

# Branching and order<sup>1</sup>

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## Abstract

A cornerstone of modern generative grammar is the notion of phrase structure. Traditionally, phenomena such as movement, deletion, and scope, and to a lesser extent coordination, have been taken as evidence about the organization of phrase structure, and about the constituents that make it up. While early work on phrase structure suggested that multiple branching structures are possible, a simplifying assumption of later work was that all branching structure is binary. This assumption has made it possible to develop a range of analyses in which hierarchical structure is the foundation for the basic relationships between parts of a sentence.

In this paper I will consider the question of whether it is possible to dispense with certain aspects of branching structure in syntactic representations. In particular, I will be concerned with the branching structure that is central to the Antisymmetry Thesis (AT) due to Kayne 1994, namely the structural relationship between heads and maximal projections that serve as arguments and adjuncts to the heads. The AT accounts for linear order in terms of asymmetric c-command, which is defined only when there is binary branching. In the absence of binary branching, no linear order is defined, and thus it follows that all relevant syntactic structure is strictly binary branching.

I will argue on minimalist grounds that the fundamental syntactic asymmetry in language is not one based on hierarchical structure, but on linear order. On this view, the hierarchical structure is a reflex of the linear order and the correspondence with Conceptual Structure (CS).

I summarize a range of empirical evidence that has been adduced in the literature to demonstrate that branching is richer than the minimalist flat branching structure. I will argue that to the extent that there is evidence for richer structure, it is actually evidence for CS, not syntactic structure.

Minimalist principles and in particular Concrete Minimalism would lead us to assume that syntactic structure is flat in the absence of compelling evidence to the contrary. If this is correct, the Antisymmetry Thesis cannot be a correct generalization about linguistic structure, since it presumes linguistic structure that does not exist. It is preferable to take linear order to be the primitive asymmetry and to treat structural asymmetry as following from and not determining linear order.

## 1. Minimalist structure

In this paper I will consider the question of whether it is possible to dispense with certain aspects of branching structure in syntactic representations. In particular, I will be concerned with the branching structure that is central to the Antisymmetry Thesis (AT) due to Kayne 1994, namely the structural relationship between heads and maximal projections that serve as arguments and adjuncts to the heads. The AT accounts for linear order in terms of asymmetric c-command, which is defined only when there is binary branching. In the absence of binary branching, no linear order is defined, and thus it follows that all relevant syntactic structure is strictly binary branching.

A cornerstone of modern generative grammar in the derivational paradigm is the notion of phrase structure. This notion is of course fundamental to AT. Under AT, linear order in sentences is a projection of branching structure. This branching structure must satisfy the constraint known as the Linear Correspondence Axiom (LCA). On this view, the primitive category of syntactic organization is the branching structure, while linear order is simply a reflex.

I will argue here on minimalist grounds that the fundamental syntactic asymmetry is not one based on hierarchical structure, but on linear order. On this view, which I will elaborate in some detail below, the hierarchical structure is largely a reflex of the linear order and the correspondence with Conceptual Structure (CS). The evidence that I will bring to bear concerns such familiar phenomena as ellipsis and similar constructions, anaphora, coordination, and movement.

The minimalist perspective, which I share in general terms, calls into question much of what has been taken for granted in earlier theories of grammar. There are varieties of minimalism that must be distinguished, however. Minimalism as a general approach is simply good science - the most parsimonious account of the phenomena. If we are going to be minimalists<sup>2</sup> we cannot choose what parts of the theory are going to be minimalist and what parts are not. So we cannot restrict ourselves to theories that have particular properties (e.g. some economy metric on abstract steps in a derivation, as in Chomsky 1995, or some particular degree of abstractness), or remain fixed on some commonly held but never validated assumption, without considering the adequacy of more parsimonious alternatives.<sup>3</sup>

In Culicover 1999 I presented an extended argument that learners must be capable of acquiring grammars of considerable complexity and idiosyncrasy. This argument is based on the observation that the grammars of native speakers embody knowledge of constructions that range in generality from the very spe-

cific to the very general. Native speaker judgments appear to be just as categorical for very idiosyncratic cases as they are for very general cases. I suggest that the learner is Conservative, in that it does not generalize beyond the natural boundaries of the evidence that it is exposed to. It is Attentive, in that it incorporates into its knowledge of language every datum that is consistent with or supported by its overall experience. If we allow that a learner can generalize when the evidence warrants it, we have the basis for an explanation of how it is possible for learners to know that something is impossible when they have not been explicitly instructed that it is, that is, where there appears to be explicit knowledge but poverty of the stimulus. The general principle is, everything is impossible unless it is required. This minimalist principle produces constraints such as Subjacency and the Keenan-Comrie Accessibility Hierarchy, when paired with an account of the complexity of mapping from strings into conceptual structure. See Hawkins 1994 for some important proposals about what such an account must look like.

In Culicover 2000 I argue on minimalist grounds, contra the Antisymmetry Thesis of Kayne 1994, that the fundamental syntactic asymmetry in language is not one based on hierarchical structure, but on linear order. The perspective that I take is a Concrete Minimalist one. I take the perspective of the language learner, who is exposed minimally to information about linear sequences of sounds and their corresponding meanings, which I will assume here to be Conceptual Structure (CS) in the sense of Jackendoff 1990. I take these to be concrete manifestations of language, as distinguished from abstract syntactic representations. From the perspective of the language learner, linear order and conceptual structure are epistemologically prior to branching syntactic structure that is not directly projected from CS. It is evidence about linear order and CS that the learner is presented with in language learning, and it is on this basis that the learner must acquire grammar. It is logically possible that there is more structure in what the grammar allows than there is in the input. The minimalist perspective requires that any such additional structure, levels of representation, notational devices, etc. beyond the two concrete ones just enumerated must be justified on the basis of compelling empirical evidence. In the case of branching structure, we must ask what work additional branching structure does, or whether linear order is sufficient to the task of explaining the facts. While it is true that either structure or linear order may be taken to be primitive in a given syntactic theory, linear order is a weaker notion than branching structure in terms of expressive power, and hence should be preferred, other things being equal.

On this view, the hierarchical structure is a reflex of the linear order and the correspondence with Conceptual Structure (CS). In some cases the structure is only apparent. I present a range of evidence to show that where there is apparent evidence for binary branching structure in a complex phrase, there is equiv-

alent structure at CS. Otherwise, I argue that the evidence for binary branching structure is only apparent.

There are six major kinds of evidence that I consider in Culicover 2000. First there are preforms, such as VP ellipsis. The evidence suggests that the antecedents of proforms are not syntactic constituents, but CS constituents. Second there is deletion, such as gapping, pseudogapping, and bare NP ellipsis. The range of possible deletions does not provide evidence for particular branching structure, although it is always possible to find a branching structure that will correspond to the deleted material if we allow constituents to be moved out in such a way that they isolate the deleted material. Hence we do not have strong evidence here for branching structure. The third is movement, and here we find that what moves is determined on the basis of a string that contains a head, and does not require branching structure. The fourth is based on relations involving c-command that depend on the topology, such as binding. We can show that the evidence is actually contradictory, in that different tests yield different branching structures; the consistent analysis is one based on CS relations and linear order. A fifth category of evidence is concerned with justifying binary branching for structures where n-ary branching appears most natural, in particular, ditransitives. A sixth category of evidence involves theory-internal considerations that correlate constituent order with the distribution of empty functional heads and the requirement that certain features be discharged under agreement. In such cases it is possible to argue that the hierarchical structure is simply a way of encoding relations that are stateable in terms of linear order, with no loss of generality or explanatory force.

In this paper I develop several lines of argument and promissory notes that are initiated in the previous paper but not pursued in detail there. I also open up several new lines of inquiry, including consideration of the structure of NP. Finally, I touch upon some general conceptual and methodological issues concerning the status of structure in syntactic theory.

## 2. Evidence for structure: pro-forms

### 2.1. VP ellipsis

In Culicover 2000 I consider the extent to which VP ellipsis counts as evidence for binary branching structure within VP. The standard type of VP ellipsis is exemplified by (1).

- (1) a. John will major in physics, and Mary will ~~major in physics~~ too.
- b. Mary intends to major in physics, but John doesn't intend to ~~major in physics~~.

Traditionally, the possibility of elliding an entire VP constitutes *prima facie* evidence that the VP is a constituent of a sentence. Suppose that VP ellipsis is correctly characterized in terms of a pro-VP, as in (2).

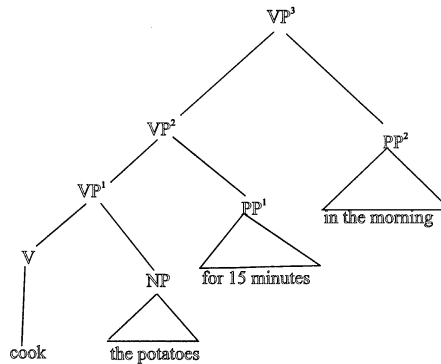
(2) John will major in physics, and Mary will [VP pro] too.

The standard principle of syntactic reasoning used in this case is that the possibility of using a proform signals that there is some constituent in the sentence that serves as its antecedent. On this basis, *major in physics* would be a constituent since it functions as the antecedent of [VP pro]. In more complex cases, this principle produces the result that there is a VP contained within the larger VP, e.g.,

- (3) Mary will cook the potatoes for 15 minutes in the morning, and Susan
- a. will cook the potatoes for 15 minutes in the morning.
  - b. will [VP pro] in the evening. (pro = cook the potatoes for 15 minutes)
  - c. will [VP pro], too. (pro = cook the potatoes for 15 minutes in the morning)

Hence the structure of the VP *cook the potatoes for 15 minutes in the morning* is the following.

