ANALYSIS OF CLAUSE AS V^{4*}

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0. INTRODUCTION

Jackendoff (1977) makes an assumption that a clause is a projection of the lexical category V, and he analyzes the traditional category S as the major phrasal category of V, i.e., V^{3}[1]. Such an analysis is necessary in order to capture, for example, the parallelism in the grammatical relations between clause and noun phrase. He furthermore proposes that the major phrasal category, V^3, dominates sentential adverbs, sentential appositive relatives, parenthetical clauses, subject NPs, and auxiliaries. Syntactically, however, these constituents do not seem homogeneous.

Section 1 of this paper shows that sentential adverbs (S-adverbs, henceforth), not being homogeneous, must be divided into two syntactically different groups, and claims, on the basis of this distinction, that it is necessary to add one more layer, V^4, to Jackendoff's maximum layer, V^{3}[2], so as to put one group of S-adverbs, as Jackendoff claims, under V^3, and the other group (in addition, some other kinds of constituents) under V^4. Section 2 discusses that these two and some other groups of adverbs occur in different environments: some groups of adverbs, but not others, may occur in given types of clauses. The discussion about which group of adverbs occurs in which type of clauses will give a crucial clue for deciding internal structures of each type of clauses. Section 3 extends the V^4 system to the analysis of adverbial subordinate clauses, and, in passing, refers to the relation of the V^4 system to "a bounding category" in the sense of Chomsky (1979) and the notion of "command." The argument on the bounding category leads us to interesting phenomena concerning WH-Movement, which will be dealt with in Section 4.

1. GROUNDS FOR THE V^4 SYSTEM

1.1 Syntactic Differences Between Two Groups of S-Adverbs

S-adverbs listed in (1a) express the speaker's attitude, opinion, or judgment while those in (1b) express the probability of the truth of propositions. The S-adverbs in both groups have been, in most of the previous studies, considered as belonging to the same category, say, speaker-oriented adverbs (Jackendoff (1972)), attitudinal disjuncts (Quirk et al. (1972)), factive adverbs (Emonds (1976)), or S adverbs (Jackendoff (1977)), etc.:

(1) a. [Group-A] fortunately, happily, sadly, surprisingly,
              astonishingly, thankfully .....

     b. [Group-B] probably, possibly, maybe, certainly,
              evidently, clearly .....

There are, however, clear differences between Group-A and Group-B in some respects.

First, although more than one S-adverb belonging to the same group cannot co-occur, two S-adverbs belonging to the different groups may co-occur:

(2) a. *Fortunately, he had surprisingly had his own opinion of
              the matter. (A - A)

     b. *Certainly, he had evidently had his own opinion of the
              matter. (B - B)

     c. Fortunately, he had evidently had his own opinion of
              the matter. (A - B)

More interestingly, when they co-occur, a Group-A adverb must always precede a Group-B one. Compare (2c) above with the following example:

(3) *Evidently, he had fortunately had his own opinion of the matter
          (B - A)

Secondly, while S-adverbs of Group-B can substitute for the "proform" of yes-no questions, yes or no, S-adverbs of Group-A must occur together with either one of them, and always precede it:

(4) Did he pass the course?

     a. Fortunately, yes. / Unfortunately, no.

     b. Surely. / Possibly.

Thirdly, some of the Group-A adverbs can co-occur with the negative morpheme not, independently of sentential negation, but none of the Group-B adverbs can:

(5) a. Not $\begin{Bmatrix} \text{surprisingly} \\ \text{so astonishingly} \end{Bmatrix}$, he didn't pass the exam.

     b. *Not $\begin{Bmatrix} \text{certainly} \\ \text{possibly} \end{Bmatrix}$, he didn't pass the exam.[3]

Fourthly, complement clauses involving Group-B adverbs may be topicalized while complement clauses involving Group-A adverbs cannot:

(6) a. That John evidently passed, no one ever expected Bill
              to notice _____ .

     b. *That fortunately John passed, no one ever expected
              Bill to notice _____ .

Fifthly, while adverbs of Group-B, together with some constituents in the main sentences, can occur in the focus position of a cleft sentence, adverbs of Group-A cannot:[4]

(7) a. *It was $\begin{Bmatrix} \text{surprisingly} \\ \text{happily} \end{Bmatrix}$ John that they selected as a delegate.

b. It was $\begin{Bmatrix} \text{certainly} \\ \text{undoubtedly} \end{Bmatrix}$ John that they selected as a delegate.

1.2   Four Groups of Adverbs

Of the five sorts of differences pointed out above, the first fact shows that Group-A and Group-B belong to different categories, and the examples in (2c) and (3), in conjunction with Jackendoff's assumption that specifiers of a higher layer precede ones of a lower layer in surface structures, argues that Group-A adverbs belong to a higher layer than Group-B adverbs do.

The second and third facts above strongly suggest that Group-A adverbs are evidently independent of the nucleus of sentences, because they occur independently of the substitutes for the entire of (interrogative) sentences, and may take the negative element not apart from sentential negations. Compared with Group-A adverbs, the adverbs of Group-B are considered more closely related with the nucleus of sentences, for they do not stand out of the nucleus.

The fourth fact decisively tells that it is necessary to add one more layer to Jackendoff's maximum projection of V, i.e., V^3. Jackendoff (1977, 42) claims that the rule of Topicalization applies to various sorts of phrasal categories, namely, NP, AP, and PP, all of which are, in his grammar, analyzed as X^3:

(8) a. My brother, everyone expects Bill to like.   (N^3)

b. Taller than Marvin, no one ever expected you to be. (A^3)

c. Into the bucket, we asked you to put the bananas. (P^3)

Thus, Topicalization is generalized to apply to X^3. This generalization correctly predicts that Topicalization may apply to clauses involving Group-B adverbs like (6a) because they are analyzed as V^3, and, at the same time, argues that clauses involving Group-A adverbs are not consisting of V^3. If the clauses like (6b) were consisting of V^3, the generalized Topicalization could apply to them. To differentiate the clauses with Group-B adverbs and those with Group-A adverbs, we need to analyze the latter sort of clauses as V^4.

All of the above arguments are consistent with the assumption that Group-B adverbs belong to the layer forming the nucleus of sentences,
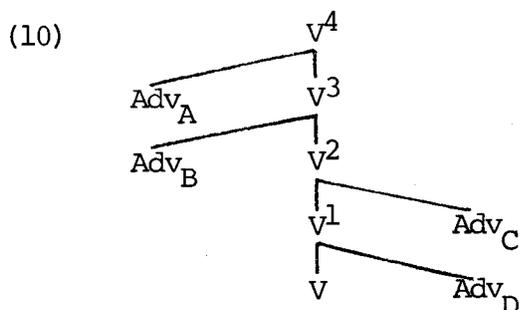
that is, V^3 in Jackendoff's grammar, and Group-A adverbs belong to one layer up, i.e., V^4:

(9)

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                    V⁴
              _____/  \
          Adv_A          V³
                    ___/ | \___
                  NP  Adv_B  Aux  V²
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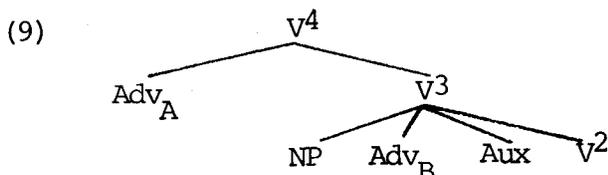
As will be seen in 2.2, the node V^4 dominates, besides Adv_A, the empty node, THM, to which various kinds of elements are preposed by root transformations, and another V^4, which forms a sentential appositive relative.

Thus, the constituents which Jackendoff has supposed to belong equally to V^3 are divided into two classes: those of V^4 and those of V^3. The constituents belonging to V^4 are usually accompanied by a comma intonation, and function as non-restrictive modifiers; on the other hand, the constituents of V^3, such as the subject NP, Aux, Group-B adverbs, are not accompanied by a comma intonation.

