
ANALYSIS OF X-BAR THEORY

2.1 Introduction

This chapter attempts to analyze the X-bar Theory. While this theory is claimed to be universal making it very suitable for the task of Machine Translation, we find a lot of variations and inconsistencies within and between different studies in regard to the usage of terminology, rule constraints, and the rule schemata. All this results to have different X-bar structures for the same phrase which rather takes the X-bar Theory away from its original goal and in any case is not desirable. The chapter raises these issues and emphasizes the need for the standardization of the X-bar Theory. Another related issue within the scope of the present study is the treatment of Double Object Constructions in the light of Binary Branching Requirement. Most of the existing studies on the topic generally skip or present very sketchy rather contradictory treatment. The chapter proposes a solution for this problem, and provides the justification.

Among various aspects of the X-bar Theory, the chapter covers the X-bar structure of Double Object Constructions which most of the authors skip or give very sketchy treatment. The chapter suggests that the distinctions between Specifier, Adjuncts, and Complements are not only based on structural differences as suggested in the existing literature but to the large extent are determined by the relationship of syntax with the lexicon via Projection Principle, the Argument Structure of lexical categories, the Theta Theory, the Case Theory and the Government Theory.

Section 2 below will focus on different X-bar levels used in X-bar Theory and introduces the three level symmetrical rule schemata. Section 3 treats the Double Object Constructions in the light of Binary Branching Requirement, for which, we feel, the existing studies are insufficient. Section 4 concentrates on difficulties that arise due to inconsistent use of the terms Specifiers, Adjuncts and Complements.

Section 5 concentrates on the different rule schemata taken in existing studies on the topic. Section 6 provides a justification for the proposed solution in the light of Theta Theory, Case Theory and Government Theory. The last section brings out the conclusions and summarizes the chapter.

2.2 X-Bar Levels and the Proposed Rule Schemata

Different works in X-bar Theory have incorporated different X-bar levels. Some works adopt the symmetrical theory of categories whereas others argue in favour of the asymmetrical theory of categories. The symmetrical theory assumes all categories to permit the same range of phrasal expansions whereas the asymmetrical theory permits different categories to have different range of phrasal expansions.

Some authors have adopted the symmetrical theory of categories. For example, Chomsky adopts a symmetrical three-level X-bar theory (Chomsky [1981a, 1986a]). For us, the three-levels mean X^0 , X' , X'' , and not X^0 , X' , X'' , X''' as some authors take. The three-level symmetrical X-bar analysis has been adopted, among others, in works of Cook [1988], Duarte [1991], Freidin [1992], Haegeman [1991], and Radford [1988]. Jackendoff in his seminal work on X-bar Syntax argues for a symmetrical four-level X-bar Theory, namely X^0 , X' , X'' , X''' (Jackendoff [1977]). A similar analysis is adopted in Halitsky [1975] and Binkert [1984]. Some works have used four-bar level analysis for particular constituents. Selkirk [1977] adopts four-level theory for analysis of Noun Phrase (NP). Akmajian, Steele, and Wasow [1979] adopts the four-level analysis for Verb Phrase (VP). A critique of this analysis is given in Pullum [1981], Gazdar, Pullum and Sag [1982] and Takejawa [1984]. Riemsdijk [1978] adopts the four-level X-bar analysis for Prepositional Phrase (PP). Stuurman [1985] has argued in favour of a symmetrical two-level X-bar Theory. Hale proposes two-level X-bar analysis for non-configurational languages (Hale [1983]).

Some proponents of X-bar Syntax have argued in favour of an asymmetrical theory of categories. Emonds [1985] presents an asymmetrical theory in which Maximal Projection for V is taken to be three-level but the maximal projection of other categories is assumed to be two-level. Jacobsen [1986: 90] takes two-level maximal projection for V, but three-level maximal projection for other categories.

We adopt the symmetrical X-bar analysis. This way we do not need different sets of rules for different phrasal categories. The same set of rules will be applicable to all phrases thus leading to uniformity and computational efficiency in terms of efforts, time and space. Further, we need exactly three levels of projection, namely X^0 , X' , and X'' . For any head X^0 , we require the level X' to take care of constituents larger than X^0 . Both the compulsory (Complements) and optional (Adjuncts) phrases can be joined at X' , one at a time, by Complement Rule (refer Rule (4) or Rule (3) below) or the Adjunct Rule (refer Rule (3) below), respectively. The highest X' which is not dominated by any other X-projection is the maximal projection of X^0 denoted by XP or X'' . The Specifier is attached at the X'' level by the Specifier Rule (refer Rule (2) below). Further, if there are any outer adjuncts, they could be accommodated at X'' level by Outer Adjunct Rule (refer Rule (1) below). Thus we need only three levels namely X^0 , X' , and X'' . This three-level hierarchical structure can take care of 'do so' substitution and 'one' substitution constructs which can not be taken care of by a two-level flat structure (Radford [1988], Haegeman [1991]). Thus the three-level symmetrical X-bar analysis is more suitable both linguistically as well as computationally.