(4)



Such evidence in fact constitutes the standard textbook argument for the structure of VP.

An analysis based on anaphora must meet a demanding methodological standard. First, it cannot be denied that some anaphoric elements can get their meaning from context, even without a linguistic antecedent. For example,

- (5)a. Look, what a jerk he is! [uttered while looking at a person trying to park his car while talking on a cellular phone and eating a hamburger]  
 b. I would never do that! [same as (5a)]

Coreference in discourse may arguably be analyzed in terms of the reference of an anaphoric element in one utterance to an object in a shared meaning representation that was constructed on the basis of a linguistic expression in a prior utterance.

- (6)a) A: Do you know that guy over there who is trying to park his car, talking on a cellular phone and eat a hamburger at the same time?  
 B: No. What a jerk he is!
- b.) A: Do you know that guy over there who is trying to park his car, talking on a cellular phone and eat a hamburger at the same time?  
 B: What a jerk! I would never do that!

From a general minimalist perspective, which is to say, one of scientific parsimony, it is most sensible to see how much explanatory force can be derived from taking the antecedent of an anaphoric expression to be some aspect of CS representation, rather than a syntactic constituent. (See Culicover and Jackendoff 1995 and references cited there.) There may of course be syntactic constraints on when this relationship may hold. What would be needed in order to demonstrate that the antecedent must be a syntactic constituent is to show that an anaphoric expression must correspond to a syntactic constituent. This is of course impossible, given sentences such as (5).

But suppose that we weaken the requirement so that if an anaphoric expression gets its meaning from a linguistic expression (and not from ‘context’), there must be a syntactic antecedent. This seems to be an arbitrary requirement, but it does promise to have the intended consequence.

We find now that we are in a methodological quandary. If anaphora fails, regardless of the apparent syntactic structure, we may say that the underlying syntactic structure does not support anaphora. If anaphora succeeds, regardless of the apparent syntactic structure, we may say that it does. Consider, for example, the case of verbs of putting, discussed in Culicover 2000. I conclude that such verbs have the following CS representation.

- (7) [ V - Location] - Theme

This structure is revealed by the fact that anaphors such as *do the same* can refer to V-Location, but not to V-Theme.

- (8) a. John put the potatoes in the pot, and Bill did the same to the onions.  
 b. \*John put the potatoes in the pot, and Bill did the same in the sink.

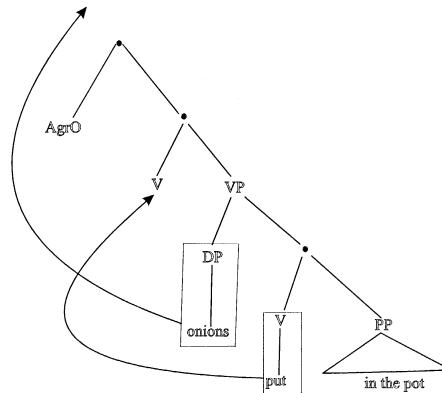
Relevant to this discussion is the fact that VP ellipsis appears to apply to V-Location but not to V-Theme.

- (9) a. John put the potatoes in the pot, and Bill did the onions.  
 b. \*John put the potatoes in the pot, and Bill did in the sink.

((9a) is an instance of pseudogapping, which Lasnik 1999 argues is a special case of ellipsis, in fact.)

So, as pointed out in Culicover 2000, we could suppose that the structure is that of (10).

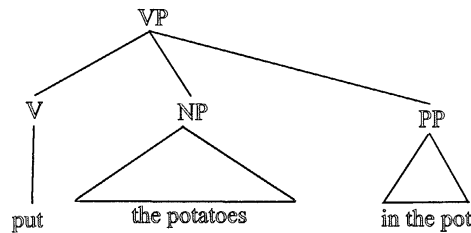
- (10)



Crucially, *put in the pot* is a constituent. Moving *onions* out of VP produces a VP that can serve as the syntactic antecedent for an anaphoric expression. *Put onions* is never a constituent, and hence cannot serve as the antecedent for such an expression.

Of course, it is always possible to take the conceptual structure, assume that it is identical in all relevant respects to the syntactic structure, and then move things around so that the surface order is derived. Doing so will allow us to maintain the position that anaphora picks out ‘syntactic’ constituents, but at the cost of a more complex syntactic analysis. On the other hand, the semantic interpretation of such a structure is in some sense maximally simple, since there is a one-to-one correspondence between syntactic structure and conceptual structure. The operations that are necessary to derive the linear order of constituents in English from (10) are essentially the mirror image of the operations that are necessary to derive the conceptual structure in (7) from a flat structure such as (11).

(11)



The operations that are needed here are (i) map the direct object *the potatoes* into the Theme argument, and (ii) map the verb *put* and the PP *in the pot* into the V-Location structure. While (10) has syntactic raising of V, (11) requires a lowering of the PP to the V in the mapping to conceptual structure.

As far as I can see there is no way to argue in favor of the syntactic analysis over the CS analysis on the basis of the facts. If the anaphoric dependence is determined by the existence of an antecedent at CS, it will always be possible to create a syntactic analogue. However, the syntactic analogue may be more complex, in that it requires certain syntactic devices that are not otherwise required. If there is no empirical evidence that can be brought to bear to evaluate such a strategy, we must rely on a principled minimalist position to rule out the more complex analysis on the grounds that there exists an adequate yet less complex alternative. This is the essence of the argument about branching structure.

Because the syntactic analysis is more complex, it is more likely to run into difficulties. In the case of the structure in (10), for example, the sequence V-NP is never a constituent. This is also the case with the flat structure in (11), of course. But if extraction of the NP is used to explain why V-PP functions as a constituent, it is not possible to account for cases in which V-NP appears to function as a constituent. In the flat structure approach, the behavior of V-PP as

a constituent is a CS fact, while the behavior of V-NP as a unit is attributed to the fact that they are adjacent in the linear order.

Let us consider a case in point, namely, VP topicalization. As noted in Culicover 2000, there is classic evidence involving sentences such as those in (12) that suggests that the structure of VP is [[V NP] PP].

- (12) They said that John would win the race at some point, and [win the race]<sub>i</sub> he did [t<sub>i</sub> [just after 5 o'clock]].

It appears that in this case, the sub-VP *win the race* has been moved from the larger VP *win the race just after 5 o'clock*. This type of movement is taken as evidence that the VP does not have a completely flat structure.

Even if the VP does not have flat structure, the structure suggested by VP topicalization is not that of (10). It is important that there are subparts of the VP that can undergo VP topicalization that cannot undergo VP ellipsis.

- (13) a. \*They said that John would put the ice cream somewhere, and he did in the freezer.  
 b. They said that John would put the ice cream somewhere, and put the ice cream he did in the freezer.
- (14) a. \*They said that Mary would eat the vegetables somehow, and she did raw.  
 b. They said that Mary would eat the vegetables, and eat the vegetables she did raw
- (15) a. \*Mary gave Bill a magazine, and Susan did ~~give Bill~~ a fantastic illustrated book about syntactic theory.  
 b. They said that Mary would give Bill something interesting for Christmas, and give Bill/him she did a fantastic illustrated book about syntactic theory.

These fact do not follow from the analysis in (10). It would be possible to make them fit by ignoring the structure, which would amount to abandonment of the binary branching analysis.

This is in fact the the correct move. Rochemont and Culicover 1990 and Culicover 1992a show that the correct generalization about VP topicalization is not that a VP moves to initial position. It is that a string consisting of the V

and any number of arguments and adjuncts may appear in topicalized position. So the topic may be simply the verb, a verb followed by an adverb, a verb and its direct object, and so on. The clause containing topicalization must meet the condition that the untopicalized material in the VP is in focus.

- (16) a. They said that Mary would sing, and sing she did.  
 b. They said that Mary would sing loudly, and sing loudly she did.  
 c. They said that Mary would sing, and sing she did as loudly as she could.  
 d. They said that Mary would sing to someone, and sing she did as loudly as she could to Otto.  
 e. They said that Mary would sing loudly, and sing loudly she did to Otto.
- (17) a. They said that Otto would learn French in two months, and learn French in two months he did.  
 b. They said that Otto would learn French quickly, and learn French he did in two months.  
 c. They said that Otto would learn quickly, and learn he did the language that he was exposed to in just two months.

The contrast shown in these examples suggests that VP ellipsis works by finding an antecedent in conceptual structure for a [<sub>VP</sub> pro], while VP topicalization is simply a discontinuous VP, whose interpretation is established along the lines sketched out above. In the case of VP topicalization, the interpretation of the partial VP need not correspond to a legitimate CS object, in contrast with the [<sub>VP</sub> pro]. A plausible intuition about how VP topicalization works is that a verb is optionally concatenated with arguments and adjuncts, which produces a possible or full VP interpretation. This string of constituents can appear in sentence-initial position. The interpretation is linked to the missing V-position following the Infl. If there are remaining arguments and adjuncts *in situ* then they are composed with the partial VP interpretation.

In a sense, there is a discontinuous syntactic structure revealed here. However, the structure emerges as a consequence of the fact that for every pair of the form [V...]-X, there is a rule of interpretation that incorporates the interpretation of X into the argument structure headed by V. E.g., in *give Bill a magazine*, *give* requires two arguments, a Recipient and a Theme.