The adequacy of dividing S-adverbs into two groups and providing a different node for each of them is supported further by the fifth fact we saw above, that is, the possibility of adverbs appearing in the focus position of a cleft sentence. Before we start this argument, however, the introduction of other groups of adverbs than S-adverbs is in order. Adverbs of time, frequency, manner, instrument, place, etc. are "restrictive adverbs" in the sense that they modify a whole VP (or, V^1) and restrict the meaning of the VP. Thus, these kinds of adverbs should belong to one layer above V^1, that is, V^2. We call this group of adverbs, analogous to Group-A or Group-B, Group-C. Manner adverbs co-occurring with such verbs as treat or behave take part in subcategorizing verbs, because these verbs are subcategorized so as to always take a manner adverb (cf. *They treated us). Thus, the manner adverbs occurring with these verbs are, like other sorts of subcategorizing constituents, a complement of V^1. We call this group of adverbs Group-D. Thus, adverbs are classified into four groups, Group A, B, C, and D, and each group is attached to a different layer, V^4, V^3, V^2, and V^1:

(10)

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                    V⁴
              _____/ |
          Adv_A      V³
              _____/ |
          Adv_B      V²
                     |___
                  V¹     Adv_C
                  |___
                V     Adv_D
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Now we turn to the problem of the possibility of adverbs occurring in the focus position of a cleft sentence. Adverbs, under certain conditions, may occur in the focus position, though that position is generally limited to NPs and PPs. Those conditions are closely related to the

layer to which an adverb belongs. Namely, adverbs of V^1 (Group-D) can occur in that position; adverbs of V^2 (Group-C) are likely to occur in that position with "focusing" elements such as only, even, not or very; adverbs of V^3 (Group-B) cannot occur alone there, but may occur if accompanied by some constituents in the main sentence; and adverbs of V^4 (Group-A) can never occur in the focus position:

(11) a. It was impolitely that they treated us.[5]

  b. It was only recently that they moved here.
    It is not often that they quarrel.

  c. It was possibly Mary that got married to John.

  d. *It was surprisingly Mary that got married to John.

Thus, the hierarchically closer to the head, V, the constituents appear, the more easily they can occur in the focus position of a cleft sentence, and, conversely, the hierarchically farther from the head they appear, the more restricted conditions they must meet in order to occupy the focus position. This generalization, coupled with the facts in (11c, d), draws the conclusion that the adverbs of Group-A belong to a higher layer than those of Group-B.

To sum up this section, so-called S-adverbs must be divided into the two groups, Group-A and Group-B; Group-B adverbs belong to the layer V^3, and are therefore a sister of the subject NP, Aux, and V^2; Group-A adverbs must be supposed to belong to one layer above V^3, and, thus, it is necessary to add one more layer to V^3, and assume that a clause consists of quadruple layers, i.e., V^4.

2.   INTERNAL STRUCTURES OF CLAUSES

2.1   Environments Where Each Group of Adverbs Appears

Adverbs of Group-A and Group-B (and other groups we introduced in the preceding section) show differences not only in syntactic behavior, but also in environments where they will be distributed. As each group of adverbs belongs to a different layer, such distributional differences give us a crucial clue for deciding internal structures of environments, that is, which layers the clauses or constructions are composed of.[6] For example, if a clause can take an adverb of Group-A, a conclusion will be drawn that the clause consists of V^4, because this kind of adverbs can occur only in V^4. And if a clause can take an adverb of Group-B, but not one of Group-A, it will be concluded that the clause consists of V^3, in which Group-B, but not Group-A, may occur. In this way, we will be able to decide internal structures of clauses or constructions.

We take up six different types of environments; independent clauses, embedded clauses under "assertive predicates" in the sense of Hooper and Thompson (1973),[7] embedded clauses under "non-assertive predicates," embedded interrogatives, infinitival clauses, and gerundive constructions (see, furthermore, 2.3 for relative clauses, and 3.1 for independent interrogatives). And we examine the possibility of each group of adverbs occurring in these six environments.

Let us start with the possibility of Group-A. This group of adverbs can occur in independent clauses and embedded clauses under assertive predicates among the six kinds of environments:

(12) a. Fortunately, she won the first prize in the contest. (independent clause)

b. John said that, fortunately, she had won the first prize in the contest. (embedded clause under an assertive predicate)

c. *John resents that she unfortunately failed to win the first prize in the contest. (embedded clause under a non-assertive predicate)

d. *John asked whether she had fortunately won the first prize in the contest. (embedded interrogative)

e. *It is important for her to fortunately win the first prize in the contest. (infinitival clause)

f. *Her fortunately having won the first prize pleased John. (gerundive construction)

Next, Group-B adverbs may occur in all the environments except infinitive and gerundive constructions:

(13) a. She possibly won the first prize in the contest.

b. John said that she had possibly won the first prize in the contest.

c. John regrets that she possibly failed to win the first prize.

d. John asked whether she had possibly won the first prize.

e. ?*It is important for her to certainly win the first prize.

f. *Her having certainly won the first prize pleased us.

(We will see below the reason why (13e) is not so good.)

Group-C and -D adverbs can freely occur in all the environments:

(14) a. John has recently met his niece.

b. John said that he had recently met his niece.

c. John regrets that he has not recently met his niece.

d. John asked whether Mary had recently met her niece.

e. John arranged for Mary to recently meet her niece.

f. Her only recently having met her niece is sure.

(15) a. They treated us politely.

b. He said that they would treat us politely.

c. John resents that they treated me impolitely.

d.   John asked whether they treated us politely.

e.   It is important for us to treat them politely.

f.   Their having treated us politely pleased us.

The relation between the four groups of adverbs and the six types
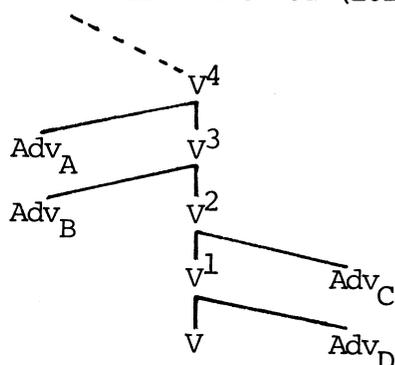of the environments is summarized as follows:

(16)

| environ-ments / adverbs	(i) main S / assertive embedded S	(ii) non-assertive embedded S / embedded Q / infinitive S	(iii) gerundive
Group-A (V^4)	ok	*	*
-B (V^3)	ok	ok (infinitive:?*)	*
-C (V^2)	ok	ok	ok
-D (V^1)	ok	ok	ok

As the existence of the layer V^n always entails the existence of the
layer(s) V^{n-1} ($n > i > 0$), the occurrence of adverbs of V^n always guaran-
tees the occurrence of adverbs of V^{n-1}, too.

Among the layers which allow the occurrence of adverbs, the highest
one corresponds to the maximum layer which constitutes a clause. If,
for example, a clause allows the occurrence of adverbs of Group-B, -C,
and -D, but not of Group-A, then the clause has V^3 as its maximum layer.
Therefore, the diagram (16) leads us to conclude, as to the internal
structures of the six types of the constructions, that main sentences
or embedded sentences under assertive predicates consist of V^4; embedded
sentences under non-assertive predicates, embedded interrogatives, or
infinitival clauses[8] consist of V^3; and gerundive constructions involve
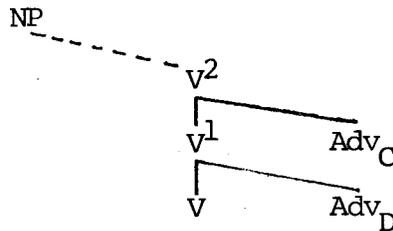V^2[9]. Such structural differences can be illustrated as in (17):

(17)   a.   environments of (16i)

b.   environments of (16ii)

$$V^3$$
$$Adv_B \quad V^2$$
$$V^1 \quad Adv_C$$
$$V \quad Adv_D$$
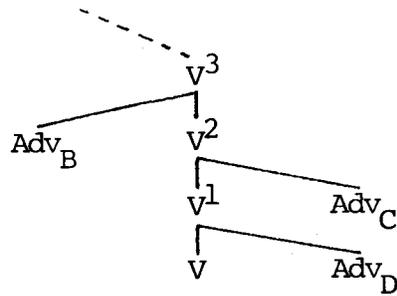
c.   environment of (16iii)

$$NP$$
$$V^2$$
$$V^1 \quad Adv_C$$
$$V \quad Adv_D$$

The sentence which we saw in (13e) seems to be a serious counter-example to the conclusion above, because infinitival clauses, though consisting of V^3, do not allow the occurrence of adverbs of Group-B with ease. However, this difficulty does not originate from the supposition that infinitival clauses lack the layer to which Group-B adverbs are attached, but from the fact that this group of adverbs modify, or, more vaguely, are related with, epistemic modal auxiliaries.[10] Infinitival clauses cannot involve any modal auxiliaries, and therefore the adverbs do not have any constituents to relate with. Hence, adverbs of Group-B cannot occur in infinitival clauses.