Accordingly, an X-bar phrase in a language is defined using the following rule schemata:

$*X'' \rightarrow (Y'') ; X''$ — (1) (The Outer Adjunct Rule)

$X'' \rightarrow (Z'') ; X'$ — (2) (The Specifier Rule)

$*X' \rightarrow (T'') ; X'$ — (3) (The Adjunct or the Complement Rule)

$X' \rightarrow (W'') ; X^0$ — (4) (The Complement Rule)

The terms included in parentheses indicate that they are optional, '*' indicates that the rule is optional, and a semicolon in the rules indicates that the terms on the right hand side are not taken as ordered. Each of Y'' , Z'' , T'' , and W'' are full phrases like for example an NP or PP.

In addition, Rule (1) is referred as Outer Adjunct Rule, and will be used in Inflectional Phrase (IP) and in Noun Phrase (NP) to handle the Outer Adjuncts, or in phrases where Adjuncts intervene between Complements and the head (e.g. in VP and the corresponding NP). Rule (2) is referred as Specifier Rule as taken standardly but not in the sense, for example, of Chomsky [1981a] or Larson [1988, 1990] where they treat one of the two internal arguments in a Double Object Construction as the Specifier. Rule (3) is referred as the Adjunct or the Complement Rule. We do not call this rule as Adjunct Rule as has been taken traditionally in the existing literature. It is done so to take care of the Double Object Constructions in view of Binary Branching Requirement and will be justified in the subsequent sections. Rule (4) is referred as the Complement Rule. Note that there are three parameters associated with this rule schemata namely the Specifier Parameter, the Complement Parameter, and the Adjunct Parameter (jointly corresponding to Adjuncts in Rule (1) and Rule (3)).

In the literature, there are three conditions laid down on X-bar rule schemata (Radford [1988: 258-78]). We consider each of them in turn.

2.2.1 The Endocentricity Constraint

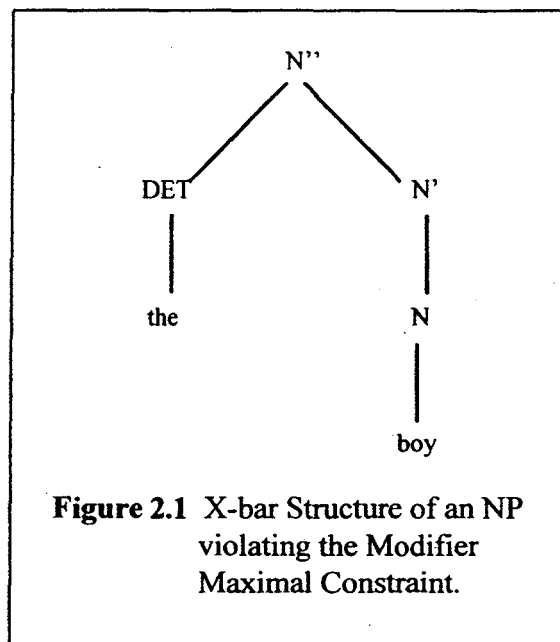
The Endocentricity Constraint requires that each XP must have X^0 as its head. Some authors do not follow this constraint. They argue that there are exocentric phrases in addition to the endocentric phrases. For example, there is a difference of opinion when dealing with Verb Phrases (VPs) which contain an auxiliary verb in addition to the main verb. Within such a VP, while most of the studies take V as the head, but Warner among others argues for the auxiliary to be the head and thus not respecting the Endocentricity Constraint. He stresses, "In sentences or VPs which contain an auxiliary, the non-auxiliary verb is not even a serious candidate for head ..." (Warner [1993: 22]) (also see Dorr [1993b: 55-6] and Radford [1988: 282] for such a proposal). On the contrary, Napoli states that auxiliary is not the head of VP (Napoli [1985: 293]). Some authors, e.g. Goodall [1987] among others (see Haegeman [1991: 132], and Cook [1988: 101], for instance), treat coordinate phrases, like '*Mohan ate Surinder*' ('Mohan and Surinder'), as NP where the head is a Conjunct not Noun, thus, again, not obeying the Endocentricity Constraint. These phrases will be treated in the next section. Some authors (see, for example, Bhatia [1993] and Gill and Gleason

[1962], among others) treat phrases involving Case assigner, e.g. '*Surinder ne*' (Surinder NOM Case) or '*Mohan nuun*' (Mohan in DAT or ACC Case), as an NP. Here again the Endocentricity Constraint is not satisfied. Such a phrase must be treated as a Case Phrase with Case assigner as the head. In every case, the Endocentricity Constraint must be respected.

