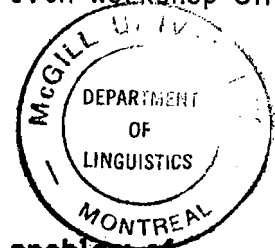# The Syntax of Adverbs
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0.0 Introduction

The goal of this paper is to provide a direction of inquiry into the problem of the syntax of adverbs. I see the central issue to be a problem of licensing. Much of recent syntactic literature has been concerned with the generation of phrase markers. Beginning with Stowell (1981), efforts have been made to reduce the dependency on Phrase Structure rules and to account for the creation of tree structures through licensing. The general movement rule of Move-alpha was extended in Lasnik and Saito (1984) to Affect-alpha so as to include other mechanisms of syntax such as deletion and insertion rules. Within the Base component, Affect-alpha would take the form of Generate-alpha. Overgeneration would then be restricted through principles of licensing (see e.g. Abney 1986, Fukui and Speas 1986). The question, then, to be explored in this paper is: what licensing principles account for the generation and distribution of adverbs. The assumption is that once the problem of licensing is solved, other problems concerning the syntactic behaviour of adverbs will be solved.

In the first section, I present five problems of the syntax of adverbs. In the second section I propose an analysis of adverb licensing. At the heart of the proposal is the assumption that adverbs are not maximal projections and as such are licensed by neither theta-role assignment nor predication but rather by a third type of licensing. In the third section I show how such an analysis offers an explanation for the problems that have been raised and further suggest that prenominal adjectives are licensed the same way that adverbs are licensed which explains certain similarities. In the fourth and final section I pose further problems and some speculations concerning which direction future research might take.

1.0 Problems

Adverbs present many interesting problems for the syntactician. Below I raise five questions concerning the generation and behaviour of adverbs. These are:

(1) a. How are adverbs licensed?
     b. Why do true adverbs enjoy freer distribution than adverbial prepositional phrases?
     c. Why does the interpretation of some adverbs vary depending on their position?
     d. Why are adverbs allowed to incorporate into verbs even though they are not arguments of the verb?
     e. Why is the relative sequencing of adverbs restricted?

1.1 Licensing

Chomsky (1986) introduces the Principle of Full Interpretation in order to restrict the generation of phrase markers. This is given in (2) below (based on Chomsky 1986: 99-101).

(2) Principle of Full Interpretation
Every element of PF and LF must receive an appropriate interpretation.
PF: Every phonetic segment must receive a phonetic interpretation.
LF: Non-maximal projections are licensed by X-bar theory.
Maximal projections are licensed as either arguments, traces of arguments, predicates, or operators.

In the following example, the NP 'the carrots' is licensed by virtue of the fact that it receives a theta-role from the verb 'eat'. The AP 'raw' is licensed through predication since it is predicated of the independently licensed NP 'the carrots'.

(3) The rabbits will eat the carrots raw.

It is not clear, however, how adverbs are to be licensed. As non-arguments, they might be expected to be licensed through predication. Chomsky (1986) gives an example of an adverbial PP 'at noon' in 'John left town at noon' and suggests, following Rothstein (1983), that this PP is predicated of an element in INFL. McConnell-Ginet (1982), however, proposes that adverbs are in fact arguments of the verb, which suggests that they are licensed through theta-role assignment.

What I will stress throughout this paper is that whatever the licensing mechanism chosen, it should serve to answer other questions concerning adverbs. In other words, while it might seem efficient to include adverbs in the licensing types proposed in the Principle of Full Interpretation, the fact that adverbs act quite differently from both arguments (theta-licensed elements) and predicates (predication licensed elements) raises the question of whether, in fact, a new type of licensing would be appropriate. This is the direction I will take in my line of inquiry.

1.2 Positioning

One of the problems that I propose to solve by means of this "new" licensing mechanism is why adverbs may appear in several different places within a sentence. Below I discuss the problem of positioning of adverbs by first describing the facts in English, then showing how the distribution of adverbs differs from the distribution of adverbial PPs. Finally I discuss how languages differ giving examples from Icelandic, German, and Afrikaans.

1.2.1 "Transportability"

Keyser(1968) proposes a transportability convention for elements that are marked [+transportable] for any given language. This has the effect that, in English, adverbs may appear in a variety of positions (for the details on the constraints of this convention, see Keyser 1968). As made clear in the examples below, adverbs appear to position themselves fairly freely.

(4)   a. Cleverly/clumsily John dropped his cup of coffee.
        b. John cleverly /clumsily dropped his cup of coffee.
        c. John dropped his cup of coffee cleverly/clumsily.

In (4) we see that certain adverbs in English may appear either sentence initially (4a), between the subject and the verb phrase (4b), or sentence finally (4c). It is not true, however, that all adverbs may appear in all three positions. Some may appear either sentence initially, or between the subject and the verb (5a,b,c), while others may appear either between the subject and the verb phrase or sentence finally (6a,b,c) (see Jackendoff 1972: 50).

(5)   a. Evidently Horatio has lost his mind.
        b. Horatio has evidently lost his mind.
        c.*Horatio has lost his mind evidently. (without comma reading)

(6)   a. Stanley easily ate his Wheaties.
        b. Stanley ate his Wheaties easily.
        c.*Easily Stanley ate his Wheaties.

A further problem is that adverbs that appear between the subject and the VP may behave differently in the presence of auxiliary verbs and modals. For example, while (7a) shows that both probably and completely may appear in the same position, (7b) and (7c) show that this apparent similarity can be teased apart through the introduction of auxiliaries. (Examples are based on Jackendoff 1972: 75-76.)

(7)   a. The tornado (probably, completely) ruined George.
        b. George (probably, *completely) is being ruined by the tornado.
        c. George is being (*probably, completely) ruined by the tornado.

1.2.2 Adverbs vs. Adverbial PPs

Adverbs and adverbial PPs , while playing a similar role semantically within the sentence, differ in their distribution suggesting that they should be distinguished syntactically. Only true adverbs show the effects of transportability. Adverbial PPs are, like other elements, restricted in their position(Jackendoff 1977: 73).

(8)   a. Bill dropped the bananas quickly/with a crash
        b. Bill quickly/*with a crash dropped the bananas.

An explanation must be sought, then, for why true adverbs differ from adverbial PPs, and why, if only one of them is [+transportable], it is the true adverbial.

1.2.3 Icelandic (Platzack 1986, Thráinsson 1986, Holmberg 1986)

A different sort of "transportability" is found in Icelandic. Adverbs such as aldrei 'never' are normally found between the inflected verb and the rest of the contents of the verb phrase. This position may be accounted for through head movement of the inflected verb into INFL.

