analysis:

171) There came at three ___, and left at four, a man from the ministry. *1 man / ?? 2 men*

Similar effects appear in asymmetric V2-coordinations with shared subjects. (172a), with ellipsis, forbids the reading involving two different hunters, which is available for (172b):

172) a. In den Wald ging ein Jäger und fing einen Hasen
into the wood went a hunter and caught a rabbit

b. In den Wald ging ein Jäger und ein Jäger fing einen Hasen

I have given arguments above that there is no sensible ATB-analysis for (172a).

The situation is actually more complicated than implied so far. Firstly, I have tried to pick examples where an indefinite NP clearly denotes a single individual. However, as is well known, indefinites can have a non-specific readings, in which case they show interaction with quantificational elements. Non-specific indefinites may undergo ellipsis, and then readings arise in which different individuals are assigned to the sets denoted by an deleted indefinite and its overt antecedent (Wolfgang Sternefeld, p.c. - cf. also discussion in Höhle (1991)). In (173a.), different newspapers may be involved, in (173b), different children must be involved, for(173c/d), we do not assume that different individuals wear the same hat or eat the same breakfast:

173) a. John sometimes buys _____, and
Peter sometimes borrows a copy of the day's newspaper <BWD
b. Mary thought about having ___, and Sue definitely wants a third child <BWD
c A hat is worn by some and ____spurned by others. <FWD
d. For some, a good breakfast is essential, for others, _____ unnecessary <FWD

I do not believe that these effects have any bearing on the argument presented here.

Secondly, it is not clear that a second instance of an (specific) indefinite DP must introduce a new referent. In (174), the two instances of a man can marginally be read as referring to the same individual. In this case, the relative clause can be read as modifying both subjects (multiple antecedents):

174) A man came in and a man went out, [who was wanted by the police] (?? *1 man*)

But this does not alter the fact that a deleted indefinite cannot introduce a new referent. (175), where the relative clause demands multiple referents as antecedent, is totally unacceptable:

175) *A man came in and ___ went out, [who were wanted by the police]

6.5 Ellipsis chains

Consider now the ellipsis-based account, based on the assumption that ellipsis sites contain syntactic copies of their overt antecedents. If (176) is derived by ellipsis over clausal conjuncts, then the LF-representations of the two examples do not differ, except for differences due to the effects of ellipsis of terminals on LF-representations:

176) a. [nothing is round] and [~~nothing~~ is square]
b. [nothing is round] and [nothing is square]

177) a. $\neg\exists x(\text{round}(x) \,\&\, \text{square}(x))$
b. $\neg\exists x(\text{round}(x)) \,\&\, \neg\exists y(\text{square}(y))$

The issue is whether interpretative contrast (177) can be derived under reasonable assumptions about the effect of ellipsis on LF-representations.

The basic elements of LF-representations that are relevant for interpretation are chains. The representations in (176) both contain the same A-chains. The difference must be due to the fact that each A-chain is independently interpreted in (176b.),, but not in (176a). The effect of ellipsis is that elements at deletion sites are not interpreted independently; rather, they receive are interpreted (assigned a denotation) jointly with their overt antecedent. The covert occurrence of nothing and its overt antecedent together form a unit eligible for interpretation only once (a single assignment of "$\neg\exists x$"). We can think of this unit: { nothing , ~~nothing~~ } as a chain, analogous to a movement chain. I term such chains "ellipsis chains".

178) Ellipsis chain formation:
ellipsis creates a discontinous element, like a movement chain, whose subparts receive no independent interpretation.

An A-chain is interpretively independent in that it receives an independent theta-role (in terms familiar from GB-theory). However, it is certainly not the case that each A-chain receives an independent referent. Control phenomena, pronominalization, etc. all involve referential dependencies among thematically independent A-chains. The proposal here is that ellipsis is a further mechanism by which anaphoric (referential) dependencies can be imposed on (thematically independent) A-chains.