- (20) a. Mary<sub>j</sub> hammered the metal<sub>i</sub> flat<sub>i,\*j</sub>  
 b. Mary<sub>j</sub> entered the room<sub>i</sub> fully clothed\*<sub>i,j</sub>
- (21) a. \*Mary hammered flat the metal.  
 b. \*Mary entered fully clothed the room.

In both cases, Heavy NP Shift can position a direct object after the predicate.

- (22) a. Mary hammered flat the metal that was sitting on the table.  
 b. Mary entered fully clothed the room across the hall.

In both cases, VP ellipsis may include the predicate.

- (23) a. Mary hammered the metal flat but John didn't.  
 b. Kim swims nude but Sandy doesn't.

It is reasonable to conclude, following Rochemont and Culicover 1990, that both types of predicates may be adjoined to VP.<sup>4</sup>

Again there is a mismatch. While the canonical syntactic structure is V-NP-Predicate, the evidence from VP anaphora suggests that the conceptual structure is

- (24) [V - Predicate] - Theme

which is of course parallel to (7). This is shown by data such as the following.

- (25) a. \*Mary eats her vegetables raw, and Bill does [<sub>VP</sub> pro] /so/it/the same thing cooked.  
 b. \*Mary pounded the cabbage to shreds, and Bill did [<sub>VP</sub> pro] /so/it/the same thing to pieces.  
 c. \*Mary sang herself hoarse, and Bill did [<sub>VP</sub> pro]/so/it/the same thing to sleep.  
 d. \*Mary hammered the metal flat, but Bill did [<sub>VP</sub> pro]/so/it/the same thing very flat.
- (26) a. Mary eats her vegetables in her pajamas, but Bill does [<sub>VP</sub>pro] /so/it/the same thing completely nude.

- b. Mary pounded the cabbage vigorously, and Bill did [<sub>VP</sub> pro] /so/it/the same thing shyly.
- c. Mary entered the room a true believer, and Bill did [<sub>VP</sub> pro] /so/it/the same thing a sceptic.
- d. Mary hammered the metal exhausted, and Bill did [<sub>VP</sub> pro] /so/it/the same thing invigorated.

### 2.3.Pseudogapping

Let us return to the main theme. In addition to VP ellipsis, there is another construction of English that has been used to argue for binary branching structure in VP, namely pseudogapping. As noted, Lasnik has argued that pseudogapping is a type of VP ellipsis, where the direct object is moved out and the remainder of the VP undergoes ellipsis.

Pseudogapping appears superficially to delete discontinuous parts of a VP, suggesting at first glance that internal syntactic structure, if it exists, is not relevant to this construction.

- (27) John will cook the potatoes quickly, and Mary will ~~cook~~ the beans quickly.

If the direct object is extracted from the VP at the point of deletion, then what is deleted could be a VP.<sup>5</sup>

- (28) John will cook<sub>i</sub> [the potatoes]<sub>j</sub> [t<sub>i</sub> t<sub>j</sub> slowly] and Mary will [the beans]<sub>k</sub> [~~cook t<sub>k</sub> slowly~~]

The analysis depends in part on the presence of the binary branching structure, and in particular a higher landing site for the direct object. Some confirming evidence is that the verb and the direct object cannot pseudogap, leaving behind just the PP.

- (29) a. \*Terry put the potatoes in the pot, but Leslie didn't ~~put the potatoes~~ in the sink.
- b. (?)Sandy eats ice cream with a spoon, and Leslie does ~~eat ice cream~~ with a fork.

If the VP ellipsis analysis of pseudogapping is possible, then the question arises as to why the following examples are ungrammatical. The sentences are in a, and the derivations in b.

- (30) a. \*John will slowly cook the potatoes, and Mary will quickly ~~e<sub>o</sub>o<sub>k</sub>~~ the beans.  
 b. \*John will slowly cook<sub>i</sub> [the potatoes]<sub>j</sub> [t<sub>i</sub> t<sub>j</sub>] and Mary will quickly [the beans]<sub>k</sub> [~~e<sub>o</sub>o<sub>k</sub> t<sub>k</sub>~~]
- (31) a. \*Slowly, John will cook the potatoes, and quickly, Mary will ~~e<sub>o</sub>o<sub>k</sub>~~ the beans  
 b. \*Slowly, John will cook<sub>i</sub> [the potatoes]<sub>j</sub> [t<sub>i</sub> t<sub>j</sub>] and quickly, Mary will [the beans]<sub>k</sub> [~~e<sub>o</sub>o<sub>k</sub> t<sub>k</sub>~~]
- (32) a. \*John will try to cook the potatoes, and Mary will try ~~t<sub>o</sub>-e<sub>o</sub>o<sub>k</sub>~~ the beans.  
 b. \*John will try to cook<sub>i</sub> [the potatoes]<sub>j</sub> [t<sub>i</sub> t<sub>j</sub>], and Mary will try [the beans]<sub>k</sub> ~~t<sub>o</sub>-[e<sub>o</sub>o<sub>k</sub> t<sub>k</sub>]~~

While we could conceivably rule out (30) on the grounds that there are two fronted constituents in VP, such an account will not work for (31). Regarding (32), while some of the details of the pseudo-gapping analysis remain unclear and may perhaps be further specified in order to deal with such sentences, it appears that the range of possibilities allowed for by movement and deletion of the remnant VP is somewhat larger than the set of actually occurring expressions. It is of course always possible to assume that there are movements that yield a coherent constituent for the cases that allow deletion and constraints that block certain configurations, so I will not attempt to argue that such an approach to pseudogapping is impossible. But note the following example (using appropriate contrastive focus intonation).

- (33) JOHN will prove that the New York TIMES is going to endorse George W. Bush, and SAM will ~~claim that the Washington Post is going to endorse George W. Bush.~~

In order to derive this sentence we would have to move *the Washington Post*, which is the subject of a tensed S. On current proposals such as Lasnik 1999 the movement would have to be to Spec,AgrO, which is a Case position. I see no consistent way of imposing such a derivation on this example while maintaining the basic assumptions of the minimalist framework in which Case is checked by functional heads such as Spec,AgrO.

It is also possible to construct pseudogapping examples for which there appears to be no reasonable source on the derivation proposed by Lasnik. Consider the following.<sup>6</sup>

- (34) a. John will bet his entire fortune that the Mets will win the pennant, and Mary will ~~bet her entire fortune~~ that the Braves will win.
- b. John will bet Sandy his entire fortune that the Mets will win the pennant, and Mary will ~~bet Sandy her entire fortune~~ that the Braves will win.

Disregarding the phenomenon of sloppy identity, which is not especially problematic for pseudogapping, we see that the constituent that must be moved out of VP prior to ellipsis is a CP, *that the Braves will win*. It is highly unlikely that a case can be made for such movement on the grounds of feature checking, given the overwhelming evidence in languages such as Dutch and German that even where there putatively is overt movement of DP to the Spec position of a functional head to the left of the V, a CP does not undergo such movement. Moreover, if CP is extracted, so is DP, so we would predict that the following would be grammatical.

- (35) \*John will bet Sandy his entire fortune that the Mets will win the pennant, and Mary will Leslie that the Braves will win.

but cf.

- (36) John will bet Sandy his entire fortune that Mets will win the pennant, and Mary will Leslie.

Moreover, PP arguments can participate in pseudogapping.

- (37) a. Marty talked to Leslie about Sandy, and Terry did  
~~talk about Sandy~~ to Kim.  
~~talk to Sandy~~ about Kim.
- b. Marty took the train from Chicago to St. Paul, and Terry did  
~~take the train from Chicago~~ to Minneapolis.  
~~take the train to St. Paul~~ from Milwaukee.

The generalization about pseudogapping appears to be that there can only be one constituent to the right of the pseudogap, and it must be a thematic argument of the verb. If this is correct then the question of branching structure simply does not arise and pseudogapping fails to be an argument about structure. Furthermore, we predict that where a VP is ambiguous between an argument and an adjunct interpretation, pseudogapping will disambiguate in favor of the argument. The following examples suggest that this is correct.

- (38) a. Leslie will sleep in the bed and Terry will ~~sleep~~ on the cot.  
 b. \*Leslie will sleep in Boston and Terry will ~~sleep~~ in Cambridge.
- (39) Kim swam under the Brooklyn Bridge and Leslie did ~~swim~~ under the GW Bridge.

In (38) the PP may have a Location or a Theme interpretation. Only the Theme interpretation is consistent with pseudogapping. In (39) the ambiguity is between location and direction. I believe that when pseudogapping applies, only the directional interpretation is possible.

### 3. Evidence for structure: deletion

The discussion of proforms in the preceding section shows that proforms are possible in VP just in case the antecedent VP contains a conceptual structure constituent that can serve as the antecedent of the pro-form. Syntactic constituency is neither necessary nor sufficient, although it is possible to stipulate abstract syntactic structure that can create constituents that do not appear in the surface, but that can function as the antecedents of pro-forms. Such constituents are reflections of the ‘virtual’ structure that is created in the course of deriving the string/conceptual structure mapping.

Similar arguments can be made with respect to deletion constructions. In some cases, such as gapping, the idea that the antecedent of the missing material is not a constituent is not controversial. But a consideration of a range of deletion constructions suggests that in **all** cases only the conceptual structure determines the possible antecedent of the missing material. Again, the internal structure of the VP is neither necessary nor sufficient to account for the possibilities.