(9) a. Hann stingur aldrei smjörinu í vasann
        He   puts   never butter   in his pocket
        'He never puts butter in his pocket.'

     b. [hann [$_{INFL}$] aldrei [$_{VP}$ stingur smjörinu í vasann]

     c. [hann [$_{INFL}$stingur$_i$] aldrei [$_{VP}$ t$_i$ smjörinu í vasann]

At D-structure, the adverb is placed between the INFL node and the VP. The head of the VP, stingur, moves at S-structure into the empty INFL position as shown in (9c).

Complications arise, however, when alternate positions of the adverb are taken into account. As (10a) below shows, the adverb may also appear between the direct object and the prepositional phrase within the VP. (10b) shows that this flexibility is not always available.

(10) a. Hann stingur smjörinu aldrei í vasann
         he   puts   butter   never in his pocket
         'He never puts butter in his pocket.'

      b. *Hann mun stinga smjörinu aldrei í vasann
          he   must put   butter   never in his pocket
          'He must never put butter in his pocket'

The generalization is that only when there is a simple verb form may the adverb appear between the direct object and the prepositional phrase (see Holmberg, Platzack, Thráinsson for more details on this construction).

To summarize the problem so far, a licensing mechanism must be found for adverbs that explains (i) the relative freedom of positioning, (ii) why some adverbs work differently from others, (iii) why adverbs and adverbial PPs do not share the same distribution, and (iv) why and how the transportability of adverbs varies from language to language.

1.3 Interpretation

A further problem that any analysis of adverbs must address is the problem of interpretation. Some adverbs receive a different interpretation depending on where they appear within the sentence. The most noticeable of these are the passive-sensitive adverbs such as <u>carelessly</u> as shown below (examples based on Jackendoff 1972: 82-83, see also McConnell-Ginet 1982).

(11) a. The police <u>carelessly</u> will arrest Fred.
      b. Fred <u>carelessly</u> will be arrested by the police.
      c. The police arrested Fred <u>carelessly</u>.
      d. Fred was arrested <u>carelessly</u> by the police.

In (11a) and (11b) the adverb appears in the pre-AUX position and refers to the subject of the sentence, whether or not that subject is also the agent. In (11a) the interpretation is that the police are being careless, in (11b) it is Fred who is being careless. (11c) and (11d) show a different pattern, however. In both cases, the adverb is post-VP, and in this position, rather than being sensitive to what is the subject of the sentence, the adverb is sensitive to the agent of the sentence whether or not the agent is also the subject. Therefore in both (11c) and (11d) the police are being careless. The distinction is shown most sharply in the contrast between (11b) and (11d). The only difference between these two sentences is the position of the adverb, yet in (11b) Fred is careless, and in (11d) the police are careless.

Jackendoff (1972) distinguishes these passive-sensitive adverbs from others which show "no discernible change in meaning" such as <u>quickly</u>. This is shown in the example below where <u>quickly</u> refers to the action of the police independently of the position of the adverb or the grammatical function of the NP.

(12) a. The police <u>quickly</u> will arrest Fred.
      b. The police will arrest Fred <u>quickly</u>.
      c. Fred <u>quickly</u> will be arrested by the police.
      d. Fred will be arrested by the police <u>quickly</u>.

A further requirement for any syntactic account of adverbs, then, is that it must also explain the relation of positioning and interpretation and why this does not appear to apply for all adverbs.

1.4 Incorporation

Adverbs present yet another interesting puzzle in the context of incorporation as presented in Baker (1985, 1988). Baker shows that through head-movement certain X^0s may incorporate into other Y^0s. This is illustrated in example (13) below where the head of the object NP <u>niu</u> 'coconut' has incorporated into the verb <u>volu</u> 'grate'.

(13) Volu <u>niu</u>   nakai e tau fanau   (Niuean: Baker 1985: 106)
      grate-<u>coconut</u> Q   abs-pl-children
      'Are the children grating coconut?'

It is not the case, however, that any head may move into any other head. Not only is there a locality restriction on head-movement, Baker's analysis also predicts that only the heads of arguments may be incorporated into the verb. As a possible example of this restriction, he gives the sentence in example (14) below (see Baker for further details of the analysis). Po 'night' is not able to incorporate into the verb since it is not an argument of the verb.

(14) *Gahua po   a ia,   ka e mohe aho (Niuean: Baker 1985: 111)
        work-night abs-he but sleep-day
        'He works nights, but sleeps days.'

Interestingly, however, there are languages where adverbs may incorporate with the verb. An example is given below from Inuktitut where the adverb 'undoubtedly' is a morpheme qquu within the verb form.

(15) ungasinnirulaatsiassaqqquuqaaq (Inuktitut: Fortescue 1980)
          'It will undoubtedly be somewhat further off'

The question remains, then, why non-arguments may incorporate only when they are adverbs.[1]

1.5 Restriction on sequences

One final question that I will be looking at concerns the cooccurrence of adverbs. Jackendoff notes that only certain sequences of different types of adverbs is allowed. While both adverbs probably and carefully may appear either sentence initially, between the subject and AUX, or between AUX and the VP, when they co-occur, probably must precede carefully. This is shown in example (16) below (taken from Jackendoff 1972: 87-93).

(16) a. Probably Max carefully was climbing the walls of the garden.
      b. Max probably was carefully climbing the walls of the garden.
      c. *Carefully Max probably was climbing the walls of the garden.
      d. *Max carefully was probably climbing the walls of the garden.

2.0 The Proposal: Head feature licensing

I propose that all the questions outlined above may best be answered if one assumes that the licensing of adverbs differs from the licensing of arguments and the licensing of predicates. My analysis will contain three assumptions concerning the licensing of adverbs. These are listed below and discussed in more detail in the following sections.

(17) Adverbs are:
      A. "defective" categories
      B. "autonymous" theta-markers

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[1]Similar facts have been reported for Chukchee (Spencer 1987).

C. related to a head feature

2.1 "Defective" Categories

Because they behave differently from other categories, adverbs are not considered major lexical categories . Perhaps the most striking difference is their inability to take complements. It is for this reason that Jackendoff (1977) characterizes adverbs, distinguishing them from adjectives, with the feature COMP. Where adjectives may take complements (i.e. are +COMP), adverbs may not ([-COMP]). This is shown in the example below where the adjective proud may take the complement PP of their achievements, the related adverb proudly may not (18a and 18b). (18c) and (18d) are similar examples taken from Jackendoff (1977).[2]

(18) a. proud of their achievements
      b. *proudly of their achievements
      c. fearful of Bill
      d. *fearfully of Bill

What I will claim is that this inability to take complements indicates that, in fact, adverbs may not project to a phrasal category. Rather they remain simply as heads. This assumption is crucial to the analysis of adverbs that I propose since, as I suggest below, heads that do not project must be licensed differently from maximal projections.