2.2.2 The Modifier Maximality Constraint

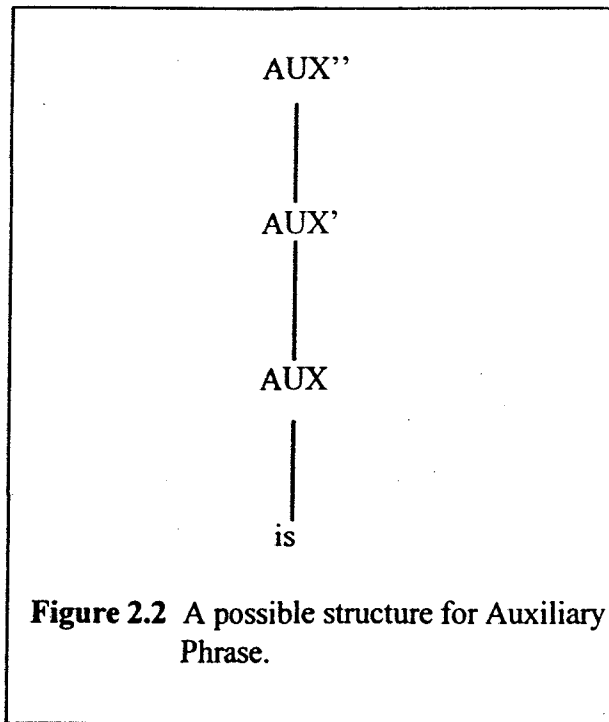
The Modifier Maximality Constraint requires that the non-heads in the expansion of a rule must be maximal projections, i.e., each Y", Z", T", and W" must be a full phrase like X".

Many researchers do not follow this condition strictly, rather they question this constraint. In addition to N, V, A, and P, we have other lexical categories, e.g., adverbs (ADV), conjunctions (CONJ), determiners (DET), auxiliary verbs (AUX), quantifiers (Q), and Case assigners (CASE). We know that X projects to XP, for X = N, V, A, P. But what about other lexical categories mentioned here. Freidin [1992: 26, 36] raises this question: "whether or not every lexical category projects its own phrasal category is open to discussion". He takes the structure for 'the boy' as shown in Figure 2.1.



Here, N projects NP but DET does not project its own phrasal category, rather DET is a lexical constituent of the phrasal projection NP of N. Pinker also treats determiners as minor lexical categories, with no superordinate projections (Pinker [1984]). There are numerous instances in Haegeman where Specifier (determiner) is not a full phrase (e.g. see Haegeman [1991: 87-95]). In fact Haegeman does not impose this condition on Specifier in Rule (2). Cook also does not treat 'the' (DET) as a full phrase; Specifier does not always consist of a complete phrase in its own right (Cook [1988: 99]). Thus, the Modifier Maximality Constraint is not satisfied for DET in these works. Some authors while giving structure for VP take Z" in Rule (2) as aspectual auxiliary, e.g. in Radford [1988: 231, 237]. Here, too, the Modifier Maximality Constraint is violated. Similar argument holds for other lexical constituents, e.g., Q, and AUX denoting modal, aspect and tense. For these categories, the issue is not so clear. Thus it is an open question whether every lexical category projects its own phrasal category. Because of this we see that X-bar analysis has generally been applied to NP, VP, AP, and PP only. A few authors have extended the concept to other phrases, namely Adverb Phrase, Case Phrase, and Conjunct phrase, etc. (see Radford [1988] for Adverb Phrase, Berwick and Fong [1990: 302] for Case Phrase, Larson [1990: 596] and the references sighted therein for Conjunct Phrase).

Thus, we either need to treat these lexical categories as full phases. For example we can take AUX as AUXP (Auxiliary Phrase) with structure as shown in Figure 2.2.



Alternately, we could relax the Modifier Maximality Constraint. For uniformity, we decide to follow the former view. The rule schemata allows this.

2.2.3 The Category Neutrality Constraint

The Category Neutrality Constraint requires that the rule schemata must be formulated entirely in terms of category variables. This means that the Rules (1-4) are applicable for all X where X can be any head. This constraint automatically follows in our case.