#### 3.1. Gapping

In gapping everything in a second conjunct is “deleted” except for constituents in focus to the right and the left of the gap ( Stillings 1975; Pesetsky 1982). E.g.,

- (40) a. JOHN speaks FRENCH, and MARY, GERMAN.  
 b. JOHN wants to speak FRENCH, and MARY, GERMAN.  
 c. JOHN wants to wake up in the morning and be able to speak FRENCH, and MARY, GERMAN.

- d. JOHN believes that everyone pays attention to you when you speak FRENCH, and MARY, GERMAN.
- (41) a. JOHN thinks that the New York Times will endorse George W. BUSH, and SAM, the Washington POST.
- b. JOHN thinks that FERRARIS are cool, and SAM, MASERATIS.
- c. On WEDNESDAY John will leave the telephone in the KITCHEN, and on THURSDAY, the LIVING room.

While it is sometimes believed that gapping only leaves behind clause-mates, such as Subject-Object pairs as in (40a), examples such as (40d) and those in (41) suggest that more complex cases are simply more difficult to process but not fundamentally different in grammatical terms (see Sag, et al. 1985 for discussion). There are many complex examples that suggest that gapping does not apply to constituents.

The *prima facie* analysis of gapping is that there is a focus position to the right of the gap that is matched up with the focus in another clause. If certain parallelism conditions are satisfied (which are non-trivial to state), the sentence is grammatical; otherwise it is not. Well-known examples show that there can be more than one constituent in the position following the gap.

- (42) Leslie sold a magazine subscription to Lee for \$20, and Kim, a newspaper subscription to Sandy for \$15.

A syntactic alternative that makes crucial use of branching structure would take the view that constituent structure is crucial to explaining the possibilities. Going back to the structure in (10), for example, we might expect that the verb could undergo gapping leaving behind the VP *the potatoes in the pot*. This prediction is consistent with examples such as the following.

- (43) Leslie put the onions in the oven, and Sandy, the potatoes in the pot.

More generally, in a strictly right branching structure everything to the right of the raised verb will be a constituent. Extractions from this constituent, such as the raising of the direct object, will exempt constituents of VP from gapping. So if the condition on gapping is really “one constituent to the right of the gap”, we should be able to make some very clear prediction about what gapping structures are possible and what are not. If someone moves out to the left for independent reasons, what remains should be possible.

Pursuing this line of thinking, the derivation of a sentence like *Mary can speak French and Bill, German* would have a derivation as in (44), assuming the basic outlines of Lasnik's minimalist proposal.

- (44) Mary [ $\text{can}_m$  [ $t_m$  speak<sub>i</sub> [French<sub>j</sub> [ $t_i$   $t_j$ ]]] and Bill [German<sub>k</sub> [~~can~~ [~~t~~ [~~speak~~ ~~t~~]]]]]

It would be necessary to assume that there is a landing site for the modal *can*. But even given this, it is not clear how to force the movement of the NP in sentences like (41). Consider for example the derivation of (41b). We would have to suppose that there is a landing site for *Maseratis*, perhaps a 'focus' position, that is not visible in ungapped sentences.

- (45) John thinks that Ferraris are cool, and Sam [Maseratis<sub>i</sub>] [~~thinks that t<sub>i</sub> are cool~~]

cf. \*John thinks that Ferraris are cool, and Sam Maseratis thinks (that) t are cool.

An even more complex analysis would be required for (41c), where *a living room* must be focused out of the PP *in the living room*.

The alternative to a constituent deletion account of gapping is one in which the syntactic structure is implicated in determining the interpretation of the focal constituents. On such an approach, the full clause provides a background against which the gapped clause is evaluated, and the structure is used to fill in the missing material. Precisely how this is done is by no means trivial, however. I will explore the mechanism in more detail in the following sections as a number of other deletion constructions are considered.

### 3.2. Bare argument ellipsis

Bare argument ellipsis<sup>7</sup> (BAE) deletes everything in the clause except for an argument.

- (46) a. John left but/and not Bill.  
b. John gave some money to Susan but not Bill.

Hence BAE is *prima facie* evidence that structure is not necessary for interpretation. Example (47b) is ambiguous, for example, since what is missing may be the antecedent VP or the antecedent S excluding the direct object.

- (47) a. John gave some money to Susan, but not Bill ~~gave some money to Susan~~.
- b. John gave some money to Susan, but not ~~John gave some money to~~ Bill.

Note also that if the deletion does not occur, the sentence is not grammatical, since *not* is out of place. Hence it could be argued that there is not a fully syntactically specified source for BAE. However, let us consider as a straw man what the analysis would look like if we wanted to assume full structure. Assume, following Lasnik 1999, that the verb lacks inflectional features and gets them only by raising to Infl. Assume that *not* is a functional head (or agrees with a functional head Neg), and that it is below Tense. If both appear we have

- (48) [Infl [not [Bill [give money to Susan]]]]

In this case, if the VP deletes, Infl has an undischarged feature and thus the derivation crashes. However, the insertion of *do* does not save the derivation, in contrast with ellipsis.

- (49) [Infl [not [Bill [give—money to Susan]]]]  
\*but didn't Bill.

- (50) Bill [Infl [not [give money to Susan]]]  
but Bill didn't

Therefore we must suppose that it is the failure of the subject to raise that causes the problem in (49), presumably involving the agreement feature.

Consider the alternative, where Infl is absent.

- (51) [not [Bill [give money to Susan]]]

Here, *give* must delete. But it is not clear why, because by assumption *give* does not have features that require agreement. On the other hand, if we say that *give* has to raise to discharge some feature, then we will have a problem when Infl is present. I leave this question open, with the speculation that there is not a natural account in terms of current views of feature discharge.

Let us return to the specifics of the BAE construction. It is quite constrained, in that it apparently must be of the form *but/and not XP*. Compare the following examples.



- (56) a.  $[\lambda x [\text{John gave some money to } x]]$  (Bill)  
 b.  $[\lambda x [x \text{ gave some money to Susan}]]$  (Bill)

In any case, there does not appear to be any argument for internal syntactic structure pertaining to this construction.

BAE also appears to be possible with non-arguments.

- (57) a. Kim is tall, but not too tall.  
 b. Sandy ran quickly, but not delicately.  
 c. Leslie is in the room, but not conscious.  
 d. Marty lived in Paris, but not in the 1950s.  
 e. Lee wants to buy an expensive car, but not too expensive.

Examples c, d, e are particularly noteworthy. (57c) shows that BAE allows a contrast between constituents of different categories, as long as they are of the same semantic type (see Sag, et al. 1985 for an account of similar examples involving coordinate conjunction). (57d) shows that the missing material in the second conjunct may be the entire first conjunct. (57e) shows that BAE may express a contrast with a constituent of an argument in the first conjunct, and not the entire argument. Further research is required to determine what the constraints on this construction are.

It is worth noting that *but not* appears to allow for gapping.

- (58) a. John speaks French, but not Bill, German.  
 b. Mary went to New York, but not Susan, to Chicago.

Similarly, coordinate conjunction with *and* appears to allow for BAE as well as Gapping.

- (59) a. John speaks French, and not German.  
 b. John speaks French, and not Mary.  
 c. Mary went to New York, and not to Chicago.  
 d. Mary went to New York, and not Susan.
- (60) a. John speaks French, and not Bill, German.  
 b. Mary went to New York, and not Susan, to Chicago.

The only thing that appears to be ruled out with *and* is the simple BAE on the subject.

- (61) a. John speaks French, and German.  
 b. \*John speaks French, and Bill.

But (62) can be improved by adding *too*.

- (62) John speaks French, and Bill too.

It is therefore plausible that both gapping and BAE are accounted for in the same way, through an interpretive rule that matches the reduced conjunct with the full conjunct under semantic parallelism, and supplies the missing material by subtracting the matched constituents. This approach generalizes directly to account for examples such as (41c), where what is missing is a non-constituent that cannot easily be construed as a constituent even on an analysis with movements and traces.

To generalize the account of BAE to gapping we will require the following: (i) a mechanism for identifying ‘matching constituents’, (ii) a mechanism for integrating the matched constituents with the interpretation of the full clause. Consider, for example, (58a).

- (63)            John speaks French  
 but not Bill [        ] German

---

x    speaks    y

- (64)  $\lambda x \lambda y [x \text{ speaks } y] (\text{German}) (\text{Bill})$

An analysis of this sort says nothing about what the constraints on the construction might be. In principle the subtraction mechanism could pick out arbitrary parts of a sentence, as in (65).

- (65)            Sandy thinks that rubber    ducks can float in warm water  
 but not Kim [                    ] concrete [                    ] fly [                    ] air

---

x                                    y                                    z                                    w

- (66) \*Sandy thinks that rubber ducks can float in warm water, but not Kim concrete fly air.

The challenge of ruling out such examples is not unique to an interpretive approach, since arbitrary movements can produce similarly bizarre remnant structures. However, if the movements are principled, and observe the structure, then the possibility arises that a structural account will be more constrained. If it turns out that the particular constraints on movement are coextensive with independently motivated constraints on what can be focused, then a more ‘functional’ focus-based account would appear preferable. I leave the question open.

The upshot of this discussion is that internal constituent structure is not needed to account for what is going on in elliptical constructions involving VP. The analysis does require that we develop an adequate account of the interpretive mechanism that is sketched out here.