2.2 "Autonymous" theta-marking

The Principle of Full Interpretation includes two types of licensing, theta-marking and predication.[3] Arguments are licensed by virtue of the fact that they receive theta-roles, and elements in predication structures are licensed through the relation of predication. These two types of licensing, however, both involve the licensing of maximal projections: theta-licensing since only maximal projections may receive theta-roles, and predication licensing since both predicates and subjects must be maximal projections. The question, then, is raised as to whether heads which do not project may be licensed at all. Mechanisms proposed by Higginbotham (1985) do introduce this possibility. The structure given in (19) below illustrates two theta relations other than theta-assignment.[4]

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[2]R. Kayne has pointed out (p.c.) that the lack of complements may have to do with a semantic restriction rather than a syntactic one. This can be seen in the following examples.
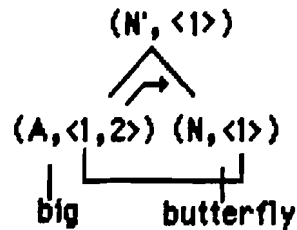(i)   He was fearful (of Bill).
(ii)   His manner was fearful (*of Bill).
Unfortunately my account does not explain the above judgements.

[3]I am leaving aside here the possibility of operator-licensing.

[4]Higginbotham also introduces a third new type of thematic relation which is theta-binding.

(19)

$$(N', \langle 1 \rangle)$$

$$(A, \langle 1,2 \rangle) \quad (N, \langle 1 \rangle)$$

big   butterfly

These two new theta-relations are (i) theta-identification and (ii) autonymous theta-marking. Theta-identification is indicated by the connecting line between the argument structure of 'big' and the argument structure of 'butterfly'. Autonymous theta-marking is indicated by the crooked arrow.

According to Higginbotham, theta-identification identifies the open position of the N with the open position of the A. The argument position of the N', therefore, is identified both with the N and the A (i.e. the conjunction of the properties of being big and being a butterfly). Higginbotham argues that a further relation must be indicated to account for the fact that a big butterfly may not be big in absolute terms, but only as far as butterflies are concerned. For this reason autonymous theta-marking is proposed. The 2-position in the argument structure of the A is satisfied by the attribute of the N which limits the dimensions of the A. Since autonymous theta-marking occurs only under government, this sort of effect should appear only with bare adjectives which govern the noun such as prenominal adjectives. Examples of the contrast are given in (20) below. In (20a) the range of big is restricted by the head N, whereas in (20b), since the A does not govern the N in subject position, the range of the adjective is less restricted.[5]

(20)   a. The big butterfly
        b. The butterfly is big.

What is important for the purposes of this paper is that there is a possible licensing mechanism for heads which is theta-identification. While Higginbotham, in his article, concentrates on the use of theta-identification

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[5]Some other, perhaps clearer, examples which show the distinction between prenominal adjectives and predicate adjectives are given below.

(i) the tall basketball player
(ii) The basketball player is tall.
(iii) The alleged Communist
(iv) *The Communist is alleged.

If a basketball player were 6'2", (ii) would be appropriate but (i) would be odd (examples due to P. Bloom, p.c.). The distinction between (iii) and (iv) is discussed in Higginbotham (1985).

for prenominal adjectives, he begins his discussion with examples of adverbs taken from Davidson (1966). The conclusion, then, that I draw is that adjectives and adverbs may be heads that enter into relationships with other heads (see also McConnell-Ginet 1982 for arguments that adverbs modify Vs and not VPs). It is clear that these adjectives and adverbs do not project, otherwise there would be no structure of mutual government and no such symbiotic relationship created.

2.3 Head Features

While I agree with Higginbotham that adverbs and adjectives are licensed as bare heads, I disagree as to exactly what it is in the licensing head which allows this relationship. Rather than assuming that these heads identify or autonymously theta-mark one another, I assume that it is a feature of the licensing head (noun or verb) which licenses the modifying head (adjective or adverb). At this point I will keep this idea quite vague with the hope that it will become clearer in the course of the paper. Some suggestions for possible head features in verbal categories are given in example (21) below.

(21) V: V (Manner)
      INFL: E(vent), AGR(eement)
      C?: Speaker (illocutionary force)

2.4. Summary of analysis

Chomsky (1986) claims that non-maximal projections are licensed by X-bar theory. This implies that the non-maximal projection would be dominated by a maximal projection that was independently licensed. In this last section, I have proposed that X^0s are not always dominated by maximal projections, and when this occurs, they must be licensed by a mechanism other than X-bar theory. This situation occurs with adverbs and pre-nominal adjectives which are licensed by a feature in the head which they govern.

3.0 Problems revisited

3.1 Licensing

It is clear that licensing of adverbs and adjectives is completely different from the licensing of maximal projections. They are seen not as arguments or as predicates but more as co-functors. As Higginbotham points out, in theta assignment and predication, theta-roles are discharged. In the case of modification, however, no theta-roles are being satisfied. It will be shown below that by specifying that adverbs and prenominal adjectives are non-maximal projections certain peculiarities of their behaviour can be explained.

3.2 Transportability (and placement)

We looked first at the problem of positioning of adverbs. As we saw, while adverbs may appear in a variety of positions, it is not true that all adverbs may appear in all positions. Below I give some generalizations concerning the typology of adverbs which is basically what is given in Jackendoff (1972) (see also Roberts 1985). In this section we will first rearrange the groups to make this typology more precise. I will then show how head feature licensing offers an explanation for these divisions.

3.2.1 Adverb typology

(22) Adverb types

Type I: Initial, Aux, VP-final (meaning change) (cleverly, clumsily,...)
Type II: Initial, Aux, VP-final (no meaning change) (quickly, slowly, ...)
Type III: Initial, Aux (evidently, probably, unbelievably,...)
Type IV: Aux, VP-final (completely, easily, totally, ...)
Type V: VP-final (hard, well, more, ...)
Type VI: Aux (truly, virtually, merely ...)

The first step to take in the investigation of these types (a step that was taken by both Jackendoff and Roberts) is to note that AUX is actually a conflation of two positions: one which I will call the AUX position and the other which I will call the VP-initial position. While the position is ambiguous in the example given in (23a), we can see this distinction clearly when we add auxiliary verbs as in (23b) and (23c). Both probably, a type III adverb, and completely, a type IV adverb, should appear in AUX position, yet with the addition of an auxiliary verb, we can see that these two adverbs do not share distributional properties.