The proposed rule schemata satisfies all these three constraints.

2.3 Binary Branching Requirement and Double Object Constructs

Binary Branching Requirement (or Hypothesis) is an important requirement on syntactic configurations. The concept was originally incorporated within the framework of Government and Binding Theory by Kayne (Kayne [1983]). Kayne proposes that binary branching constitutes an upper limit on syntactic configurations, and the maximal number of children a node can take is therefore two. This

requirement guarantees that paths relating a trace or an anaphora to its antecedent are not ambiguous. Further, a grammar following binary branching hypothesis is more constrained and requires fewer decisions and leads to speedy construction of the grammar than in a grammar with n-ary branching. It is especially important for language acquisition.

Many authors, e.g. Aoun and Li [1989], Chomsky [1981a], Duarte [1991], Freidin [1992], Haegeman [1991], and Larson [1988, 1990] incorporate Binary Branching Requirement in their works, whereas others, e.g. Cook [1988], Dorr [1993b: 136, 143], Goodall [1987], Iwakura [1987], Kajiwara [1989], Oehrle [1976], and Radford [1988], do not take this issue into consideration.

Though some works intend to impose the Binary Branching Requirement on syntactic configurations, it can not be satisfied there in the strict sense. It is due to the reason that they impose the 'sisterhood condition' on Complements: "Complements are sisters of the head". Obviously, this is contradictory. This is what happens, for example, in Duarte (see Duarte [1991: 28, 33]) and Haegeman (see Haegeman [1991: 95]). Note that we do not impose the 'sisterhood condition' on Complements.

Now, let us consider Double Object Constructions. Double Object Constructions are 3-place predicates, or equivalently they have two internal arguments. They are also referred to as the ditransitive lexical categories. Double Object Constructs have been well discussed, for example in the works of Barss and Lasnik [1986], Chomsky [1981a], Iwakura [1987], Jackendoff [1990b], Kajiwara [1989], Larson [1988, 1990], and Oehrle [1976]. None of the studies on the topic is sufficient. According to Duarte, a syntactic configuration is invalid if it does not follow the Binary Branching Requirement. The solutions by Iwakura [1987], Kajiwara [1989], and Oehrle [1976] do not meet the Binary Branching Requirement, the solutions by others have been well criticized. The rule schemata in existing studies on X-bar Theory for example Cook [1988], Haegeman [1991], Radford [1988], etc. are simply incapable of handling the Double Object Constructions because it can not incorporate the Binary Branching Requirement. The root of the problem is the

imposition of 'sisterhood condition' on Complements due to Hornstein and Lightfoot [1981].

Consider a Double Object Construction X^0 . Let its two Complements be T'' and W'' . If we impose the Binary Branching Requirement because of its obvious advantages, then only one of the Complements, say W'' , of X^0 can be accommodated at the Complement position by Rule (4). We are forced for the upward branching of X-bar structure to secure an argument position for the second Complement T'' at the so called Adjunct node. This node now needs proper interpretation. We do not call this node as the Adjunct node, rather, first, we consult the argument structure (the lexicon) for the entry X^0 . If X^0 is ditransitive, the so called Adjunct node is to be taken as the second Complement position. This is the reason we do not call Rule 3 as the Adjunct Rule, rather we refer it as the Complement or the Adjunct Rule. In case X^0 is ditransitive, Rule 3 will act as Complement Rule. In case the Adjuncts are actually present in the phrase XP under consideration, this Rule 3 will, in addition, act as the Adjunct Rule.



Note that the above procedure (and hence the proposed rule schemata) is capable of handling 1-place and 2-place predicates in addition to 3-place predicates.

In the light of Binary Branching Requirement, an X-bar structure for a Double Object Construction V^0 like 'lend', 'give', 'put' etc. as taken, for example, by Cook [1988], Dorr [1993b], and Radford [1988] as shown in Figure 2.3 will be represented as in Figure 2.4.

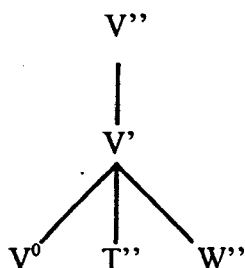


Figure 2.3 An invalid X-bar phrase structure for a Double Object Construct not obeying Binary Branching Requirement.