Another imaginable counter-argument is that though we have distinguished Group-A from Group-B, this distinction would not be necessary, for Group-B as well as Group-A may appear in the initial position, accompanied by a comma intonation:

(18)   a.   Fortunately, he wrote me a letter of recommendation.

       b.   Certainly, he wrote me a letter of recommendation.

The occurrence of Group-B in the initial position, however, is possible only when no adverb of Group-A appears in that position:

(19)   *Fortunately, certainly, he wrote me a letter of recommenda-
       tion.[11]

To account for the facts in (18) and (19), let us suppose that Group-B adverbs, which originate under V^3, can detach from the domination of V^3, and be raised and attached to V^4 when the node Adv under V^4 is vacant. If this is the case, it is predicted that the raising-to-V^4 takes place only in the environments which have the node Adv under the layer V^4. In fact, the raising-to-V^4 takes place in main sentences and embedded

sentences under assertive predicates, both of which consist of V^4, but not in embedded sentences under non-assertive predicates, embedded interrogatives, or infinitival clauses, all of which consist of V^3:

(20)　a.　Possibly, she won the first prize in the contest.

　　　b.　John thought that possibly, she had won the first prize in the contest.

　　　c.　*John regrets that possibly, she failed to win the first prize in the contest.

　　　d.　*John asked whether possibly, she had won the first prize in the contest.

　　　e.　*It is important for possibly her to win the first prize in the contest.

Hence, certain similarities between Group-A and Group-B cannot be a counter-argument to our conclusion that these two groups belong to different layers.

2.2　Environments Where Other V^4-Constituents Appear

It has been suggested in 1.2 that the node V^4 dominates not only Adv, but also the node THM, which accepts elements moved by root transformations such as Topicalization, VP Preposing, Left Dislocation, etc., and the node V^4, which forms a sentential appositive relative, that is, a non-restrictive relative clause modifying an entire clause. From the claim made in the preceding subsection, we can expect that only main clauses and embedded clauses under assertive predicates allow the application of root transformation and the occurrence of sentential appositive relatives, because these two sorts of clauses can have the layer under which THM and V^4 may be dominated.

Root transformations, in fact, are generally applicable only in main sentences or embedded sentences under assertive predicates, as is demonstrated by Hooper and Thompson (1973):[12]

(21)　a.　The new book, he lost _____ in the library.

　　　b.　Mary said that, the new book, he had lost _____ in the library.

　　　c.　*Mary resents that, the new book, he lost _____ in the library.

　　　d.　*Mary asked whether, the new book, he lost _____ in the library.

　　　e.　*It is impossible for the new book, her to have lost _____ in the library.

　　　f.　*The new book her having lost _____ in the library surprised me.

Similarly, sentential appositive relatives may occur only in main clauses and embedded clauses under assertive predicates. Consider the following sentences:

(22)   a.   Men die, which even children know.

         b.   I couldn't believe that men die, which most children know in these days, when I was a child.

         c.   *It astonished me that men die, which most children know in these days, when I was a child.

         d.   *I wondered whether men died, which most children know in these days, when I was a child.

         e.   *It was unbelievable for men to die, which most children know in these days, when I was a child.

These facts are enough to argue that the appositive relatives are attached to the clauses they are modifying, and, hence, the appositive relatives cannot occur in the clauses lacking the layer to which the appositive relatives are attached.

However, consider the next examples, where the adverbial clauses are preposed, and the appositive relatives may be interpreted as modifying the embedded clauses:

(22)   c'.   When I was a child, it astonished me that men die, which most children know in these days.

         d'.   When I was a child, I wondered whether men actually died, which most children know in these days.

         e'.   When I was a child, it was unbelievable for men to die, which most children know in these days.

If the appositive relatives are always attached to the clauses they are modifying, sentences (22c'-e') should be ill-formed because they lack the layer to which the appositive relatives are attached. But, the supposition that the appositives are always attached to the modified clauses does not seem to be the case; it is rather plausible that appositive relatives can modify the clauses even if they are not attached to the clauses. See, for example, the next sentence:

(23)   John longed for Mary to go to Africa, which surprised me.

The modification of the appositive relative is ambiguous: it is interpreted either as modifying the main clause or as modifying the embedded clause. The embedded clause, consisting of V^3, has no room for the relative to occur. Therefore, it must be considered that the appositive relative is present in the main clause, and that the appositive relative can modify not only the main clause but also the embedded one. To meet this requirement, we suppose that the interpretation of appositive relatives is given, along the line of Jackendoff (1977), by an interpretive rule, like one in (24):

(24)   A sentential appositive relative modifies a V^3 which is commanded by, and adjacent to, the appositive relative.[13]

In (23), the appositive relative is present in the main clause, and there are two V^3 which are commanded by, and adjacent to, the appositive relative, namely, the main V^3 and the embedded V^3. Both of the two V^3 are semantically compatible with the appositive relative. Thus, the appositive relative may be interpreted either as modifying the main V^3 or as modifying the embedded V^3. Similarly, in (22c'-e'), the embedded clauses do not have V^4, to which the appositive relatives may be attached, so the relatives must be considered to be present in the main clauses. The appositive relatives in the main clauses dominate and are adjacent to both the main V^3 and the embedded V^3. While the appositive relatives do not semantically fit with the main V^3, they are semantically compatible with the embedded V^3. Hence, the appositive relatives can be interpreted as modifying the embedded clauses, and this interpretation is preferable to the other one.

In (22c-e), on the other hand, the appositive relatives cannot be supposed to be present in the main clauses, for the time adverbial clauses are the V^2-constituent of the main clauses (cf. § 3.1.), and, if the appositive relatives were dominated by the main clauses, they, being a V^4-constituent, would appear on the right of the time adverbial clauses, a V^2-constituent. That the appositive relatives appear on the left of the time adverbial clauses means that the appositive relatives are not dominated by the main clauses, but by the embedded clauses. However, since the embedded clauses consist of V^3, they do not allow the V^4-constituent to appear within them. Therefore, sentences (22c-e) are ill-formed.

Notice, additionally, that the appositive relatives modifying NPs do not have the restriction that they can occur only in the environments which involve V^4. Since this kind of appositive relative is not a V^4-constituent, they can occur even in embedded clauses lacking the layer V^4:

(25) a. Mary regrets that John, who is very careful, lost his umbrella.

   b. Mary asked where John, who is usually very careful, lost his umbrella.

   c. It is necessary for John to contact Mary, who has a lot of information about jobs, if he needs a job.

2.3 Restrictive and Non-Restrictive Relatives

In the preceding two subsections, we have paid attention to the internal structures of complement sentence type. Now, let us take a look at the internal structures of restrictive relatives and non-restrictive relatives.

Non-restrictive relatives may take Group-A adverbs or Group-B adverbs, while restrictive relatives may take only Group-B adverbs:

(26) a. That student, who has fortunately passed Foundations of Syntax, will take Intermediate Syntax next semester.

   b. That student, who has certainly passed Foundations of Syntax, will take Intermediate Syntax next semester.