(23) a. The tornado probably/completely ruined George.
      b. George probably/*completely was ruined by the tornado.
      c. George is being *probably/completely ruined by the tornado.

This prompts the first change in the table above so that Type III adverbs appear in initial or AUX position, and Type IV adverbs appear in VP-initial or VP-final position.

(24) Type III: Initial, AUX
      Type IV: VP-initial, VP-final

Further, we can see that adverbs of Type I and Type II may appear in all four positions (25), initial, Aux, VP-initial, and VP-final.

(25) a. (Clumsily) John (clumsily) has (clumsily) dropped his coffee (clumsily).
      b. (Quickly) John (quickly) had (quickly) finished his meal (quickly).

(26) Type I: Initial, AUX, VP-initial, VP-final
Type II: Initial, AUX, VP-initial, VP-final

Another interfering factor which complicates the adverb table is the fact that some adverbs (Type I) change meaning depending on the position. One example of this was given above (see (11)) and another is given below in (27) (taken from McConnell-Ginet).

(27) a. <u>Reluctantly</u> Mary was instructed by Joan.
      b. Mary was <u>reluctantly</u> instructed by Joan.
      c. Mary <u>reluctantly</u> was instructed by Joan.
      d. Mary was instructed <u>reluctantly</u> by Joan.

Jackendoff puts the adverb in Type I and classifies these as meaning changing adverbs (in order to distinguish this group from Type II). However, if we were to divide Type I adverbs into two sub-types: a Type Ia adverb which is subject sensitive (27a,b) and a Type Ib adverb which is agent sensitive (27c,d), then Type Ia would appear in initial position and in AUX position, while Type Ib would appear in VP-initial position and VP-final position.

(28) Type Ia: Initial, AUX
Type Ib: VP-initial, VP-final

Now we can see that Type Ia and Type III fall together and Type Ib and Type IV fall together. One last change needs to be made to clear up the table. Type II, in fact, looks like a combination of Type III and Type IV. We could tease this apart with the Type I adverbs where the meaning changed. In fact, I will claim that there is also a meaning change with Type II adverbs, except that it is much more subtle. This is illustrated in (29) below.

(29) a. <u>Quickly</u> John will be arrested by the police.
      b. John <u>quickly</u> will be arrested by the police.
      c. John will be <u>quickly</u> arrested by the police.
      d. John will be arrested <u>quickly</u> by the police.

In (29a,b) <u>quickly</u> appears to be modifying the event of the arrest while in (29c,d), <u>quickly</u> modifies the process of the arrest. In other words, in (29a,b), the arrest will happen right away. In (29c,d), the manner of the arrest will be hurried. If this is true, then Type II like Type I may be divided into Type IIa and Type IIb. Now our adverb chart looks like this.

(30)

Initial/AUX	VP-initial/VP-final	AUX	VP-final
Type Ia	Type Ib		
Type IIa	Type IIb		
Type III			
	Type IV		
			Type V
	Type VI		

Leaving Type V and Type VI aside (I will only speculate about them later), we can see that the rest of the adverbs fall neatly into two groups. The fact that these two groups exist falls out from the fact that they are licensed by two different heads. Types Ia, IIa, and III I will claim are all licensed by a feature in the head INFL, while Types Ib, IIb, and IV are all licensed by a feature in the head V. Now the question remains as to why each adverb class still enjoys a range of positions. In the following section I will show how this also follows from the licensing mechanism employed.

3.2.2 Feature extension

As we saw at the beginning of this paper, adverbs in many languages enjoy a wide range of positions. Basically I will claim that this is due to mechanisms in the grammar that allow features of heads to pass up and down the tree (see e.g. duPlessis 1986, this volume). Since the same range of positioning is not attested in every language, some parameterization of this must be introduced. Below I will discuss English and Icelandic and then will end with a few speculations concerning German.

3.2.2.1 English

I claim that in English, the effect of transportability comes about through feature percolation from the head to the maximal projection. In English, then, adverbs may appear anywhere along the projection line of the licensing head. This is shown in the tree diagram below and illustrated in the examples given in (32) and (33).

(31)
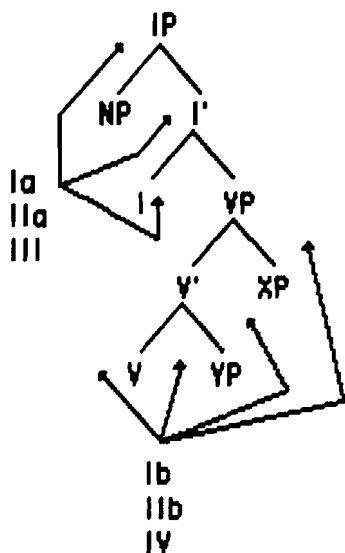
(32) a. George has probably read the book.
      b. George probably has read the book.
      c. Probably, George has read the book.

(33) a. Mary will have slowly put the book on the table
      b. Mary will have put the book slowly on the table.
      c. Mary will have put the book on the table slowly.

Now we can explain why only true adverbs are transportable and not adverbial PPs. Since the latter are licensed through predication and are predicated of the VP or an IP, they may not appear within the maximal projection of the V or the INFL(Jackendoff 1972).

(34) a.   John will lose his wallet in the garden.
      b. *John will, in the garden, lose his wallet.
      c.   In all probability John has lost the race.
      d.   John has, in all probability, lost the race.
            (good only with comma reading)

One way of explaining the positioning of Type V adverbs in VP-final position would be to claim that they are maximal projections. In fact, many of the examples given by Jackendoff of Type V adverbs are arguably PPs (before, home, indoors, downstairs). However, others are harder to argue for (hard, more, less, slow, terribly). I leave this as a question for further research.
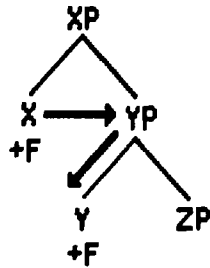
3.2.2.2 Icelandic

In Icelandic, feature extension appears to work very differently from the examples we have seen for English. Rather than transporting "up" the tree, the adverb is appearing lower in the tree than expected. The problematic case is given in (35b) below where an INFL-licensed adverb appears between the object and the prepositional phrase.

(35) a. *Hann mun stinga smjörinu aldrei í vasann
            he   must put   butter   never in his pocket
            'He must never put butter in his pocket'

      b.   Hann stingur smjörinu aldrei í vasann
            he   puts   butter   never in his pocket
   'He never puts butter in his pocket.'