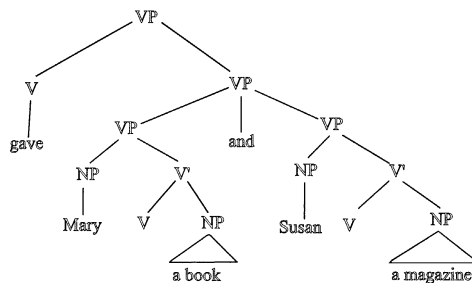
### 3.3. Conjunction reduction

It is well-known that non-constituents can be conjoined, at least superficially, so there is no evidence from conjunction for a particular internal structure of VP. But then the absence of evidence for such structure could be taken as an argument against the structure being there at all, given a minimalist perspective. However, the argument is not quite so simple. Consider, for example, the following sentence.

(67) John gave Mary a book and ~~John~~ gave Susan a magazine.

It was argued in Wexler and Culicover 1980 that the structure of the right conjunct is that of a complete clause, with empty nodes in place of *John* and *gave*. In other respects the structure would be same as that of the left conjunct. The same effect can be accomplished by taking the material in the right conjunct to be a constituent, along the lines of Larson 1988.

(68)



(For arguments against this approach, see Jackendoff 1990.) In either case, we are able to preserve the principle that coordination conjoins constituents. But note that on the Wexler/Culicover analysis there are no claims made about the internal structure of the VP, while on the Larson analysis there are no theory-external arguments for the constituency of *Mary a book* (see also Kayne 1983). I conclude that while conjunction reduction can perhaps be made consistent with an elaborated VP structure, nothing about conjunction reduction per se requires that we assume such structure.

### 3.4. Right node raising (RNR)

Right node raising (RNR) involves apparent missing material in the left conjunct, as in (69).

(69) Mary cooked and Bill ate the potatoes.

It is generally assumed that the underlying structure is more or less like (70).

(70) Mary cooked ~~the potatoes~~ and Bill ate the potatoes.

However, examples such as the following (due to Postal) show that (70) cannot be correct, or at least is not the only option. The a-examples are the RNR sentences and the b-examples are the putative sources.

- (71) a. Mary cooked and Bill ate the same potatoes.  
 b. \*Mary cooked ~~the same potatoes~~ and Bill ate the same potatoes.
- (72) a. Mary lives and Bill works in a different city.  
 b. \*Mary lives ~~in a different city~~ and Bill works in a different city.
- (73) a. Mary speaks and Bill reads French and German, respectively.  
 b. Mary speaks French and Bill reads German, respectively

These examples are possible only if the shared constituent, e.g. *the same potatoes* in (71), is the argument of a complex predicate derived from the unshared part of the sentence. The interpretation would then proceed in the same way that it would if the shared constituent were a subject and not a constituent of the VP, as in (74).

- (74) a. The same people were at the concert and came to the reception afterwards.  
 b. The same potatoes were cooked by Mary and eaten by Bill.

In the case of (74a), for example, we would say that there is a single coordinate predicate, not two distinct clauses each of which is predicated of *the same people*. A similar statement holds for (74b), on the assumption that the passive is base generated. By parallelism, we would then want to say that there is a single coordinate predicate in the a-examples in (71)-(73).

It should be obvious where this argument is going. The notion that *Mary cooked* and *Bill ate* are constituents are absurd in terms of the traditional notion of syntactic structure. It is just this absurdity that explains why traditional grammatical approaches have largely ignored the demonstration by Steedman 1990 Steedman 1996; and Dowty 1988 that it is possible to construct a semantic interpretation for a string of words without using a traditional syntactic structure as input.<sup>9</sup> But examples such as (71)-(73) suggest that it must be necessary to construct a semantic interpretation in this way. However, it is not unreasonable to hypothesize that such a derivation is constructed only if it is forced by the particular configuration of constituents. If we accept this hypothesis, then the syntactic structure of a simple sentence such as *Mary cooked the potatoes* is nothing more than a projected structure, imposed by the conceptual structure in which are individuated entities such as **Mary** and **the potatoes** and properties such as **cook the potatoes**. There are also virtual constituents, such as *Mary cooked*, *Bill ate*, and *Mary cooked and Bill ate*. Crucially, it appears that it is only the projected structure, and not the virtual structure, that has corresponding proforms.

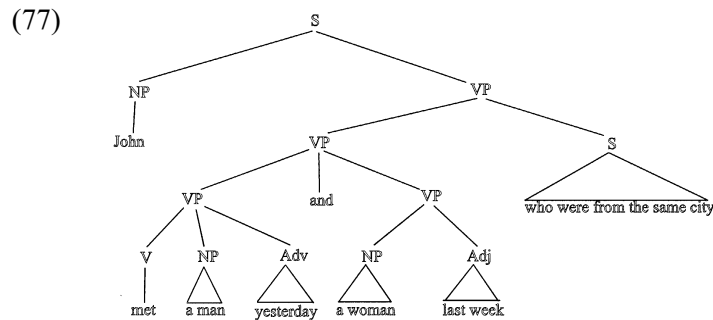
Conjunction interacts with other constructions to produce complex partial VPs whose derivation is quite problematic. Consider the following examples.

- (75) a. John met a man last week who was from NY and a woman yesterday who was from Boston.
- b. Mary read an article in the newspaper last week about high energy physics, and a review yesterday of a book about Albert Einstein.
- c. John gave to Susan last week a picture of Einstein, and to Mary yesterday a picture of Godel.

(75a) exemplifies extraposition of a relative clause from a direct object NP, and (75b) exemplifies extraposition of PP. (75c) shows that Heavy NP Shift (HNPS) is also possible. In all three sentences, the verb is missing. On the view that extraposition and HNPS involve adjunction to a VP node, it must follow that expressions like *a woman yesterday who was from Boston* are VPs with empty heads. But then consider what happens when we introduce symmetrical predicates into the adjoined phrase.

- (76) a. John met a man last week and a woman yesterday who were from the same city.  
 b. Mary read an article in the newspaper last week and a review yesterday about the same thing.  
 c. John gave to Susan last week and to Mary yesterday a picture of the same person.

The fact that these sentences lack untransformed sources that produce coherent interpretations suggests that the structures that we see are their true structures, e.g.,



It is possible, of course, to suppose that there is an empty V in the right conjunct. But then it will be necessary to explain why this empty V cannot occur when something precedes the second VP.

- (78) a. \*John met a man yesterday and Mary a woman last week who were from the same city.  
 b. \*John will meet a man tomorrow and Mary may a woman next week who are from the same city.  
 c. \*John gave to Susan last week and Bill to Mary yesterday a picture of the same person.

In fact the possibility of the RNR construction occurs only when all the material in the left conjunct is shared by the right conjunct up to the point of contrast. Reconstruction of extraposition and HNPS in the right conjunct completes the interpretation of the direct object that can then be directly substituted into the property defined by the left conjunct through lambda abstraction. No such interpretation procedure is available when simply the V is missing the

second conjunct, since the subject NP preceding the missing V causes the first conjunct to be closed off as an interpretation that is shared by the second conjunct.

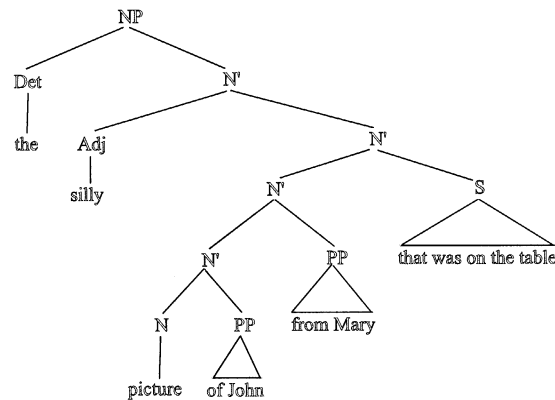
Accepting this view of RNR leads to the conclusion that any internal structure in VP, and perhaps even in S, is a projection of the conceptual structure onto the string ('projected structure') or an artefact of the derivation ('virtual structure').<sup>10</sup>

#### 4. NP structure

The evidence considered regarding the structure of VPs can be adapted straightforwardly to the structure of NPs. In the case of NP there are basic views, one more traditional and one emerging from the move to encode inflection in the form of functional heads.

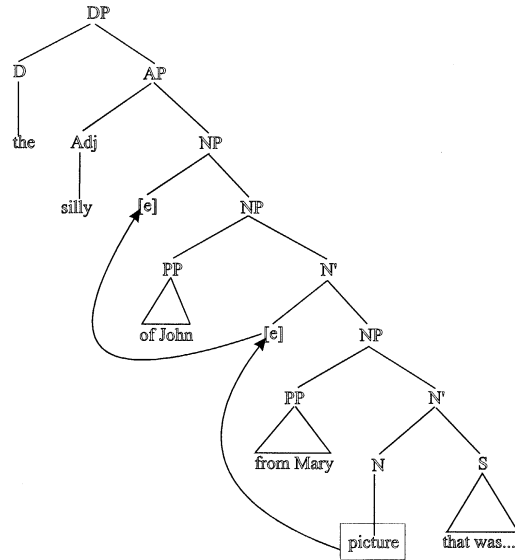
On the traditional view, the structure of the NP is one in which the N is the head, the complements and modifying phrases are adjoined to the right, and the pronominal material is adjoined to the left. A typical structure is given in (79).

(79)



On the more current view, the structure is more like (80).

(80)



This is almost certainly just an approximate structure, since it leaves out functional heads such as NUM and AGR, but it will suffice to illustrate the point.

The primary evidence for the branching structure of NP involves anaphora and ellipsis. The following data is typical.