(27) a. *Students who have fortunately passed Foundations of Syntax will take Intermediate Syntax next semester.

    b. Students who have certainly passed Foundations of Syntax will take Intermediate Syntax next semester.

Moreover, non-restrictive relatives, but not restrictive relatives, allo\
the application of root transformations:

(28) This car, which only rarely did I drive, is in excellent condition.

(29) *The car which only rarely did I drive is in excellent condition.

It follows, then, that non-restrictive relatives consist of V^4, and restrictive relatives, V^3. This conclusion serves to account for one of the remarkable structural differences between them: restrictive relatives, but not non-restrictive relatives, may be composed of infinitival clauses:

(30) a. *These criteria, upon which to distinguish assertive predicates from non-assertive ones, are proposed in their paper.

    b. The criteria upon which to distinguish assertive predicates from non-assertive ones are proposed in their paper.

As is noted in 2.1, infinitival clauses consist of, at most, V^3. Then, they are not qualified to become non-restrictive relatives, which require V^4.

To sum up this section, main sentences, embedded sentences under assertive predicates, and non-restrictive relatives consist of V^4, and therefore the phenomena related to the constituents of V^4 are observable in these environments. Embedded sentences under non-assertive predicates, embedded interrogatives, infinitival clauses, and restrictive relatives, on the other hand, consist of V^3, and hence the phenomena related to the V^4-constituents cannot be observed in these environments. Gerundive constructions involve V^2 within NPs, then they show only the phenomena concerned with the V^2-constituents.

3. ADVERBIAL SUBORDINATE CLAUSES

3.1 Classification of Adverbial Clauses

This section applies the V^4 system to the analysis of adverbial subordinate clauses, and attempts to reinforce the V^4 system further.[14]

English has a variety of adverbial subordinate clauses (hence-forth, adv-clauses). They are classified into four groups on the basis of syntactic differences we will see below soon. Each of the four groups, Group I, II, III, and IV, is supposed to belong to a different layer, V^1, V^2, V^3, and V^4.

(31)   Group IV: (non-restrictive) because, although, for, (re-
                        sult) so that ...

        Group III: (contrast) while, whereas, though, if, unless,
                        (reason) since ...

        Group II: because, when, after, before, (duration) while,
                        (time) since, (purpose) so that ...

        Group I: as if (as in He treated us as if we were beasts.)

Adv-clauses of Group IV are sometimes called "non-restrictive adverbial
clauses" because they are clearly independent of main sentences, and
they are usually set off by a comma intonation. Adv-clauses of Group
III are conjoined with main sentences almost in a coordinate relation.
Adv-clauses of Group II are often called "restrictive adverbial clauses"
because they modify the entire VP (or, V^1) and restrict the meaning of
the VP. Adv-clauses of Group I take part in the subcategorization of
verbs. These four groups show syntactic differences in several respects,
and those differences can be explained on the basis of the supposition
that each group belongs to a different layer.

1) Replacement by do so When a verb phrase is repeated, the second
occurrence of the verb phrase can be replaced by the pro-form do so.
This pro-form includes an adv-clause of Group I as its part, but not of
Group II, III, or IV:

(32)   a.   *John treated us as if we were beggars, but Mary did so
                as if we were aristocrats. (I)

        b.   John came here before I arrived, but Mary did so after
                I arrived. (II)

        c.   John will attend the class unless he is busy, but Mary
                will do so even if she is busy. (III)

        d.   John was telling a lie, because his face turned red,
                and Mary was doing so, because her attitude was rest-
                less. (IV)

This is because do so is considered to be a substitute for V^1 (cf.
Jackendoff (1977, 65)). Notice, however, that when an adv-clause in the
first clause is not in contrast with one in the second clause, the pro-
form do so may include the second occurrence of Group I and II, and
possibly of Group III, but clearly not of Group IV:

(33)   a.   John treated us as if we were animals, and Mary did so,
                too. (= treated us as if we were animals)

        b.   John left here before I arrived, and Mary did so, too.
                (= left before I arrived)

        c.   John will attend the class even if it snows, and Mary
                will do so, too. (? = attend the class even if it
                snows)

        d.   John was telling a lie, because his face turned red, and
                Mary was doing so. (= telling a lie)

Thus, the lower the layer to which an adv-clause belongs, the more likely it is to be replaced by do so.

2)   Focus of cleft sentence   Some adv-clauses can occur in the focus position of a cleft sentence.   That is, adv-clauses of Group I and II can relatively easily occur in that position, but adv-clauses of Group III and IV cannot:
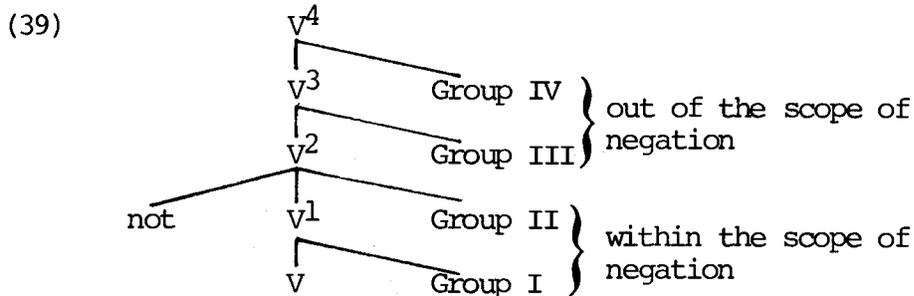
(34)   a.   It was as if they were dead that they behaved.

(35)   a.   It was because it rained heavily that they stayed home all the day.

    b.   It was so that they might arrive there before the sun set that they left early.   (purpose)

    c.   It was while the meeting was being held that the students began to make a riot.   (duration)

    d.   It is since my son was born that we have been living here.   (time)

(36)   a.   *It is unless it rains that we will go on a picnic.

    b.   *It is since he often tells lies that he is disliked by many persons.   (reason)

    c.   *It is while she resembles her mother that her sister resembles her father.   (contrast)

(37)   a.   *It was for he conceded his defeat on TV that his defeat was sure.

    b.   *It is so that we are now here that we left early. (result)

From the contrast of (35b) vs. (37b), (35c) vs. (36c), and (35d) vs. (36b), it is clear that the possibility of the occurrence in the focus position is determined not by the sorts of the subordinate conjunctions, but by the layer to which the adv-clauses belong.   This is because, as is stated in 1.2, the lower the layer a constituent belongs to, the more easily it can occur in the focus position of a cleft sentence.

3)   Scope of negation   When a main sentence is negated, the four groups of adv-clauses show a difference as to whether they are within or out of the scope of negation.   That is to say, Group I is clearly within its scope; Group II is ambiguous; and Group III and IV are out of its scope:

(38)   a.   They didn't treat us as if we were babies.   (in)

    b.   They have not been living here since their father died. (in / out)

    c.   She is not beautiful whereas her sister is beautiful. (out)

    d.   He can't speak Japanese well, because he lived in the U.S. for a long time.   (out)

Let us suppose that the negative element <u>not</u> is under the domination of V^2. Then, phrases or clauses which are <u>c-commanded</u>[15] by the negative element <u>not</u> are within the scope of negation.

(39)

V^4
V^3 Group IV } out of the scope of
V^2 Group III) negation
not V^1 Group II } within the scope of
  V   Group I) negation

<u>4</u>) <u>Missing subject</u> Subjects of embedded sentences sometimes do not appear in surface structures when they are understood as coreferential with some NPs in main sentences. This phenomenon is observable in adv-clauses, too. In the case of the adv-clauses, missing subjects are always understood as coreferential with subjects of main sentences, and are restricted to the subjects of adv-clauses of Group I, II, and III, but never of IV:

(40)   a.   He behaved as if knowing everything about the matter.

        b.   I read your article while waiting for you.

        c.   I shall be home early tonight unless meeting with un-
              expected difficulties.

   d.   *He will fail the exam, for wasting time foolishly.