What appears to be happening is that the features of INFL may appear within the VP, but only when there has been head movement of the V to the INFL position. This is not unreasonable given a view of head-movement proposed in Lamontagne and Travis (1987). In order to explain the generalization of the Head Movement Constraint of Travis (1984) it was proposed that the contents of the empty category left behind by head movement must be recovered through head feature transmission which allows one head to transmit features to a sister maximal projection. These features will then filter down to the head of the maximal projection. The relevant structure is given in (36) below where the features of X are transmitted to YP and

subsequently are passed down to Y. Since recoverability of content is dependent on such a structure, head movement must be local.
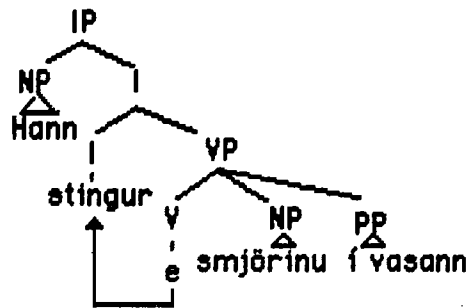
(36) Feature transmission   Feature recoverability
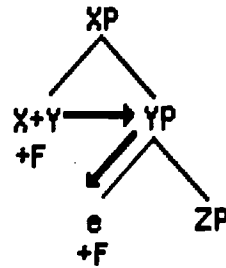
The relevance of this mechanism to adverb positioning in Icelandic should be clear from the structure given in (37) for sentence (35b) above.

(37)

The verb <u>stingur</u> moves through head movement to the INFL position. In order to recover the features of the V, INFL must transmit them to the VP which will in turn pass them to the V. Since the V has moved into the INFL position, it is possible that not only the features of the V but also the features of the INFL will be passed back down to the V position. Obviously, this is not possible in all languages. However, the positioning of the adverb in Icelandic suggests that this is, in fact, what is happening in this language. Once these features are passed down, not only is the empty category in V identified, but the line of INFL features is extended, allowing transportability of the adverb.[6] Note that if there are two verbal elements as in (33a), while the INFL features may be passed to the intermediary V, they may not be passed to the lowest V, which accounts for the ungrammaticality of (33a).[7]

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[6]Note that this indicates that the proper level of licensing is not at D-structure. Thanks to Mark Baker for pointing this out.

[7]Holmberg (1986) accounts for adverb placement in examples such as (35b) through movement of the direct object (object shift). His account has the advantage that it explains why the adverb will not appear after a VP internal PP while this is still problematic for my proposal.

There have been other proposals to account for the Icelandic facts. Thraínsson and Platzack have proposed that movement of the head out of the VP allows pruning of the VP node and the adverb is allowed to scramble with members of the VP. This would imply that such an extension of INFL features is possible only when there is movement. In the next section I argue that German offers a possible counterexample to this claim.

3.2.2.3 German[8]

In German, unless the INFL-adverb is topicalized, it always appear within the VP as illustrated by the example below.

(38) Die Studentin hat das Buch wahrscheinlich gelesen.
      the student   has the book probably   read
      'The student has probably read the book.'
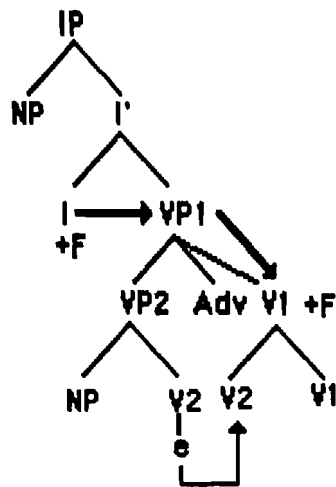
In fact, it may appear very deeply embedded.

(39) Die Studentin hätte das Buch wahrscheinlich lesen sollen
      the student   has   the book probably   read   should
      'The student probably was supposed to read the book.'

This suggests first that features may be passed from one head to another independent of movement and second that they may be passed down a series of heads. The fact that features may be passed even if there has been no movement is not troublesome since all of the examples of affix hopping and Case assignment are precisely that (see the structure in (36)). One lexically realized head passes features to another lexically realized head. The second problem, however, goes against the Head Feature Transmission Constraint of Lamontagne and Travis (1987) which states that features may only be passed from the head to the sister of the head. There is a way around this, however, since it has been claimed that in fact the series of verbs at the end of a German sentence is a verbal complex created by V movement. I will assume, then, that INFL does pass the relevant features to its sister VP and that the adverb is generated as a sister to that V. It appears to have a position within the lowest VP only because all of the Vs have moved to the highest V position (see e.g. Baker, Noonan, and van Riemsdijk in this volume for a discussion of this issue). The structure, then, would be as in (38)[9].

(40) Germanic verb clusters

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[8]The problem of adverbs in Germanic languages, in fact, was the initial focus of this paper. Since the workshop, however, the topic has broadened and the problem of Germanic has become incidental.

[9]I have argued elsewhere that German is INFL-second, rather than INFL-last (see Travis 1984, Travis 1987).

```
                    IP
                   /  \
                 NP    I'
                      /  \
                   I ──→ VP1 \
                   +F    / \   \
                       VP2 Adv V1 +F
                      /  \    / \
                    NP   V2  V2   V1
                         |    ↑
                         e    |
                         └────┘
```

German, then, would stand as an argument against any claim that adverbs may appear within the VP only if the head of that VP were empty.

The question may be raised as to whether German (and other Germanic languages) is allowed to transport adverbs up the tree as in English. At first glance the answer seems to be quite clear given the following contrasts.

(41) a. The student probably has read the book.
      b. *Die Studentin wahrscheinlich hat das Buch gelesen.
      c.   Probably the student has read the book.
      d. *Wahrscheinlich die Studentin hat das Buch gelesen.

The data in (41) suggest that, while in English INFL-type adverbs may appear anywhere along the projection line of INFL, this is not the case in German. However, the picture becomes more complicated given the interaction of V2 effects. A common explanation of the ungrammaticality of (41b) as opposed to the grammaticality of (41a) is based on the assumption that (41b) represents a topicalized structure while (41a) does not. The relevant S-structures are given in (42) below.

(42) a. [$_{IP}$ The student [probably [$_{I'}$ has [$_{VP}$ read the book]]]]

     b. [$_{CP}$ Die Studentin$_i$ [wahrscheinlich [$_{C'}$ hat$_j$ [$_{IP}$ t$_i$ t$_j$ [$_{VP}$ das Buch
                                                            gelesen t$_j$]]]]]

Given this difference in structures, the ungrammaticality of (41b) can be blamed on the fact that wahrscheinlich is not within the INFL-projection.