- (81) that silly picture of John from Mary that was on the table, and
- a. this artful one of Susan from Gretel that was on the shelf  
[one = picture]
  - b. this one of Susan from Gretel that was on the shelf  
[one = (silly) picture]
  - c. this one from Gretel that was on the shelf  
[one = (silly) picture (of Susan)]
  - d. this one that was on the shelf  
[one = (silly) picture (of Susan) (from Gretel)]
  - e. this one  
[one = (silly) picture (of John) (from Mary) (that was on the table)]

The parentheses around the modifiers indicate that while *one* may be interpreted as the full NP in the preceding conjunct, minus the contrastive material, it need not be.

The structure in (79) is clearly consistent with this data, since *one* seems to correspond to an N'. Similar data involving a gap suggest the same analysis.

- (82) those silly pictures of John from Mary that were on the table, and
- a. these artful \*(ones) of Susan from Gretel that were on the shelf  
[ones = pictures]
  - b. these (?ones) of Susan from Gretel that were on the shelf  
[[e]/ones = (silly) pictures]
  - c. these (?ones) from Gretel that were on the shelf  
[[e]/one = (silly) pictures (of Susan)]
  - d. these (?ones) that were on the shelf  
[[e]/ones = (silly) pictures (of Susan) (from Gretel)]
  - e. this one  
[[e]/ones = (silly) pictures (of John) (from Mary) (that were on the table)]

It is not entirely clear how to account for this data in terms of the structure in (80), but there is little doubt that the movement machinery is sufficiently powerful to produce intermediate structures that correspond to the N? constituents in (79) for the purpose of these constructions.<sup>11</sup>

In any case, the issue is moot, because of the fact that the test involving *one(s)/[e]* picks out non-constituents as well.

- (83) that silly picture of John from Mary that was on the table, and
- a. this artful one from Mary  
[one = picture (of John) (that was on the table)]
  - b. this one from Mary  
[one = (silly) picture (of John)(that was on the table)]

Since (*silly*) *picture of John that was on the table* is not a constituent of the first NP, it is not clear how it could be a syntactic antecedent of *one* in the second NP. Of course, we could always assume that there is a stage in the derivation of

the NP where the required constituent exists, and that it is then broken up. Such an approach might be most natural if we assumed something like the structure in (80), since there could be hidden movements that create this constituent in the course of the derivation. E.g.,

- (84) picture that was on the table  
of John - picture that was on the table  
[do *one* anaphora at this point]  
picture of John that was on the table  
from Mary - picture of John that was on the table  
of John from Mary - picture that was on the table  
picture of John from Mary - that was on the table

As suggested in our discussion of VP structure, if such movements are permitted simply for the purpose of getting the correct intermediate structures, then there is no principled basis for arguing for or against any structure.

But it is possible to construct a factual as well as a conceptual argument against such a general approach. In the following examples, we find that there are fixed orders for the modifiers.

- (85) a. an article about Ohio State that describes the various research programs  
b. \*an article that describes the various research programs about Ohio State  
c. an article about Ohio State that describes the various research programs, and one about Michigan  
[one = article (that describes the various research programs)]
- (86) a. a picture of John showing his famous smile  
b. \*a picture showing his famous smile of John  
c. a picture of John showing his famous smile, and one of Mary  
[one = picture (showing his/her famous smile)]

- (87) a. the man arrested in the park who was carrying a rifle  
 b. \*the man who was carrying a rifle arrested in the park  
 c. the man arrested in the park who was carrying a rifle and the one found hiding in the gazebo  
 [one = man (who was carrying a rifle)]

In each case the antecedent cannot be a constituent of the preceding NP. While it is mechanically possible to create such an antecedent temporarily for the purpose of anaphora, the fact that such constituents cannot exist in the surface casts serious doubt on any such mechanism. What seems to be going on, rather, is that the constraints on surface ordering do not interfere in the construction of an interpretation for *one* that is simply the portion of the interpretation of the antecedent NP less the material in contrast. I propose that the full interpretation of the NP, with its structure, is accessible to the process that interprets *one*. But given that there is no syntactic constituency involved here, there is no reason to pick a particular branching structure for the NP on the basis of *one*. It is in fact sufficient to take the post-nominal constituents to be sisters of one another and the head noun. Each plays a particular role in the interpretation of the NP, either as a complement or a modifier, and this function must be correctly represented at CS. I will take up in a bit more detail the question of the interpretation mechanism in §6.

There are some well-known puzzles regarding the structure of NP that arise in the case of conjunction. For instance, Partee 1975 argued that a relative clause must be within the scope of a quantifier on interpretive grounds. E.g.,

- (88) every woman that was at the party

Here, the quantifier appears to take scope over the set denoted by *woman*, restricted by the modifier *that was at the party*. The syntactic structure in which *every woman* is a constituent does not directly reflect the scope of the quantifier. So given this line of argument, the structure should be (89a) and not (89b).

- (89) a. [every [[woman][that was at the party]]]  
 b. [[every woman][that was at the party]]

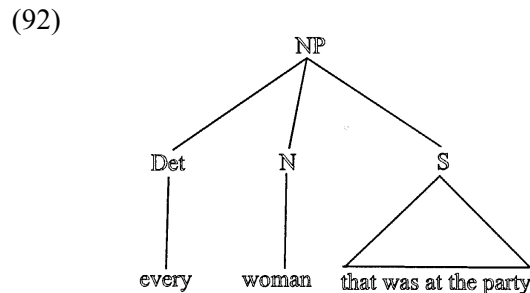
However, this conclusion is contradicted by cases of conjoined NPs with a shared relative clause.

- (90) a. every woman and every man who were at the party (were drunk)  
 b. the men and the women who were married to one another (were very similar)

In these cases, because of the distinct determiners and also the symmetrical predicates, it appears that the structure must be that of (89b). Note also that it is possible, perhaps in a somewhat archaic style, to have a relative clause on a pronoun, which is itself a full NP.

- (91) a. He who hesitates is lost.  
 b. We who are about to take the exam salute you.

Our solution is to abandon the claim that the syntactic structure is fixed and independent of the CS representation. Rather, the structure is flat. The apparent requirement that certain constituents must be grouped together is a consequence of the scope of the quantifier and the modifiers at CS. To be specific, in the case of (89) the structure is (92).



This structure conforms, of course, to more recent views about the logical form of quantified expressions (e.g. Heim 1982).

- (93) [Every x, x a woman, s.t. x was at the party]

But as Chomsky 1975 argued, the syntactic structure can always be translated into some logical form, and so there is no requirement that it be isomorphic to the logical form in all respects. For instance, when we come to conjoined structures, again the claim is that the structure is no more hierarchical than it needs to be in order to account for the interpretation.

(94) [[[every woman] and [every man]] [who were at the party]]

Since the predicate in the relative clause is not symmetrical, the relative clause may be interpreted as distributed over the two antecedent NPs.<sup>12</sup>

(95) [every x, x a woman, s.t. x was at the party] and [every y, y a man, s.t. y was at the party]

But when the predicate is a symmetrical one, it imposes a different interpretation the antecedents, regardless of the structure.

(96) [[[the men] and [the women]][who were married to one another]]

Here *the man and the woman* denote man-woman pairs that satisfy the condition imposed by the relative clause. That the antecedent of the relative pronoun does not need to be a constituent is shown by sentences like the following.

(97) a. A man came in and a woman left who turned out to be married to one another.

b. I met a man yesterday and a woman last week who turned out to be married to one another.

These examples show that the syntax must be sufficiently unstructured to allow for all of the possibilities that arise from the semantic properties of the determiners and the modifiers.

Let us consider now the structure to the left of the NP. In English there is a fixed order, described in the very early studies in generative grammar (see Jackendoff 1969, among others). A partial version is given in (100). All are optional.

(98) a. Det Num/Quan Adj\* N  
b. the three/many big fat horses

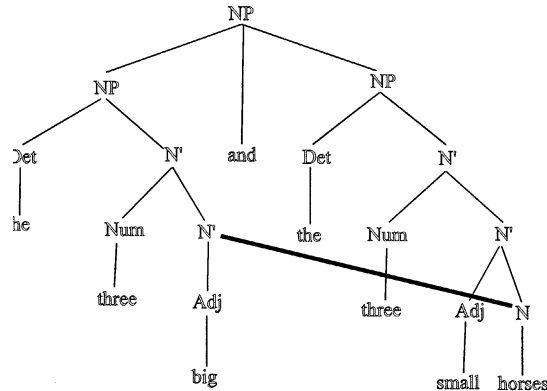
In the earliest work it was suggested that the prenominal sequence is a constituent (e.g., Jackendoff 1969). In fact there is evidence to support this view, as illustrated by the following.

(99) the three big and the three small horses

On the view that what is conjoined is a constituent, it would follow that *the three big* is a constituent. Of course, this view is somewhat controversial, and there are alternative ways of account for constructions such as (99) without ac-

cepting this conclusion. For example, we could take the head of *the three big* to be an empty N. More radical approaches to coordination would take the head *horses* to be shared by the two conjuncts (e.g. Goodall 1984), as in (100).

(100)



The point of assuming that there is an empty head or a shared head is to preserve the right-branching structure of the prenominal sequence in the absence of a nominal head in the left conjunct. But there is yet another possibility, which is that what is conjoined is the prenominal sequence, and there is RNR of the head. In this case the structure would be the unintuitive (101).