In general, the phenomenon of the missing subject obeys the condition that the missing subject be <u>commanded</u> by its antecedent.[16] The notion of command is defined as follows:

(41)   A commands <u>B</u> if neither <u>A</u> nor <u>B</u> dominates the other, and the
        S-node that most immediately dominates <u>A</u> also dominates <u>B</u>.

The antecedents of the missing subjects in (40) are the subjects of the main sentences. If we accept the definition of command as it stands, the subject of the main sentence would command not only the subjects of adv-clauses of Group I, II, and III, but also the subject of Group IV. Thus, the said condition would wrongly predict that the subject of an adv-clause of Group IV might also be missing. To avoid this, it is necessary to modify the notion of command so as to exclude V^4 from the commanding domain of the main subject. We hence propose that V^3 as well as the major phrasal category, V^4, constitutes a cyclic category, or, in the more recent terminology of Chomsky (1979), "a bounding category," and redefine the notion of command, with recourse to the terms of a bounding category, as follows:

(42)   A commands <u>B</u> if neither <u>A</u> nor <u>B</u> dominates the other, and the
        bounding category that most immediately dominates <u>A</u> also
        dominates <u>B</u>.

In the tree diagram (43), the boxed NP is the subject of the main clause, a candidate for the antecedent of missing subjects. The first bounding category which dominates this boxed NP is V^3. According to the modified definition of command in (42), the boxed NP commands the subjects of adv-clauses of Group I, II, and III, but not of Group IV:

(43)
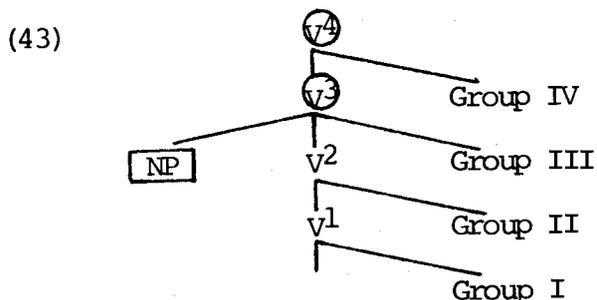
Thus, the condition on missing subjects correctly predicts that the subject of adv-clauses of Group IV cannot be missing.

The modification of the notion command in (42) is independently motivated. Langacker (1969) and Ross (1967) make a hypothesis that indeterminate elements (ex. someone, already, too, etc.) may alternate with indefinite elements (ex. anyone, yet, either, etc.) when the former elements are commanded by adversatives or affective elements (ex. Neg, if, doubt, etc.):

(44)   a.   He didn't think that she had any brains.

       b.   That she have any brains is not important to us.

Indeterminates within V^4-constituents, i.e., S-adverbs, preposed elements, and sentential appositive relatives, are, however, never affected by the existence of not in the main sentences:

(44)   c.   To $\begin{Bmatrix} \text{some} \\ \text{*any} \end{Bmatrix}$ teachers' surprise, John didn't pass the final exam.

       d. $\begin{Bmatrix} \text{Some} \\ \text{*Any} \end{Bmatrix}$ brains, she doesn't have.

       e.   He didn't tell the truth, which irritated $\begin{Bmatrix} \text{some} \\ \text{*any} \end{Bmatrix}$ of his friends.

This means that the V^4-constituents are out of the commanding domain of the affective element in the main sentence. The modified definition of the notion command, as expected, excludes the V^4-constituents from the commanding domain of the negative element, which is dominated under V^2 (cf. (39)):

(45)
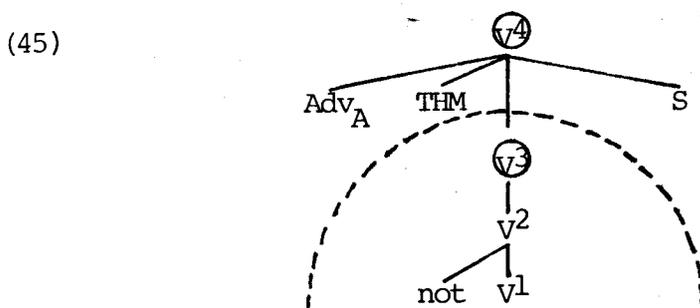
O: bounding category

Therefore, the V^4-constituents are not affected by the affective elements even though they belong to the same clauses as the affective elements.

5) <u>Transposability</u> Adv-clauses of Group I, II, and III can be transposed, but adv-clauses of Group IV cannot:

(46)   a.   (*)As if he knows everything about it, he behaves.[17]

       b.   So that they could arrive there before the sun set, they started early in the morning.   (purpose)

       c.   While I agree with you up to this point, I cannot agree to your plan as a whole.

       d.   *So that they are now in Paris, they used an airplane.[18] (result)

Quirk et al. (1972, 553) state that one of the differences between coordinate clauses and subordinate clauses is that the latter can be transposed whereas the former cannot. This fact suggests that conjoined clauses have such a tendency that the more independent of the previous clause a clause is, the more sequentially fixed it is in relation to the previous clause, and, hence, the more difficult to transpose. As to the transposability, adv-clauses of Group IV show the similarity to coordinate clauses. This is because Group IV is completely independent of a preceding clause, and resembles a coordinate clause in this respect.

6) <u>Question</u> We have seen in 2.1 and 2.2 that while the V^3-constituents such as Group-B adverbs may occur in embedded interrogatives, the V^4-constituents such as Group-A adverbs, THM, or appositive relatives cannot occur in embedded interrogatives. The same is true of independent interrogatives: the V^3-constituents may occur in independent interrogatives, whereas the V^4-constituents cannot:

(47)   Will he possibly leave early?[19]

(48)   a.   *Fortunately will he leave early?

       b.   *To Mary, will he talk about the problem?

       c.   *Will he meet Mary, who is his old girl friend?

Then, interrogatives, whether embedded or independent, are concluded to consist of V^3.

Turning to adv-clauses, the adv-clauses of Group I, II, and III may occur in interrogative clauses, but the adv-clauses of Group IV cannot:

(49)   a.   Did they treat you as if you were a fool?

       b.   Did he leave while the party lasted?

       c.   Is he a Mexican though his wife is an American?

       d.   *Don't they write to each other, although they are brothers?

This is a natural consequence of the above conclusion about the internal structure of interrogatives: since interrogatives consist of V^3, they have no layer to which adv-clauses of Group IV are attached. Hence, the adv-clauses of Group IV cannot occur in interrogatives.

The six differences in syntactic behavior among the four groups can be summarized as follows:

(50)

Group behavior	I	II	III	IV
within do so	ok	*	*	*
cleft	ok	ok	*	*
within scope of neg	ok	ok	*	*
missing subject	ok	ok	ok	*
transposa- bility	ok	ok	ok	*
question	ok	ok	ok	*

3.2   Environments Where Each Group of Adv-Clauses Appears

As is shown in 2.1 - 2.2, if a constituent belongs to V^n, this constituent is expected to occur in environments which involve the layer V^{n+i} ($i > 0$). The preceding subsection has made it clear which groups of adv-clauses belong to which layers. Then, our next task is to verify whether given adv-clauses occur in certain environments, as is expected.

At the outset, as Group IV belongs to V^4, adv-clauses of this group are expected to appear only in environments in which V^4 may occur. In fact, they can appear in main sentences, embedded sentences under assertive predicates, and non-restrictive relatives, but not in embedded sentences under non-assertive predicates, embedded questions, infinitival clauses, restrictive relatives, or gerundive constructions:

(51)   a.   He doesn't like me, because he tries to avoid me whenever he sees me.

b.   I realized that he doesn't like me, because he thinks 2.15%/day is usurious.[20]

c.   John, who doesn't like me, because he avoids me whenever he sees me, is notorious for being stingy.

d.   *It bothers me that he doesn't like me, because he thinks 2.15%/day is usurious.

e. *She asked me whether he left early in the morning, so that he is now in Paris.

f. *For him to have left early in the morning so that he is now in Paris pleased his parents.

g. *The boy who started early in the morning so that he is now in Paris is fond of traveling.

h. *Their having started early so that they are now in Paris pleased their parents.