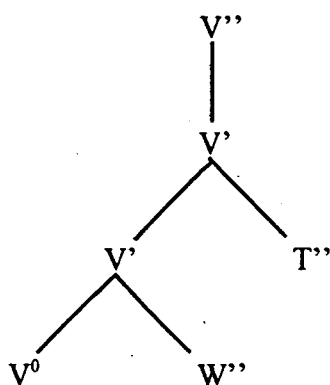
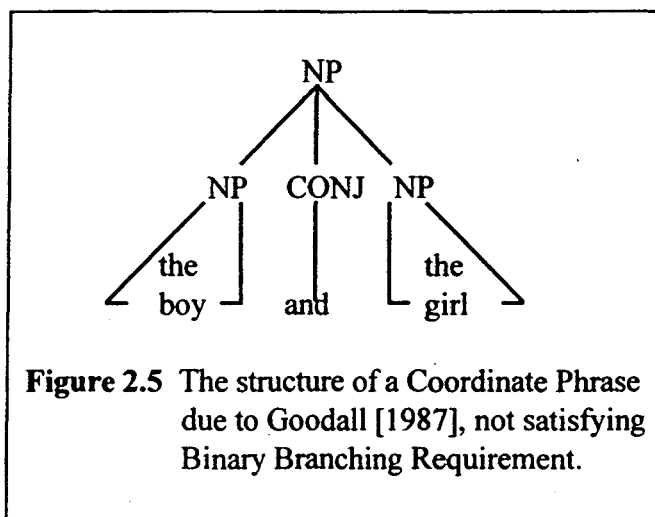


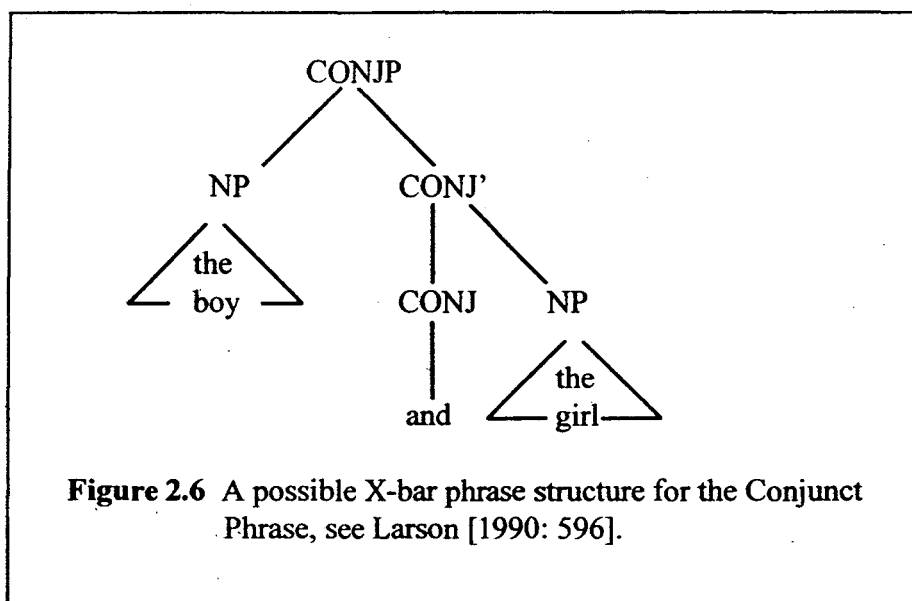
Figure 2.4 X-bar phrase structure of a Double Object Construct in the light of Binary Branching Requirement.

Note that the structures like in Figure 2.3 are ruled out due to Duarte in the light of Binary Branching Requirement.

An important issue related with Binary Branching Hypothesis is the structure for Coordinate Phrases such as 'the boy and the girl'. Goodall [1987] treats such phrases as NP with ternary branching structure as shown in Figure 2.5.



Such a phrase should not be treated as NP rather it should be treated as Conjunct Phrase with Conjunct as the head, and having the structure as shown in Figure 2.6.