(101) [[[the three big] and [the three small]] horses]

As in the case of RNR in VPs and Ss, the condition on the well-formedness of such constructions is that they be interpretable using the standard rules of interpretation for dealing with non-coordinate right-branching structures. If we say that the interpretation of *the three big* is a lambda expression with a variable in place of the head, then interpretation of the conjoined phrase is straightforward without resorting to empty N's or discontinuous constituency.

(102)  $\lambda x$  [[the [three [big x]] and [the [three [small x]]](horses)

The idea that what we are dealing with here is RNR and not empty N or discontinuous constituency is confirmed by the fact that the construction exemplified in (99) is possible only when there is nothing to the right of "head" in the left conjunct. If both conjuncts were full NPs then we would expect the following to be grammatical, but they are not.

- (103) a. \*the three big that John owns and the three small horses that Mary owns  
 b. \*the three long about Mary and the three short stories about Susan  
 (cf. the three long and the three short stories about Susan)

To sum up, what we see in the case of conjoined NPs is that the structure is variable. It is induced by the translation into CS, and any particular configuration is well-formed just in case the translation is consistent with CS. In this sense, then, the structure is a virtual structure. It is truly present, but it is not an inherent property of the phrasal category. As such, it cannot be recruited to account for other relations between constituents within the NP. The fixed structure of NP is the structure of its corresponding CS, which is the level where binding and scope relations are defined. The syntactic structure that is available is that which is invariant over different correspondences, which is the linear order. As I have suggested already, the linear order is the fundamental asymmetry in syntactic structure that is epistemologically indisputable and on intuitive grounds should certainly be available for defining relations such as binding and scope. But as I have also argued, this is the only syntactic information that is available for such purposes.

### 5. Topological relations

In Culicover 2000 I summarize the arguments for binary branching structure that involve c-command. I conclude that considerations of pronominal and reflexive binding, parasitic gaps, and scope produce conflicting indications regarding the internal structure of the VP. For example, the Anti-c-command condition for P-gaps suggests that the direct object does not c-command the complement in the following example.

- (104) a person who<sub>i</sub> I informed t<sub>i</sub> [that I would turn t<sub>i</sub> into the authorities]

On the other hand, Binding condition C suggests that it does.

- (105) \*I informed him<sub>i</sub> that I would turn Norm<sub>i</sub> into the authorities.

My tentative conclusion in Culicover 2000 was that c-command is not pertinent to either of these phenomena. Clearly, if we want to get rid of c-command we are going to have to replace it with something that is at least as adequate in capturing the observed facts. I suggest that binding is determined by linear order and the hierarchy that exists at CS, while the Anti-c-command condition can be formulated in terms of argument structure. In this section I will sketch out these proposals in greater detail.

### 5.1. Scope

Let us consider whether c-command determines binding domain of a quantifier.

- (106) a. Mary talked to every policeman on the force<sub>i</sub> about his<sub>i</sub> political attitudes.
- b. Mary talked to every policeman on the force<sub>i</sub> after he<sub>i</sub> retired.
- c. Mary<sub>j</sub> talked to every policeman on the force<sub>i</sub> without PRO<sub>j</sub> offending him<sub>i</sub>.
- d. \*Mary talked to every policeman on the force<sub>i</sub> and wrote about his<sub>i</sub> attitudes in her thesis.
- e. \*Mary<sub>j</sub> said that I had planned to talk to every policeman on the force<sub>i</sub> without PRO<sub>j</sub> expressing herself<sub>j</sub> clearly to him<sub>i</sub>.

Suppose that we hypothesize that a QP must c-command a pronoun that it binds. This requirement entails the following:

- (107) Object of a preposition c-commands into an argument.  
Example: I talked to every/no student<sub>i</sub> about her<sub>i</sub> grades.
- (108) Object of a preposition c-commands into a temporal adjunct.  
Example: I talked to every/no student<sub>i</sub> before she<sub>i</sub> took the exam.
- (109) Object of a preposition c-commands into an adjunct that is controlled by the subject.  
Example: I talked to every/no student<sub>i</sub> in order to convince her<sub>i</sub> to take the exam.

As argued in Culicover 2000, the conclusion that the object of a preposition c-commands outside of the PP undermines the integrity of the structural claims. It is of course possible to extend the index of a QP to the PP that dominates it, but this is not a principled solution. A plausible alternative, and the only possible one in various minimalist approaches, is that there is a dominance relation that holds between the quantifier phrase and the pronoun at conceptual structure.<sup>13</sup>

On this view, there would be two conditions for that the QP-*pro* pair must meet in order for scope to hold. First, QP must precede *pro*. Second, QP must be higher than the constituent that contains *pro* in CS. Since CS does not represent syntactic structure exactly, but the corresponding logical and argument structure, there will be mismatches between the two. In particular, the object of a preposition that is an argument of a verb will not c-command in syntactic structure, but will at CS.

The crucial evidence that suggests that this is indeed the correct way to account for scope involves two types of prepositional phrases. As noted above in connection with the verb *sleep* (see (38)), the object of the preposition may be an argument but need not be. The difference depends on whether the object is a piece of furniture (like a bed) or a location (like a city). The same distinction appears to be active in determining scope possibilities.

- (110) a. Sandy slept in every bed<sub>i</sub> before it<sub>i</sub>s owner could change the sheets.  
       b. \*Sandy slept in every city<sub>i</sub> before it<sub>i</sub>s council could institute a bed tax.

### 5.2. Condition C

Condition C derives from Langacker's classic precede and command characterization of 'pronominalization': a pronoun cannot precede and command its antecedent. 'Command' corresponds closely to hierarchical dominance in CS, with the difference being that a subject is higher than a constituent of the predicate, but both command the other (given a Subject-Predicate structure). Precede and command works perfectly for condition C effects. The cases that it allows are those where the pronoun precedes but is lower than the antecedent, and those where the antecedent precedes the pronoun. Note that the structural relation is in fact a CS one, since prepositions do not block command.

### 5.3. Parasitic gaps

The parasitic gap construction is exemplified by familiar examples like the following.

- (111) These are the files that I filed t<sub>i</sub> without reading pg<sub>i</sub>.

For a review of the basic properties of this construction, see Culicover 1999. The property that we are concerned with here is that the true gap, marked as t<sub>i</sub> here, cannot be the subject of a clause that contains the P-gap.

- (112) \*These are the files OP<sub>i</sub> that t<sub>i</sub> confused me when I read pg<sub>i</sub>

If the P-gap is in a constituent that is adjoined higher than the subject, then the sentence is grammatical.

- (113) These are the files  $OP_i$  that Mary claimed  $t_i$  would confuse me without first familiarizing herself with  $pg_i$ .

This phenomenon has been subsumed under the constraint that the true gap cannot c-command the P-gap. This is called the Anti-c-command condition (ACC).

The narrower generalization is actually that a P-gap cannot be in the domain of a subject true gap. Moreover, a P-gap must be in the scope of an operator in A' position, where we may in principle define scope in terms of a syntactic domain. The notion of "domain" can be defined without c-command. All that is required is that the operator that defines the domain be external to the domain. This externality condition is not met by the subject-predicate relation, because while the subject is external to the predicate, it is not an operator in an A' position.

- (114)  $\alpha$  is in the **domain** of  $\beta$  iff  $\alpha$  is contained in some constituent sister  $\gamma$  of  $\beta$ .

Given this definition, we can restate the ACC as the Domain Condition for P-gaps.

- (115) **Domain Condition for P-gaps:**

A parasitic gap must be in the domain of an operator in A' position.

Cases in which the true gap is a subject but the P-gap is not in the predicate of this subject, such as (113), are not ruled out by (115), a correct result. On the other hand, it is well-known that P-gaps do not occur with *wh-in-situ*, a consequence of the A' condition.<sup>14</sup> This follows directly from (115).

This account is confirmed also by the following type of sentence, first noted independently by Nakajima 1985-1986 and Haegeman 1984.

- (116) a. a man who when you see  $pg_i$   $t_i$  will definitely talk to you  
 b. a man who when you see  $pg_i$  you should definitely talk to  $t_i$

Here, the P-gap is contained in an adjunct that is higher than the subject. Hence the adjunct is not in the domain of the subject, and there is no violation of (115).

A counterexample to this account would be an ungrammatical case in which a non-subject true gap c-commands a P-gap. I know of no such cases.

To summarize, it is possible to characterize the ACC without reference to c-command or to branching structure beyond that which is required for CS.

## 6. Incremental derivation

Philips to appear proposes that sentences have binary branching syntactic structure, but that the structure may change dynamically in the course of a derivation. The range of possibilities is severely constrained by the assumption that the derivation takes place left-to-right, and further by the assumption that by default all branching is rightward. A constituent that is formed in the course of a derivation may participate in a constituency test. But this constituent may fail to exist later in the derivation, and so will not be available to some other constituency test. Philips summarizes his basic proposal in the form of the following predictions.

**Prediction 1:** A constituency test may refer to only those strings that are constituents at the point in the incremental derivation when the test applies. (p.7)

**Prediction 3:** Constituents become unavailable to syntactic processes as soon as they have been destroyed. (p.15)

In the case of ellipsis, Philips predicts that the antecedent of [<sub>VP</sub> pro] will be a constituent of an antecedent VP: “Given the standard assumption that deletion or ellipsis of a constituent is licensed by the presence of some constituent that serves as an antecedent, we predict that the only constituents that can be antecedents for ellipsis are those constituents that are still constituents when the ellipsis site is licensed. Since the antecedent and the gap are typically in different conjoined sentences in ellipsis constructions, this effectively entails that in order to be an antecedent for ellipsis a constituent must survive at least until the end of the first conjoined sentence” (p.13). Consider (117).