It is evident that in (51b), the adv-clause does not modify the main sentence, but the embedded sentence, for when an adv-clause modifies a main clause, it can be moved to before an embedded sentence (cf. (52)), and the adv-clause in (51b) cannot be moved to before that-clause (cf. (53)):

(52) a. John knew that she was clever before he talked with her.

b. John knew before he talked with her that she was clever.

(53) *I realize because he thinks 2.15%/day is usurious that he doesn't like me.

Next, adv-clauses of Group III can appear in environments where the layer V^3 or the layer upper than it will occur. That is, of the eight environments listed above, all but gerundive constructions allow the occurrence of Group III:

(54) a. He voted for Reagan whereas his wife voted for Carter.

b. I said that he voted for Reagan whereas his wife voted for Carter.

c. John, who voted for Reagan whereas his wife voted for Carter, is a Democrat.

d. I regret that he voted for Reagan whereas his wife voted for Carter.

e. I wonder why he voted for Reagan whereas his wife voted for Carter.

f. For him to have voted for Reagan whereas his wife voted for Carter surprised his friends.[21]

g. The man who voted for Reagan whereas his wife voted for Carter is very conservative.

h. *His voting for Reagan whereas his wife voted for Carter astonished me.

As Group II belongs to V^2, adv-clauses of this group can appear in environments which involve V^2. All the environments listed above, including gerundive constructions, involve V^2. Then, Group II can occur in all the environments:

(55) a. He was arrested while he was strolling in the park.

b. It seems that he was arrested while he was strolling in the park.

    c.   John, who was arrested while he was strolling in the park, protested against the police.

    d.   It was strange that he was arrested while he was strolling in the park.

    e.   I can't understand why he was arrested while he was strolling in the park.

    f.   For him to have been arrested while he was strolling in the park is illegal.

    g.   The boy who was arrested while he was strolling in the park is my friend.

    h.   His having been arrested while he was strolling in the park surprised us.

The existence of V^2 always entails the existence of V^1. Then, though we do not illustrate the cases of Group I, adv-clauses of this group can occur in all the eight environments.

3.3 Where Preposed Adv-Clauses Are Attached

When adv-clauses are preposed, they are set off by a comma intonation, which is characteristic of V^4-constituents or constituents attached to V^4. Thus, it seems that preposed adv-clauses are attached to V^4.

If this were the case, we would encounter a difficulty because the preposing of adv-clauses takes place even in the environments where V^4 does not occur, say, embedded sentences under non-assertive predicates, or embedded interrogatives:[22]

(56)   a.   It was strange that though he had studied hard, he failed the exam.

        b.   John regrets that before Mary arrived, he had left.

(57)   a.   He asked her who, when she was in trouble, she would consult.

        b.   I wonder why, though it is fine today, he stays home.

However, some of the criteria which have been used to distinguish adv-clauses into four groups will clarify that the preposed adv-clauses are attached not to V^4, but to V^3.

First, when main clauses are negated, preposed adv-clauses are out of the scope of negation:

(58)   a.   When he kissed a hussy, his wife did not cry at all.

        b.   Because she is clever, she will not run such a risk.

It has been suggested in 3.1 that constituents which are c-commanded by the negative morpheme under V^2 are within the scope of negation. The fact in (58), then, shows that the preposed adv-clauses are not under V^2, but are attached to V^3 or V^4.

Secondly, the preposed adv-clauses do not occur in gerundive constructions:

(59)   a.   *Because the driver was careless the car having crashed was reported in the newspaper.

     b.   *Before Mary arrived his having left disappointed her.

This fact also shows that the preposed adv-clauses are attached to V^3 or V^4, because gerundives may accept constituents of V^2 or V^1, but not ones of V^4 or V^3.

Thirdly, preposed adv-clauses can involve missing subjects:

(60)   a.   Though agreeing with you up to this point, I cannot agree to your plan as a whole.

     b.   Unless sick, children are never peevish.

Suppose, along with Jackendoff (1972), that an antecedent of the missing subject is interpreted by an interpretive rule which works at the level of surface structure or at the end of each cycle. Inputs to this interpretive rule are structures where adv-clauses have been preposed. The interpretation rule is subject to the condition that the missing subject is commanded by its antecedent,[23] namely, in this case, by the subject of the main clause. If the adv-clauses were attached to V^4, the subject of the main clause would not command the missing subjects in the adv-clauses because the layer V^3 to which the subject of the main clause belongs <u>does</u> constitute a bounding category (cf. p. 99). Therefore, relative to these assumptions, we must conclude that the preposed adv-clauses are attached to V^3 or the layer lower than it.

Fourthly, preposed adv-clauses occur in interrogatives:

(61)   a.   If he cannot attend the conference, who should we invite?

     b.   Before he came here, where did he live?

Interrogatives consist of V^3 at their maximum (cf. p. 101). Then, we must consider that the preposed adv-clauses are attached to V^3 or the layer lower than it.

Of the four facts above, the first and second facts tell that the preposed adv-clauses are attached to V^4 or V^3, and the third and fourth facts tell that they are attached to V^3 or a layer lower than it. Therefore, it must be concluded that the preposed adv-clauses are attached to V^3. This conclusion explains why the preposing of adv-clauses is permissible in embedded interrogatives or embedded clauses under non-assertive predicates, as in (56) and (57): the preposed adv-clauses will be attached to V^3, and these embedded clauses have a layer to accept the preposed adv-clauses, i.e., the layer V^3. If this argument is correct, the facts concerning the preposing of adv-clauses do not argue against our claim that interrogative clauses or embedded clauses under non-assertive predicates consist of V^3.

Summarizing this section, adv-clauses are classified into the four groups, and the syntactic and distributional differences among the four groups can be explained on the basis of the assumption that they belong to the different layers. The argument results in strengthening the adequacy of the V^4 system.

4. The V^4 System and Bounding Category

The preceding sections have proposed that a clause be analyzed not as V^3, but as V^4, and that V^3 as well as V^4 be regarded as a bounding category. These proposals enable us to account for interesting phenomena concerning extraction of phrases from subordinate clauses embedded under so-called "bridge verbs."

Assertive predicates usually work as bridge verbs. That is, this sort of predicates allow the rule of WH-Movement[24] to extract phrases from clauses embedded under them:

(62)   a.   John thought that she had lost the umbrella in the park.

b.   What did John think that she had lost _____ in the park? (WH-Fronting)

c.   The umbrella which John thought that she had lost in the park was found yesterday. (Relativization)

Interestingly enough, however, assertive predicates do not work as bridge verbs if embedded clauses involve S-adverbs of Group-A:

(63)   a.   John thought that unfortunately, she had lost the umbrella in the park.

b.   *What did John think that unfortunately, she had lost _____ in the park? (WH-Fronting)

c.   *The umbrella which John thought that unfortunately, she had lost _____ in the park was found yesterday. (Relativization)

The prohibition of WH-Movement is not restricted to the cases where embedded clauses involve S-adverbs of Group-A; the same prohibition is observed when embedded clauses under bridge verbs have already undergone the root transformations (we henceforth confine the illustration of examples to the process of Relativization[25] for the reason in note 25):

(64)   a.   John thought that the umbrella, she had lost _____ in the park.

b.   *The park where John thought that the umbrella, she had lost _____ _____ is located near the library.

Moreover, the same thing is true when embedded clauses are modified by a sentential appositive relative:

(65)   a.   John thought that she had lost the umbrella, which irritated him.

b.   *The umbrella which John thought that she had lost _____, which irritated him, was found yesterday.

Additionally, the application of WH-Movement is blocked when an adverb of Group-B has been raised to the layer V^4, as well:

(66)   a.   John thought that possibly, she had lost the umbrella in the park.

          b.   *The umbrella which John thought that possibly, she had lost _____ in the park was found yesterday.