It can be shown, however, that even in structures that are arguably not topicalized structures, INFL-type adverbs are not permitted to appear in the position between the subject and the VP. The relevant examples are taken from Afrikaans (thanks to Jean duPlessis). In colloquial Afrikaans, it is possible to have movement of the verb into INFL in embedded clauses (43a).

However, it is not possible to have topicalization (43b). Since topicalization is not allowed, it is clear that the subject in (43a) must truly be in subject position and not in topic position.

(43) a. Ek het gehoor dat Jan het die boek gelees
          I have heard that Jan has the book read
          'I heard that Jan has read the book.'

      b. *Ek het gehoor dat gister het Jan die boek gelees.
                             yesterday

      c. *Ek het gehoor dat Jan waarskynlik het die boek gelees.
                                  probably
      d. Ek het gehoor dat Jan het waarskynlik die boek gelees.

As (43c) and (43d) show, independently of any problem of topicalization, adverbs in Afrikaans are not allowed to be transported up the projection line of INFL.

3.3 Interpretation

So far I have been very vague about the sort of features that will be responsible for the licensing of adverbs, however, this is important to the interpretation of the adverb. The difference between the subject sensitive adverb and the agent sensitive adverb is already partly determined by which head is responsible for the licensing. Subject sensitive adverbs (44a,b) will be licensed by INFL while agent sensitive adverbs (44c,d) will be licensed by V. I assume further that the relevant feature in INFL is AGR and the relevant feature in the V will be Manner. This is what accounts for the fact that in (44a) carelessly appears to be predicated of the police while in (44b) carelessly appears to be predicated of Fred.

(44) a. The police carelessly will arrest Fred.
      b. Fred carelessly will be arrested by the police.
      c. The police arrested Fred carelessly.
      d. Fred was arrested carelessly by the police.

If an adverb is licensed by the feature AGR, it will assign an adjunct theta-role (see Zubizarreta 1982) to whatever AGR is coindexed with. If the adverb is licensed by Manner, it will assign an adjunct theta-role to the external argument of the verb. This accounts not only for the subject insensitivity of Manner licensed adverbs but also for the judgements given below.

(45) a. The rock will be unwillingly thrown by the hostages.
      b. *The rock unwillingly will be thrown by the hostages.
          (from McConnell-Ginet, 1982)

In (45a) unwillingly is licensed by the agentive feature on the verb. In (45a) however, it is licensed by the AGR feature of INFL which is coindexed with the rock. This explains the semantic anomaly of the phrase.

Interestingly, INFL has features that license two very different types of adverbs: the subject-oriented adverbs such as carelessly, and the epistemic or sentential adverbs such as probably. By specifying that adverbs are licensed by features of the head we are able to account for this difference in interpretation. We have already stated that subject-oriented adverbs are licensed by AGR, and we could say further that epistemic adverbs (Type III) are licensed by the Event feature of INFL. A quick overview of the possible features used to license adverbs is given below.

(46) INFL   VERB
     Type Ia: AGR   Type Ib: Agent
     Type IIa: Event   Type IIb: Manner
     Type III: Event   Type IV: Manner

One type of adverb that has not yet been mentioned is the speaker-oriented adverb (e.g. frankly). These are an interesting problem in themselves since most counter-examples to the claim that adverbs cannot take complements come from this class (e.g. unfortunately for us).[10] There is also a possibility that these adverbs are licensed by a discourse feature in the matrix COMP. I leave this question open for further research.

3.4 Incorporation

What appears to be a problem for incorporation turns out, in fact, to be a confirmation of this view of adverb licensing, particularly the claim that adverbs are in a head to head relationship with their licenser. The problem is that while the theory of incorporation as presented in Baker (1985, 1988) predicts that only arguments should incorporate, adverbs often appear in incorporated structures. One example was given from Inuktitut and below more types of adverbials that appear within the verb in this language are given below(taken from Fortescue 1980).

(47) V-modifier
     Degree: only, exactly, completely
     Manner: powerfully, quickly, suddenly
     V-epistemic
     Epistemic Modality: probably, certainly not, apparently

It is important to note the way in which Baker's theory restricts incorporation. The reason that only the heads of arguments may incorporate follows from the fact that head movement out of non-arguments violates the ECP. I suggest, then, that incorporation is a two-step process: (i)

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[10]Thanks to Marie-Odile Junker of University of Ottawa for pointing this out to me.

movement, (ii) morphological incorporation[11]. The argument/non-argument distinction is relevant only for the first step. Morphological incorporation may occur to any structure of the type given in (48) below.

(48) Incorporation structure

$$X^0$$
$$X^0 \quad Y^0$$
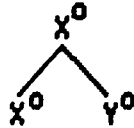
By dividing incorporation into these two processes, it is possible to explain why adverbs appear to escape the non-argument restriction. The idea is that if the structure in (48) can be base-generated (i.e. created independently of movement) then there will appear to be no restrictions beyond the morphological rules of the language. Since this is exactly the structure that is created in adverb licensing, it is not at all surprising to see adverbs incorporate.

(49) Incorporation (movement vs. base-generation)

a.

VP
V   NP
N V   N

b.

VP
V
Adv V
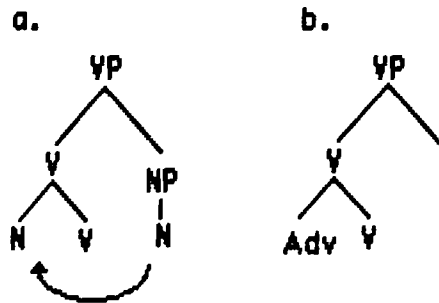
3.5 Sequencing

The final problem that was raised at the beginning of this paper was the problem of adverb sequences. The data are repeated below in example (50).

(50) a. <u>Probably</u> Max <u>carefully</u> was climbing the walls of the garden.
      b. Max <u>probably</u> was <u>carefully</u> climbing the walls of the garden.
      c. *<u>Carefully</u> Max <u>probably</u> was climbing the walls of the garden.
      d. *Max <u>carefully</u> was <u>probably</u> climbing the walls of the garden.