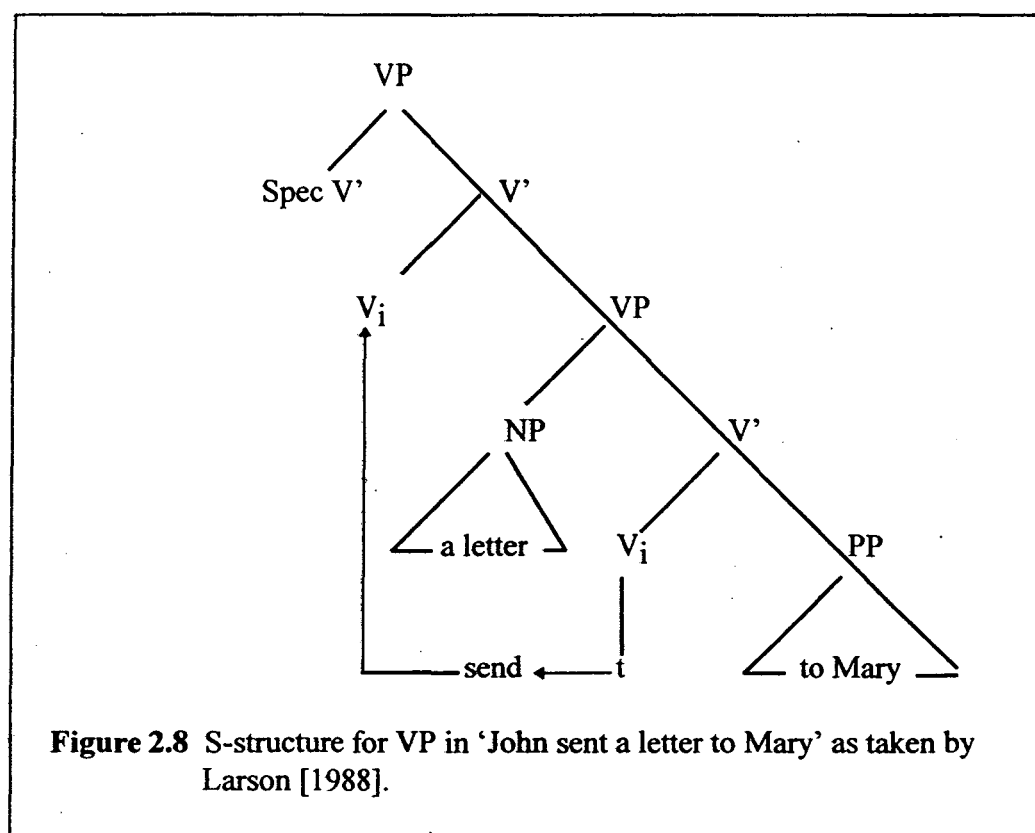
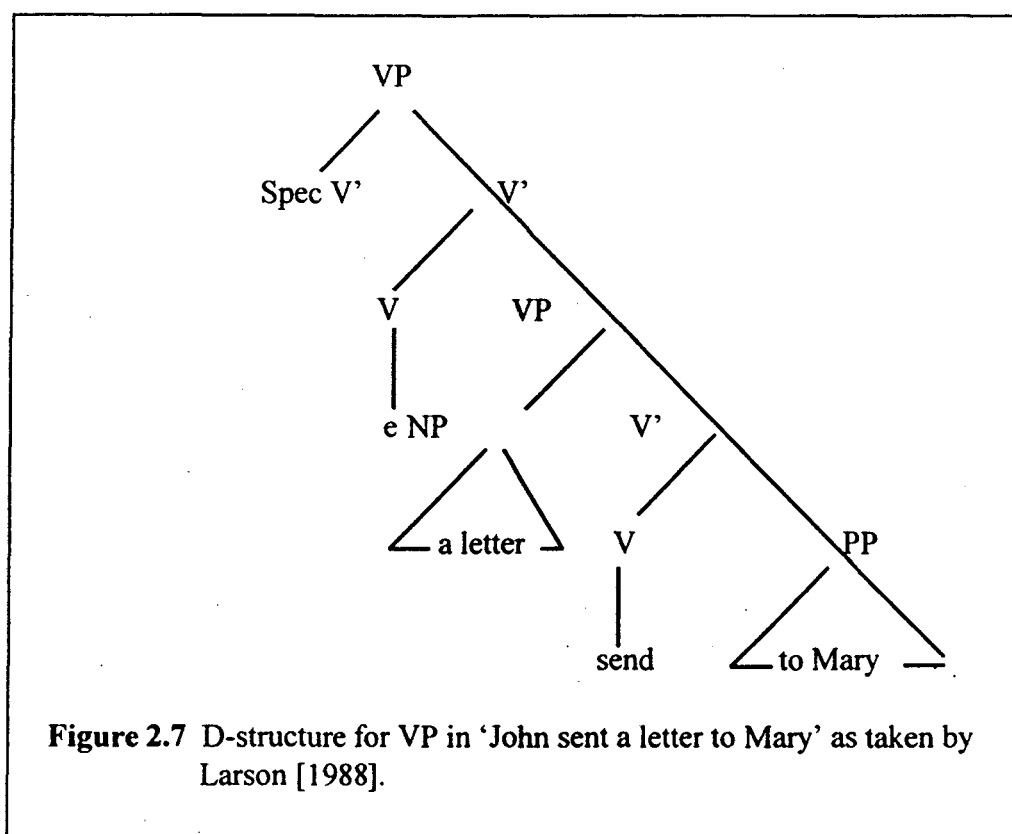


2.4 Specifier, Complement, and Adjunct

We find many inconsistencies within and between different authors regarding the definitions of Specifier, Adjunct, and Complement. Most of the works use these terms very arbitrarily and indiscriminately.