In this way, assertive predicates cannot work as bridge verbs when the embedded clauses involve some V^4-constituents, though the assertive predicates are usually bridge verbs. The modifications of the theory introduced thus far, i.e., the reanalysis of S as V^4 and the treatment of V^3 and V^4 as bounding categories, make it possible to account for such facts about extraction in a principled way.

We have seen in 2.1 that embedded clauses under assertive predicates may have V^4 at their maximum. This should be interpreted in such a way that such clauses do not always consist of V^4: only when they choose some V^4-constituents, they consist of V^4, whereas when they do not choose any V^4-constituents, they merely consist of V^3. Following this interpretation, the embedded clause of (62) is composed of V^3, and those of (63) – (66), of V^4.

Next, it is appropriate to say here a few words about complementizers. Complementizers are supposed, along with Jackendoff (1977), to be introduced by the following PS rule:

(67) $V^{\underline{n}} \longrightarrow COMP\ V^{\underline{n}}$

That is, a constituent $V^{\underline{n}}$ is rewritten to COMP and the same category, $V^{\underline{n}}$. In the case of $\underline{n} = 3$, rule (67) will produce a structure like (68a), and in the case of $\underline{n} = 4$, it will produce a structure like (68b):

(68)   a.

    b.
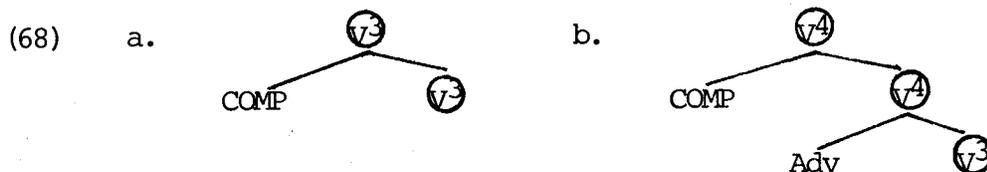
O: bounding category

When a clause consists of V^3, as in (68a), it contains two bounding categories, i.e., the inner and outer V^3, and, when a clause consists of V^4, as in (68b), it contains three bounding categories, i.e., the V^3 and the inner and outer V^4, for V^4 as well as V^3 is regarded as a bounding category (see pp. 99).

WH-Movement is subject to the Subjacency Condition, so that it cannot move phrases, crossing more than one bounding category, i.e., V^3 or V^4 (and NP). See Chomsky (1977; 1979).

Keeping these apparatus in mind, let us return to the sentences in (62) – (66). The structure of embedded clause in (62) is something like (68a). The application of WH-Movement in the embedded cycle moves the wh-phrase in the inner V^3 to the COMP position under the outer V^3. As there is only one bounding category (i.e., the inner V^3) between the

original position and COMP, this movement does not violate the Subjacency
Condition, and the derivational process will proceed to the matrix cycle.
On the other hand, the structure of the embedded clauses in (63) - (66),
having some V^4-constituents, is something like (68b). The rule of
WH-Movement attempts to move the wh-phrases in V^3 to the COMP position
under the outer V^4. But, this movement does violate the Subjacency Con-
dition, since there intervene two bounding categories (i.e., V^3 and the
inner V^4) between the original position and COMP. Thus, the movement
is blocked, and the derivational process stops at this stage. This is
the reason why no well-formed sentences are derived when embedded clauses
contain some V^4-constituents.

Resuming the derivational process of the well-formed sentences (62b)
and (62c), the application of WH-Movement in the matrix cycle will move
the wh-phrase in the COMP position of the embedded clause into the
COMP position of the matrix clause:

(69)

COMP V^3
John thought
COMP V^3
she had lost wh
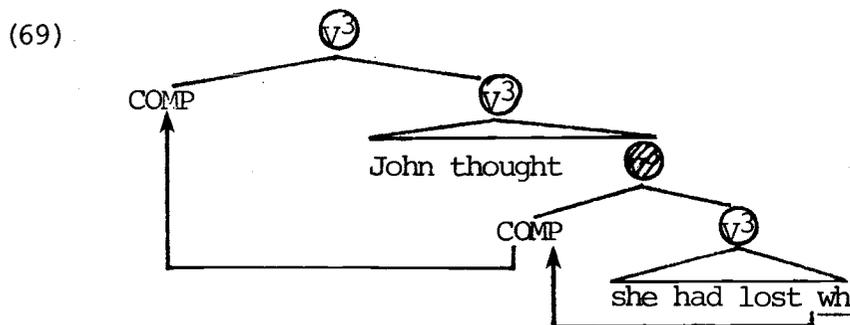
The second application of WH-Movement, strictly, will violate the Sub-
jacency Condition, because it moves the wh-phrase from COMP of the embed-
ded clause to COMP of the main clause, crossing two bounding categories,
i.e., the outer V^3 of the embedded clause and the inner V^3 of the main
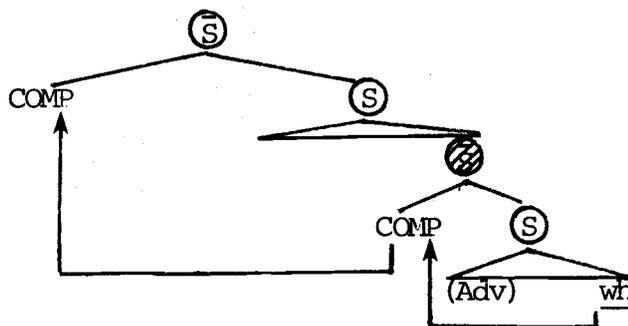clause.

With respect to the treatment of the node dominating COMP, Chomsky
(1979) has proposed that a bounding category dominating COMP under a
bridge verb is deleted or does not count as a bounding category.[26] Fol-
lowing this proposal, the outer V^3 of the embedded clause is deleted
or does not count, as is indicated by slanting lines in (69). Then,
the second application of WH-Movement in reality does not violate the
Subjacency Condition, and can move the wh-phrase from COMP of the embed-
ded clause to COMP of the main clause, producing the well-formed surface
structures of (62b) and (62c).

We conclude this section by considering the above problem from
the standpoint of Jackendoff's V^3 system and Chomsky's $\bar{S}$ system. In
these systems, there is no stratificational difference between the sen-
tences without the V^4-constituents like (62) and those with the V^4-con-
stituents like (63) - (66). All of these sentences are equally provided
with the structure of (70a) in Jackendoff's system, and (70b) in Chomsky'
system:

(70)　　a.
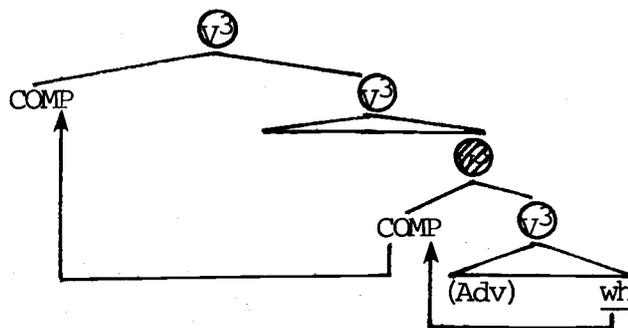
　　b.

The sole difference between the sentences without the V^4-constituents
and those with them is that the embedded clause of the former sentences
do not have the V^4-constituents under the innermost V^3 or innermost S
while the embedded clauses of the latter sentences have them. This dif-
ference, however, is not relevant to the number of the bounding cate-
gories. Thus, these two systems cannot attribute the difference in
grammaticality between (62) and (63) - (66) to violation or non-viola-
tion of the Subjacency Condition. If they allowed the derivation of
(62), they would be compelled to allow those of (63) - (66), too. No-
tice, incidentally, that the difference in grammaticality cannot be
ascribed to a constraint such that the extraction is blocked when there
is some pre-subject constituent, for the extraction is blocked even when
some V^4-constituent, say, an appositive relative, occurs in final posi-
tion. Thus, it is mandatory to admit the existence of the layer V^4, and
regard both V^4 and V^3 as bounding categories. These things are exactly
what the V^4 system claims. Hence, the adequacy of the V^4 system is
verified by the arguments based on extraction phenomena.