The generalization is that speaker-oriented adverbs must precede S-adverbs (Type III) which must precede subject-oriented adverbs which must precede manner adverbs.
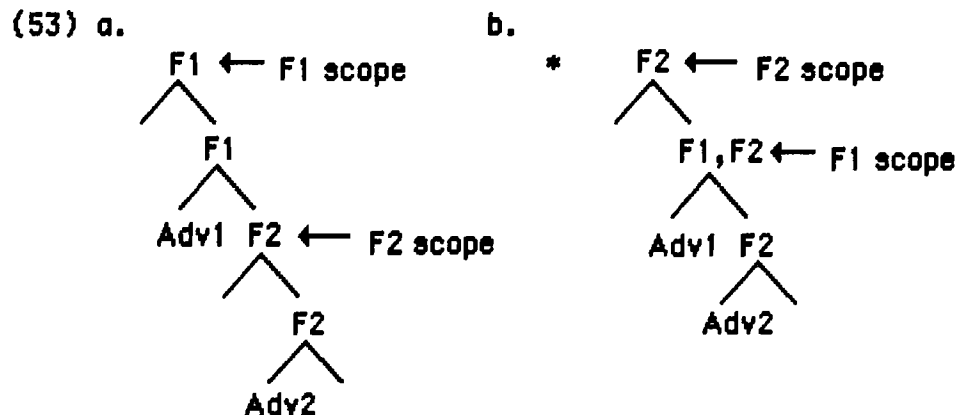
(51) Speaker < S-adverbs < subject < manner

---

[11]This would be problematic for Baker's claim that all elements below X^0 must enter into morphological processes.

A question which interacts with this problem of sequencing is how the scope of adverbs is assigned. I make three assumptions concerning the assignment of the scope of an adverb.

(52) i. scope is assigned by feature percolation
    ii. percolating features may not cross paths (but a head may contain more than one index)
    iii. speaker-oriented adverbs (CP scope)
        S-adverbs (IP scope)
        subject-oriented (INFL)
        manner/agent (V)

First, I will assume that scope is _not_ assigned via LF movement but rather by feature percolation. Williams (1984) argues that modals determine their scope domain at LF not by virtue of QR but by a percolation of their index from the head to the maximal projection. Since adverbs are heads related to heads, I assume that they use the same mechanism.

Secondly, I assume that this projection of features cannot cross paths. In other words, a feature cannot project past another feature. A possible percolation structure is given in (53a) below and an impossible structure in (53b).

(53) a.
$$F1 \leftarrow F1 \text{ scope}$$
$$F1$$
$$Adv1 \quad F2 \leftarrow F2 \text{ scope}$$
$$F2$$
$$Adv2$$

b.
$$* \quad F2 \leftarrow F2 \text{ scope}$$
$$F1,F2 \leftarrow F1 \text{ scope}$$
$$Adv1 \quad F2$$
$$Adv2$$

However, I will assume that a head may contain two features since a head may support two modifiers. It is only when the features begin to project that such restrictions on crossing paths hold.

An interesting extension of this system can be used to explain similar interactive effects between epistemic modal verbs and subject-oriented adverbs. The data below show that epistemic modals pattern like epistemic adverbs (examples developed from Jackendoff 1972, p. 103).

(54) a. ?*Pete _carefully should_ have crept out of there by now.
    b. Pete _should carefully_ have crept out of there by now.

(54a) would be ruled out by the restriction against crossing percolation lines. Should should have wide scope over the maximal IP but it cannot get such scope without crossing the index of carefully. In (54b), INFL may support the indices of both carefully and should and the index of should will percolate to have scope over the IP.

3.6 Prenominal adjectives

Prenominal adjectives show interesting parallels with adverbs, as suggested in Higginbotham's work. I will assume that this is due to the fact that they are licensed in a similar fashion. On the surface, this parallel is not at all astonishing especially given pairs such as the one below (taken from Jackendoff 1972: 60).

(55) a. John's rapid reading of the letter
      b. John's rapidly reading the letter

But on closer look, there are other more subtle similarities. Like adverbs, prenominal adjectives may not take complements.

(56) a. the proud (*of their achievements) students
      b. the fearful (*of Bill) dog

Adjectives may also take on an adverbial type meaning. Below, in the prenominal position (57a) the meaning can either be that the dancer danced beautifully (the adverbial reading) or that the dancer was physically beautiful (the adjectival reading). In (57b), however, where a full AP is present, only the adjectival reading is possible.

(57a) a. the [$_A$ beautiful] dancer
       b. The dancer was [$_{AP}$ beautiful].

If prenominal adjectives are indeed licensed in the same way as adverbs, one would expect some of the same effects. For some reason, transportability does not occur. However, there is a bit of evidence that just as adverbs may be related to Vs and INFLs, adjectives may be related to Ns and Ds. All of the adjectives already discussed would be related to the head N. However, there are others that appear to be dependent on the type of determiner used (mere, utter, virtual). Firstly we can see that such adjectives may only appear in prenominal positions.

(58) a. a mere boy
      b. *The/*A boy was mere.

Secondly, these adjectives may only appear in predicative NPs which tend to have indefinite determiners (see Jackendoff 1972: 55).

(59) a. He is a mere boy/*the mere boy.
      b. The play turned out to be an utter disaster/*the utter disaster.

I claim, then, that prenominal adjectives, like adverbs, are licensed via head-feature-licensing. This explains why (i) they do not take complements, (ii) they may have adverbial readings, and (iii) they may be dependent on the form of the determiner.[12]

It is also interesting to note that the adjectives that appear to be dependent on the D are related to the adverbs of problematic Type VI (_truly_, _virtually_, _merely_). Though I offer no solution to the problem of the non-transportability of these adverbs here, I assume that the relation of _merely_ to INFL is the same as the relation of _mere_ to D.

4.0 Extensions/complications

While solving problems, the analysis presented above also leaves many questions unanswered. Below I present several of these and, where possible, speculate on the direction a solution might take.

4.2 Epistemic adverbs/modals vs. subject-oriented adverbs/root modals

4.2.1 Inversion

In some interesting ways, adverbs parallel modals. S-adverbs (Type III) often act like epistemic modals while subject-oriented adverbs (Type Ia) will act like root modals. This may not be surprising given the parallel interpretations where both subject-oriented adverbs and root modals assign adjunct theta-roles to the subject (see Zubizarreta 1982: 41ff.). We have already seen this similarity as it relates to the sequencing facts described in section 3.5 above. Jackendoff (1972: 103) argues that Type III adverbs (such as _probably_) work like epistemic modals in that neither follow subject-oriented adverbs .

(60) a.*Carefully Max _probably_ was climbing the walls of the garden.
      b. _Probably_ Max carefully was climbing the walls of the garden.
      c.*?Dave quietly _may_ leave the room. (epistemic reading)
      d. Dave _may_ quietly have left the room.

The parallel extends to a further puzzling fact also noted by Jackendoff (1972: 84-87, 102-3). He points out that neither Type III adverbs nor epistemic modals "feel comfortable in questions". On the other hand, there is no such problem with other sorts of adverbs or with root modals.