(117) Mary will cook the potatoes for 15 minutes in the morning, and Susan will for 25 minutes.

On Philips’ analysis (and on the standard analysis), the structure of (117) lacks a constituent corresponding to *cook the potatoes in the morning*. Philips’ prediction fails because Prediction 1 refers to constituency tests, and VP ellipsis is not a (syntactic) constituency test.



Now suppose that the basic semantic interpretation of *all the books* is the basis for the collective reading, and that the distributive reading is derived from this, by a rule that pulls it out and attaches it higher in the logical form at CS. The expression *read all the books* corresponds only to the CS representation for the collective reading. There is no object in the CS of the distributed reading that corresponds to *read all the books*. Hence the interpretation will be only the basic one, namely, the collective reading. If this approach is a viable one, then the loss of scope relations does not require that we accept Philips' characterization of the derivation of these sentences in syntactic terms.

## 7. Conclusion

I have discussed a range of evidence that is consistent with or argues for a flat structure of the major phrasal structures in English. If we adopt the flat structure, then various phenomena that formerly received coherent accounts in terms of branching structure must be rethought. I have explored some of the consequences of the flat structure hypothesis for ellipsis, gapping, bare argument ellipsis and other deletions, and for binding and parasitic gaps. In general, the alternatives rely on linear order and the independently motivated hierarchical structure at CS. Both of these are central to a Concrete Minimalist perspective. I argue that there must be strong empirical evidence to motivate an extension of syntactic theory beyond these two levels of representation. While additional levels of structure can take over the functions of linear order or conceptual structure, as in the Antisymmetry approach, this is not sufficient to demonstrate that they are a necessary components of a syntactic theory.

## Notes

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2. That is, good scientists.

3. For the contrast between the general minimalist approach and the specifics of Chomsky's (1995) Minimalist Program, see Johnson and Lappin 1999.

4. Object-oriented predicates must be adjoined to VP, for reasons discussed in Rochemont and Culicover 1990.

5. Lasnik argues that the deleted verb must delete when it is not raised, because its features are not checked.

6. Examples of this sort are due to Robert Levine (p.c.).

7. Noted in early work by Hankamer 1979, and Hankamer and Sag 1976 and discussed by Lappin 1995, Chao 1988, and Reinhart 1991, among others.

8. Space is too limited for me to do justice to the vast literature on the interpretation of deletion and anaphora. For an a range of recent proposals and references, see the papers in Lappin and Benmamoun 1999.

9. The exception is Philips to appear. Philips argues that Steedman's approach is incapable of accounting for certain differences between full and partial structures, since Steedman, like us, must situate certain relations such as binding in conceptual structure and not in syntax. Of course, binding is sensitive to surface order, which is in syntax but not necessarily structural, so some of Philips' arguments are not that telling. Phillips also discusses the interaction of scope and ellipsis, to which I return later in this paper (§).

10. I do not have the space to explore here the parallelisms between RNR and gapping. Note, too, that if Postal 1994 is correct that RNR does not require parallel structures, there is at least one major difference between the two constructions.

11. See Rochemont and Culicover 1997 for an argument that the power of this machinery renders the branching structure hypothesis vacuous.

12. It is worth noting that the quantifiers seem to behave normally with respect to their capacity to take wide or narrow scope and to bind pronouns, in spite of the structure.

(i) Every woman and every man who were at the party met someone interesting.

(ii) Every woman and every man who were at the party met his or her spouse before  
the evening was over.

These facts further suggest that the logical form over which the scope and binding relations are defined are determined by but distinct from the syntactic structure.

13. See Culicover 1992b for an account along these lines formulated in terms of LF.

14. For an unexplained exception, see Wahba 1995.

## References

- Chao, W.:** 1988, *On Ellipsis*. New York, Garland Publishing.
- Chomsky, N.:** 1975, 'Questions of Form and Interpretation,' *Linguistic Analysis*: 75-109
- Culicover, P. W.:** 1992a, 'Focus and grammar,' [Proceedings of CONSOLE 1], In OTS Working Papers. Utrecht, Proceedings of CONSOLE 1.
- Culicover, P. W.:** 1992b, 'A note on quantifier binding,' *Linguistic Inquiry* 23: 659-663.
- Culicover, P. W.:** 1999, *Syntactic Nuts*, Oxford, Oxford University Press.
- Culicover, P. W.:** 2000, 'Concrete minimalism, branching structure, and linear order,' In *Proceedings of GLiP-2* (Generative Linguistics in Poland). Warsaw.
- Culicover, P. W., and Jackendoff, R.:** 1995, 'Something else for the Binding Theory,' *Linguistic Inquiry* 26: 249-275.
- Dowty, D. R.:** 1988, 'Type raising, functional composition, and non-constituent conjunction,' In Oehrle, R. T., Bach, E., and Wheeler, D., eds, *Categorial Grammars and Natural Language Structures*. Dordrecht, D. Reidel, 153-197.
- Fiengo, R., and May, R.:** 1994, *Indices and Identity*, Cambridge, MA, MIT Press.
- Goodall, G.:** 1984, Parallel Structures in Syntax. Unpublished doctoral dissertation, University of California at San Diego.
- Haegeman, L.:** 1984, 'Parasitic gaps and adverbial clauses,' *Journal of Linguistics* 20: 229-232.
- Hankamer, J.:** 1979, *Deletion in Coordinate Structures*. New York, Garland Publishing Inc.
- Hankamer, J., and Sag, I.:** 1976, 'Deep and surface anaphora,' *Linguistic Inquiry* 7: 391-426.
- Heim, I.:** 1982, The Semantics of Definite and Indefinite Noun Phrases. Unpublished doctoral dissertation, University of Massachusetts, Amherst.
- Jackendoff, R. S.:** 1969, Speculations on presentences and determiners. Bloomington, IN, Indian University Linguistics Club.
- Jackendoff, R.:** 1990, 'On Larson's treatment of the double object construction,' *Linguistic Inquiry* 21: 427-456.
- Kayne, R. S.:** 1983, 'Connectedness,' *Linguistic Inquiry* 24: 223-249.
- Kayne, R. S.:** 1994, *The Antisymmetry of Syntax*, Cambridge, MA, MIT Press.
- Lappin, S.:** 1995, 'Generalised Quantifiers, Exception Phrases, and Logicality,' In Kempson, R., ed, *Bulletin of the Interest Group in Pure and Applied Logics*. Vol. 3. Nos. 2 & 3. Special Issue on Deduction and Language. Saarbrücken, Germany, Max-Planck-Institut für Informatik, 203-222.

- Lappin, S., and Benmamoun, E.:** 1999, *Fragments: Studies in Ellipses and Gapping*, Oxford, Oxford University Press.
- Larson, R.:** 1988, 'On the double object construction,' *Linguistic Inquiry* 19: 335-391.
- Lasnik, H.:** 1999, 'Pseudogapping puzzles,' In Lappin, S., and Benmamoun, E., eds, *Fragments: Studies in Ellipses and Gapping*, Oxford, Oxford University Press, 141-174.
- Nakajima, H.:** 1985-1986, 'Kiss's Case Transmittance Approach and the Binding Path Approach to Parasitic Gaps,' *The Linguistic Review* 5: 335-344.
- Partee, B.:** 1975, 'Montague Grammar and Transformational Grammar,' *Linguistic Inquiry* 6: 203-300.
- Pesetsky, D.:** 1982, Paths and Categories. Unpublished doctoral dissertation, MIT.
- Phillips, C.:** to appear, 'Linear order and constituency,' *Linguistic Inquiry*.
- Postal, P. M.:** 1994, 'Parasitic and Pseudoparasitic Gaps,' *Linguistic Inquiry* 25: 63-117.
- Reinhart, T.:** 1991, 'Elliptic conjunctions: Non-Quantificational LF,' In Kasher, A., ed, *The Chomskyan Turn*. Blackwell.
- Rochemont, M. S., and Culicover, P. W.:** 1990, *English Focus Constructions and the Theory of Grammar*, Cambridge, Cambridge University Press.
- Rochemont, M. S., and Culicover, P. W.:** 1997, 'Deriving dependent right adjuncts in English,' In Beermann, Dorothee, LeBlanc, D., and Riemsdijk, H. v., eds, *Rightward Movement*. Amsterdam, John Benjamins, 279-300.
- Sag, I., Gazdar, G., Wasow, T., and Weisler, S.:** 1985, 'Coordination and how to distinguish categories,' *Natural Language and Linguistic Theory* 3: 117-171.
- Steedman, M.:** 1990, 'Gapping as constituent coordination,' *Linguistics and Philosophy* 13: 207-263.
- Steedman, M.:** 1996, *Surface Structure and Interpretation*, Cambridge, MA, MIT Press.
- Stillings, J.:** 1975, 'The formulation of gapping in English as evidence for variable types in syntactic transformations,' *Linguistic Analysis* 247-274.
- Wahba, W. B.:** 1995, 'Parasitic Gaps in Arabic: Papers from the Seventh Annual Symposium on Arabic Linguistics,' In Eid, M., ed, *Perspectives on Arabic Linguistics VII*. Amsterdam/Philadelphia, John Benjamins Publishing Company, 59-68.
- Wexler, K., and Culicover, P. W.:** 1980, *Formal Principles of Language Acquisition*, Cambridge, MA, MIT Press.