FOOTNOTES

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Ann Farmer and Chisato Kitagawa, for their insightful comments on earlier
drafts of this paper. I also thank Otto Santa Ana, Margaret Speas,
Stuart Davis, and Jane Disinger for acting as informants.

[1]For the purpose of simplicity, we use numerals, instead of bars
or primes, to present the number of bars.

[2]This paper will not refer to the problem of whether the claim
here that the major phrasal category of V is V^4 should be extended to
major phrasal categories of other lexical categories. Irrespective of

the answer to this problem, the claim of this paper will not detract
from the major merits of the X-bar theory, such as the generalized
definition of the grammatical relations, or the cross-categorial defi-
nition of rules.

[3]Notice, however, that adverbs of Group-B cannot be negated, ir-
respective of whether the main sentence is negated or not:

(i)   *Not possibly, he passed the exam.

It seems that this is related to the fact that adverbs of Group-B have
the same function as epistemic modal auxiliaries in that they both ex-
press the probability of truth of propositions, and none of the epistemic
modal auxiliaries can be negated:

(ii)   a.   He may not come if it rains.

            = It is possible that he will not come if it rains.

            $\neq$ It is not possible that he will come if it rains.

[4]Richard Oehrle (personal communication) points out that the adverbs
of Group-A cannot occur in other copula construction, as well:

(i)   *That is surprisingly John.

[5]The judgment varies. Some speakers take all of the cleft sen-
tences having manner adverbs in the focus position as ungrammatical,
while some others take them as grammatical.

[6]The idea that the occurrence of adverbs serves as a clue for deter-
mining the internal structures of clauses was, to my knowledge, first
proposed by Kajita (1968).

[7]The following are examples of assertive and non-assertive predi-
cates:

      [assertive predicates] think, believe, expect, say, tell;
            appear, seem; be certain, be sure, be clear, etc.

      [non-assertive predicates] regret, resent, forget; amuse,
            surprise; be odd, be strange, be interesting, etc.

[8]This should be understood in the meaning that infinitival clauses
may take V^3 at their maximum. Infinitival clauses whose subject is
obligatorily controlled by some NP in the main clauses, for example,
are supposed to consist of V^2. See, further, note 21.

[9]See Jackendoff (1977) for the argument that gerundive construc-
tions are composed of the mixture of NP and V^2.

[10]This explanation is suggested by Richard Oehrle (personal communi-
cation).

[11]The interpretation relevant here is that both adverbs function
as sentential adverbs. When the first adverb is interpreted as modify-
ing only the second adverb, (19) is acceptable.

[12]Green (1976), however, points out counter-examples to this generalization.

[13]See p. 99 for the definition and redefinition of the notion of command.

[14]Williams (1975) also draws, partially in relation to adv-clauses, a conclusion that a clause should be analyzed as V^4. His classification of adv-clauses, however, is quite different from ours: adv-clauses are classified into two groups, ones of V^3 (our Group III) and ones of V^4 (our Group IV); and such adv-clauses as because, before, after, while-clauses are classified as ones of V^3. For reasons discussed in this section, they should be classified into four groups, and the mentioned adv-clauses must be classified as Group II.

[15]The notion of c-command is defined as follows:

(i)   A c-commands B if the first branching category dominating A dominates B. (Chomsky and Lasnik (1977, 459)

We have no idea as to why the adv-clause in (38b) may be understood as out of the scope of negation, too. Richard Oehrle (personal communication), however, points out that the difference in the scope of negation, and, additionally in the replaceability by do so, is related to prosody; if adv-clauses are prosodically connected to the preceding parts, they are within the scope of negation and replaceable by do so, while if they are prosodically disconnected, they are out of the scope of negation and not replaceable by do so. Then, it may be necessary to suppose that when adv-clauses are prosodically disconnected, they belong to higher layers than when they are prosodically connected.

[16]Cf. Langacker (1969, 182) and Jackendoff (1972, 180)

[17](46a) is not so bad as (46d), but is still less acceptable than (46b) or (46c). The less acceptability of (46a) stems from the fact that the strictly subcategorizing elements are unlikely to be preposed.

[18]Williams (1975) has incorrectly claimed that adv-clauses of V^4 can be transposed.

[19]Cf. Greenbaum (1969, 111).

[20]This is cited from Ross (1973, 228).

[21]Infinitival constructions whose subjects are obligatorily controlled by some NP in the main clauses cannot take adv-clauses of Group III:

(i)   *John tried to win the race whereas Tom passed the exam.
       Cf. John tried to win the race whereas Tom tried to pass the exam.

but can take ones of Group II:

(ii)   John tried to finish the term paper before the deadline drew near.

Then, as is suggested in note 8, this type of infinitival constructions are supposed to consist not of V^3, but of V^2.

[22]This problem was presented by Richard Oehrle (personal communication).

[23]Cf. Jackendoff (1972).

[24]By WH-Movement, I mean, along with Chomsky (1977), to refer to the unbounded leftward movement rules collectively, such as WH-Fronting, Relativization, Topicalization, Clefting, etc. Though I do not construct examples of Topicalization, Clefting, etc. for convenience and brevity, the same point holds for these processes, as well:

(i) a. The umbrella, John thought that she had lost _____ in the park. (Topicalization)

     b. It was the umbrella that John thought that she had lost _____ in the park. (Clefting)

(ii) a. *The umbrella, John thought that unfortunately, she had lost _____ in the park.

     b. *It was the umbrella that John thought that unfortunately, she had lost _____ in the park.

I am thankful to Adrian Akmajian for calling this fact to my attention.

[25]The most typical and simplest process of WH-Movement is WH-Fronting, but I refrain from using WH-Fronting as a representative of WH-Movement to avoid an imaginable counterargument, though, in reality, merely a pseudo-counterargument. Embedded clauses with some V^4-constituent are incompatible with yes-no (independent) interrogatives as well as wh-interrogatives:

(i) a. *Do you think that unfortunately, she lost the umbrella in the park?

     b. *Do you think that the umbrella, she lost _____ in the park?

     c. *Do you think that she lost the umbrella in the park, which irritated John?

These ill-formed examples do not involve the application of WH-Movement. Then, one might say that the cause of the ill-formedness of wh-questions like (63b) is the same as that of the ill-formedness of yes-no questions like (i), and should not be attributed to the extraction of wh-phrases from the embedded sentences (Adrian Akmajian (personal communication)).

However, the ill-formedness of (63b) and that of (i) stem from different causes. The predicates in (63b) and (i) are assertive predicates, which allow the main assertion to take place in embedded clauses when the entire sentences are declarative (cf. Hooper and Thompson (1973)). Analogously, these predicates allow the focus of question to occur in the embedded clauses when the entire sentences are yes-no questions. That is, the questions in (i) are interpreted as

asking about the truth value of the embedded clauses. If so, it follows, from the argument on the internal structure of interrogatives in 2.1, that the embedded clauses consist of V^3 at their maximum, and lack the layer to which the V^4-constituents are attached. Therefore, the sentences in (i) are ill-formed.

On the other hand, the focus of wh-questions is wh-phrases; so, if wh-phrases occur in the main clauses, as in (63b), the main clauses are interrogative clauses involving the focus of question; consequently, the main clauses are considered as consisting of V^3, and the embedded clauses retain the possibility of consisting of V^4. Hence, the ill-formedness of wh-questions like (63b) should not be ascribed to the limited capacity of the internal structure of the embedded clauses, but to the extraction of wh-phrases by WH-Movement just like the extraction of relative pronouns by WH-Movement in (63c).

[26]Ann Farmer (personal communication) points out that if the node dominating COMP is deleted, there will be no node under which COMP is dominated, and complementizers will dangle. Then, it is more appropriate to consider that the node in question is not deleted, but it merely does not count as a bounding category.

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