(61) a.*Did Frank probably beat all his opponents?
      b. Did Frank easily beat all his opponents?
      c. Max may leave soon. (epistemic or root)
      d. May Max leave? (only root)

---

[12]Interestingly, Chukchee which allows the incorporation of adverbs, also allows the incorporation of adjectives (see Spencer 1987).

In (61a) the sentential adverb <u>probably</u> makes the question ungrammatical,
while the VP-adverb <u>easily</u> creates no problem as shown by (61b). Further,
where (61c) is ambiguous between the root or epistemic reading, as soon as
the structure is inverted as in (61d), only the root interpretation is
available. Jackendoff claims that it is not a semantic restriction on the co-
occurrence of the adverb or modal and the question since (i) tag-questions
are allowed (see (62) below) and (ii) even inversion that does not indicate
question formation will create ungrammatical structures (see (63)
below).[13]

(59) Max certainly has finished eating his dinner, hasn't he?

(60) a. Bill has never seen anything to compare with that.
      b. Never has Bill seen anything to compare with that.
      c. Bill apparently has never seen anything to compare with that.
      d.*Never has Bill apparently seen anything to compare with that.

These data suggest that elements which are given their scope interpretation
through head feature projection from INFL may not receive the correct
interpretation if that INFL position is empty. Note that this is crucial only for
adverbs (or modals) that must project their features to have scope over IP.
Subject-oriented adverbs and root modals which assign adjunct theta-roles to
the subject do not have any such restriction.

4.1.2 Passive sensitivity

In spite of the similarity between root modals and subject-oriented adverbs,
Jackendoff (1972: 104-5, basing his work on Newmeyer 1970) points out one
inconsistency. We have seen that subject-oriented adverbs assign adjunct-
theta roles to the subject position. It follows, then, that if the element in the
subject position is inconsistent with the theta-role to be assigned, the
resulting sentence will be semantically odd.

(64) a. Bill carefully has picked the flowers.
      b.#The flowers carefully have been picked by Bill.

With root modals, however, while the interpretation will assign its theta-
role to the subject where possible. If the subject is inconsistent with the
theta-role, the theta-role will be assigned to the agent. This is shown in
(65) below. In (65a) and (65b) the root interpretation of the modal picks out

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[13]Jackendoff points out that (62) is best with falling intonation though he adds
that "with rising intonation [it] seem[s] at least marginal, and certainly
better than the corresponding yes-no question"(1972: 85). The preference of
falling intonation along with the fact that the inversion in (63) is triggered by
a negative operator in [SPEC, CP] suggests that the ungrammaticality may be
explained through the appearance of a wide-scope operator. I will not
explore this possibility here.

the subject. In (65a) the doctor is given permission to do the examination, in (65b) John is given permission to undergo the examination. If the structure contains an inanimate object, however, the interpretation is no longer subject-sensitive. In both (65c) and (65d) the visitors are given permission since giving the flowers permission is nonsensical.

(65) a. The doctor may examine John.
      b. John may be examined by the doctor.
      c. Visitors may pick the flowers.
      d. Flowers may be picked by the visitors.

It seems that subject sensitive adverbs, which are licensed by the AGR feature, must assign their adjunct theta-role to their licensing feature, AGR. Root modals, however, which are base-generated directly in the head, are freer in what they choose to assign their adjunct theta-role to. In other words, root modals are not tied to AGR since they are in a position which is independently licensed by X-bar theory and are not dependent on AGR for their licensing.

The parallels and differences between the two types of modals, root and epistemic, and the two types of adverbs, subject-sensitive and sentential, provide many questions for further explorations.

4.2 The relation of quantifiers and adverbs

A final rather large problem involves the comparison of adverbs and quantifiers. This has received many pages of discussion in the literature in particular in the investigation of quantifier float. I have avoided any forays into this area but because of the obvious correlations, any development of this work on adverbs would have to include a harder look at this problem. One area that must be mentioned, however, since it is directly related to data introduced in this paper regards the behaviour of quantified phrases in Icelandic. In section 1.2.3 I discussed the problem of adverbs appearing within the VP in Icelandic. As (66) below shows, not only adverbs but also QP subject may appear in this position.

(66) pad   segir Sveini einhver sögu (Thráinsson, 1986)
        there tells Sveini somebody a story
        'Someone tells Sveini a story.'

If adverbs may be found in this position because they are licensed by the head features in INFL which have been transmitted into the empty V position (see section 3.2.2.2), it must that the QP is licensed in the same way. We might argue that the QP is related to AGR in INFL as evidenced by the fact that the verb agrees with the QP. What is harder to argue is that these quantifiers are like adverbs in that they are heads that do not project maximally. However, Higginbotham (1987) has argued that indefinites are defective in that they do not have determiners. Further inquiry into the parallels of QPs and adverbs could explore the possibility that categories may be defective in

a variety of ways. Adverbs do not take complements while indefinites do not take determiners. If an element is, in some sense, not complete, perhaps then it must be licensed via head-licensing and would show similarities to other elements using the same sort of licensing.

In this context it is interesting to note that quantifiers within the VP in English have restricted scope as pointed out by Williams (1984). Where (67a) is ambiguous between the reading where _must_ has wide scope or _someone_ has wide scope, in (67b) the only available reading is one in which _must_ has wide scope.

(67) a. Someone must be in his house
      b. There must be someone in his house. (Williams, 1984)

Williams explains this by claiming (i) the epistemic modal _must_ percolates its index to the maximal projection IP giving it scope over the IP, and (ii) that _there_ is a scope marker for _someone_ . In (67a) if _someone_ undergoes QR, it will have wide scope. If not, it will have narrow scope. In (67b), _there_ limits the scope of _someone_ and _must_ will have wide scope via feature percolation.

I assume, along with Williams, that modals do not undergo QR. I extend this, however, to all elements not in A-positions which means that any element that is licensed by a head-feature will not undergo QR. I further assume that _someone_ is licensed by AGR in INFL. Since the QP is licensed via AGR, it is like a root modal or a subject-oriented adverb and, as such, it does not have IP scope. The same effect is achieved except that _there_ does not have to be taken as a scope marker. The assumption here is that quantifiers may act as adverbs in that they may be licensed by head-features. In the examples given above, the quantifiers are behaving as subject-oriented adverbs which are licensed by the AGR feature in INFL.

5.0 Conclusion

In this paper I have proposed a new type of licensing – head feature licensing – in order to account for the distribution of "deviant" categories such as adverbs and prenominal adjectives. While offering an answer to some questions raised concerning the distribution and interpretation of adverbs and adjectives, this form of licensing also leaves many questions unanswered. The intention has been that to offer a different angle on an old issue, in the hope that the remaining bits of the puzzle will eventually fall into place.

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