The different interpretations assigned reduce (mainly) to the presence or absence of the ellipsis chain linking the subjects of the two conjuncts:

179) a. 1 chain: { nothing, ~~nothing~~ }
b. 2 chains: { nothing }, { nothing }

The single chain in (179a) only license one intance of " ¬Ex " in its interpretation. The principle of Full Interpretation requires that each of the two independent instances of nothing in the LF (179b) be interpreted, so that "¬Ex " appears twice in its interpretation.

Although many details and consequences remain to be worked out, I hope to have shown that the concept of ellipsis chain provides the basis for an account of interpretative asymmetries induced by ellipsis in coordinate structures, without the need to resort to small conjuncts and the ATB-formalism.

The ellipsis chain approach applies equally to examples where the interpretative asymmetry does not appear in such striking fashion as in (176). The truth conditions of (180a) do not differ from those of (180b), for instance:

180) a. Mary came in and sat down.
b. Mary came in and Mary sat down.

Notice how the ellipsis approach decomposes a singular forking chain of an ATB-analysis into three simple (non-forking) chains:

182) { Mary —< t / t > }

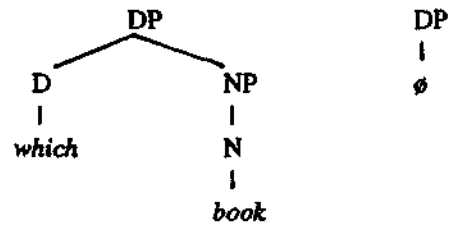
183) a. { Mary , t } movement chain (conj-1)
b. { ~~Mary~~ , t } movement chain (conj-2)
c. { Mary , ~~Mary~~ } ellipsis chain

6.6 Copies, c-command and locality

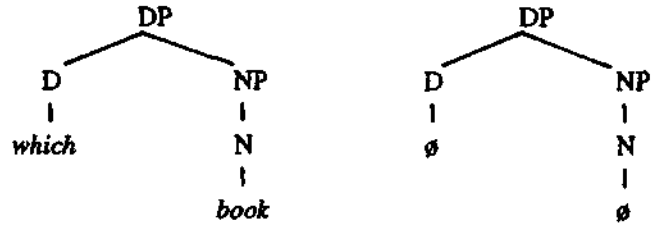
Ellipsis chains, like movement chains, constitute discontinous entities in phrase-markers that are relevant for interpretation at LF. However, ellipsis chains differ radically from movement chains in one crucial respect. Members of a movement chain are ordered by the c-command relation. Traces must be c-commanded by their "overt" antecedents. Ellipsis sites clearly do not have to be c-commanded their "overt" antecedents.

Under the "standard" view (184), the trace left by movement is a "PF-empty" terminal dominated by a node of the category α. However, if movement is an copying operation, then the trace of moved α is a syntactic copy of α. Antecedent-α and its copy-trace differ only in that the former but not the latter dominates PF-material (185):

184)



185)



Under the copy-approach, traces contain internal structure / are "layered". In Chomsky (1992), it is proposed to utilise this property of traces under a "copy-and-deletion" conception of movement, to account for "reconstruction" facts.

What is relevant here is that the relation between subconstituents of antecedents and traces is not c-command. C-command only relates the root of the antecedent alpha to the trace - subparts of traces are not c-commanded by corresponding parts of the antecedent. Under this view, the antecedent-trace relation in chains created by movement is similar to the antecedent-ellipsis site relation in coordinations. Although c-command does not obtain between the deletion site and its antecedent, c-command does obtain between the root of the phrase containing the antecedent - the initial conjunct - and corresponding phrases (conjuncts) containing deletion sites as subparts.

Ellipsis in coordination can be viewed as partial deletion in phrase markers that are partially "copies" of one another. While copies arising through movement are necessarily fully identical - as determined by the movement operation itself - identity of conjuncts is contingent. Conjunct clauses are generated independently of one another, and any two conjuncts may (though need not) show partial identity. So ellipsis in coordination (forward deletion) can be viewed as partial deletion of terminal strings, licensed through c-command of the containing conjunct by a partial copy.