Freidin [1992: 40] does not take Specifier into consideration in his general schema for phrase structure. But, on page 27 (and also at pages 41 and 321), he treats DET 'the' as Specifier: "lexical constituents of phrasal projections like Det and Adv act as modifiers of the lexical head of the projection. Each can be referred to as a Specifier". However, on page 40, he treats Det as Adjunct: "Adjuncts are generally phrases (e.g. AP, PP, S) or lexical constituents (e.g. Det for NP)". Authors such as Cook, Haegeman, and Radford treat DET 'the' as Specifier. Similarly, Freidin treats 'very' in 'very quickly' as modifier, but other works, e.g. Radford [1988], treat it as a Specifier. This indiscriminate or inconsistent usage of the terminology is not desirable as this leads to different syntactic structures for the same phrase.

Consider the D-structure and S-structure configurations for VP in each of the sentences (a) 'John sent a letter to Mary' and (b) 'John sent Mary a letter' as taken by Larson (see Larson [1988: 342-43, 353] and Jackendoff [1990b: 436-37]), and reproduced in Figure 2.7, Figure 2.8 and Figure 2.9, Figure 2.10 respectively. In Figure 2.7 and Figure 2.8, the direct object 'a letter' is treated as Specifier, whereas in Figure 2.9 and Figure 2.10 it is treated as Adjunct. In all cases it has to be a Complement.



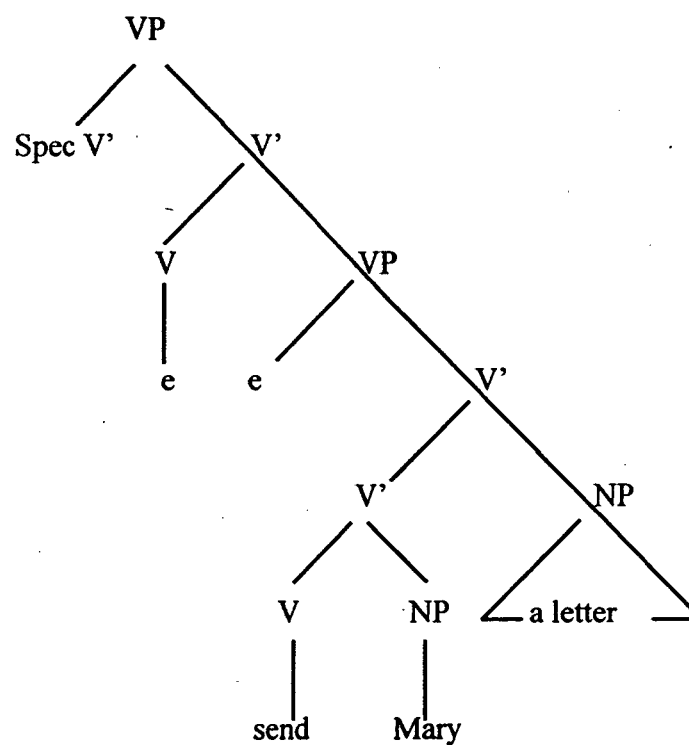


Figure 2.9 D-structure for VP in 'John sent Mary a letter' as taken by Larson [1988].