There are two further parallels which emerge, when ellipsis in coordination and movement as copy-and-deletion are looked at in this way. Firstly, deletion in movement chains typically takes place in all copies except the highest (leftmost). That is, chain-internal deletion parallels Forward Deletion in coordination.

Secondly, like movement, ellipsis chain formation underlies strict locality conditions. This becomes clear from considering multiple conjuncts. In (36), the deleted subject must take the subject of the immediately preceding conjunct as its antecedent:

36) Mary came in and John sat down and read the paper.

37) a. * Mary came in and John sat down and ~~Mary~~ read the paper.

b. Mary came in and John sat down and ~~John~~ read the paper.

Ellipsis-chain formation is possible only with (daughters of) the immediately local c-commanding antecedent. This relates to another aspect of the ATB-phenomenon - the requirement that ellipsis sites appear in all (non-peripheral) conjuncts, which I have not considered here (see Williams 1978 for discussion).

Notes:

* This material was presented in various forms at the GGS-Meeting in Zürich, February 1993; to audiences in Berlin, Düsseldorf, Frankfurt, London, Tübingen and Venice during 1993; and in March 1994, at the DGfS-meeting in Münster and at the Inaugural Conference of FAS in Berlin. My thanks to everybody who listened and offered their intuitions, comments and criticisms. Manfred Bierwisch, Ewald Lang and Arnim von Stechow have been particularly incisive. Artemis Alexiadou, Gerhard Jäger, Christine Maaßen and André Meinunger have helped me in countless discussions.

1. A wh-phrase can be simultaneously extracted from a nominative and an accusative position (i). See Williams (1978) on the contrast (i) vs. (ii):

i I know a man who [Bill saw t] and [Sue thinks t likes Mary]
ii * I know a man who [Bill saw t] and [t likes Mary]

2. If anaphor binding involves LF-raising of the anaphor to I°, as suggested in Chomsky (1992), such examples will involve a CSC-violation at LF under a VP-&-VP analysis. See the discussion of LF-movement in §3. below.

3. It might be thought that the output of across-the-board raising in such a case could be conceived of as a "derived coordinate DP". But (39a) does not mean the same as (i):

   i [A man and a cat] seemed to be in the kitchen and to be in the bathroom

   In (i), the DP-conjuncts denote a plural individual with respect to which each conjunct is evaluated. They do not distribute to the different conjuncts, unless respectively is added, whereas in (39), the DPs clearly must distribute.

4. See Höhle (1990,1991), Wunderlich (1988); more recently Heycock and Kroch (1993). Zwart (1991) seems to be an exception, in assuming a large-conjunct-plus-ellipsis analysis, rather than ATB-extraction analysis, of the shared subject in these examples.

5. This aspect of the analysis links to the debate about the special status of SVO-sentences among declarative V2-sentences, and the proper analysis of V2-sentences. I refer to Heycock and Kroch's paper, Zwart (1991,1992), and Wilder (1993) for discussion. The insight that what is at issue in this type of coordination is the SU-V2 status of the second conjunct (contrasting with the X-V2 status of the initial conjunct) is in my view correct. This was already pointed out in Zwart (1991). Several authors treat these sentences as if the (relevant) "subject-gap" of the second conjunct is located after the verb.

6. If the only case of embedded coordination are conjoined DPs - i.e. that conjuncts in all other coordinations are root CPs, meaning there are no PP-conjuncts, AP-conjuncts, embedded CP-conjuncts, etc. - it may look as if the problem is solved. But questions still remain - for example, concerning non-local selection of Case-features on DP-conjuncts, etc..

7. It is conceivable that the analysis (151) should be replaced with analysis in terms of RPD - this time over conjoined DPs:

   i) [Das Mädchen ~~die einander gut kannten~~] und [der Junge die einander gut kannten] ...

8. A further aspect of the representations (164) apparently correctly captured by (165) concerns the relative scope of negation and conjunction. I do not discuss this aspect here.

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