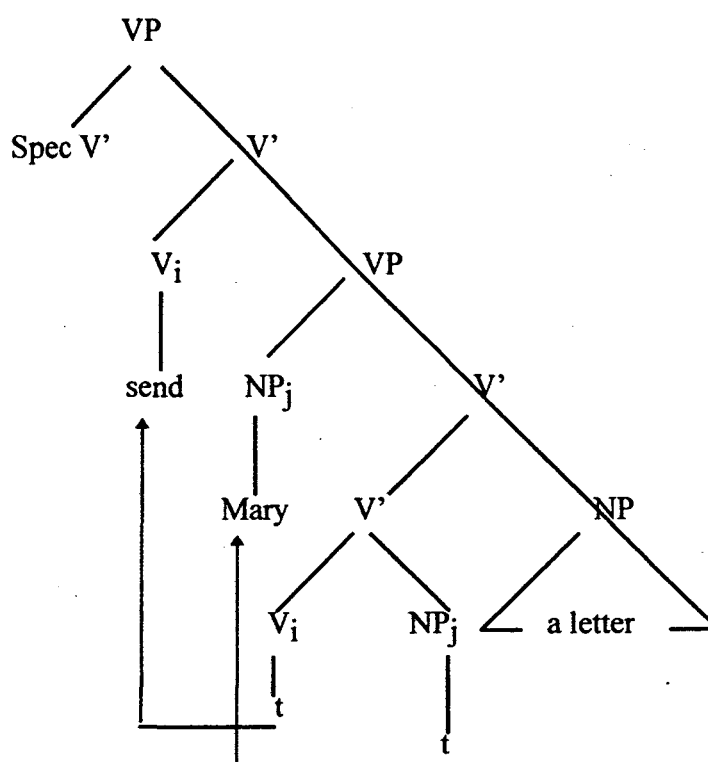
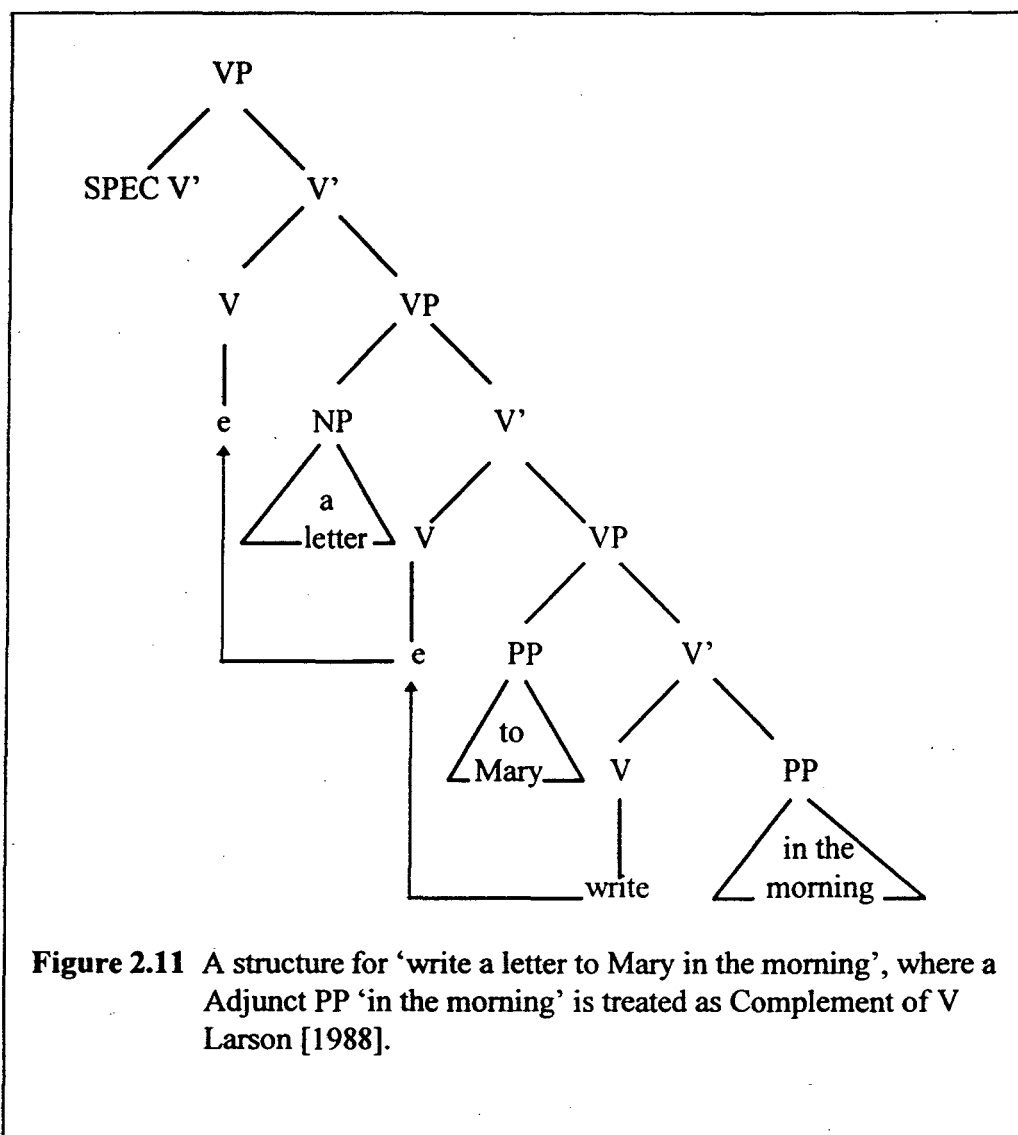


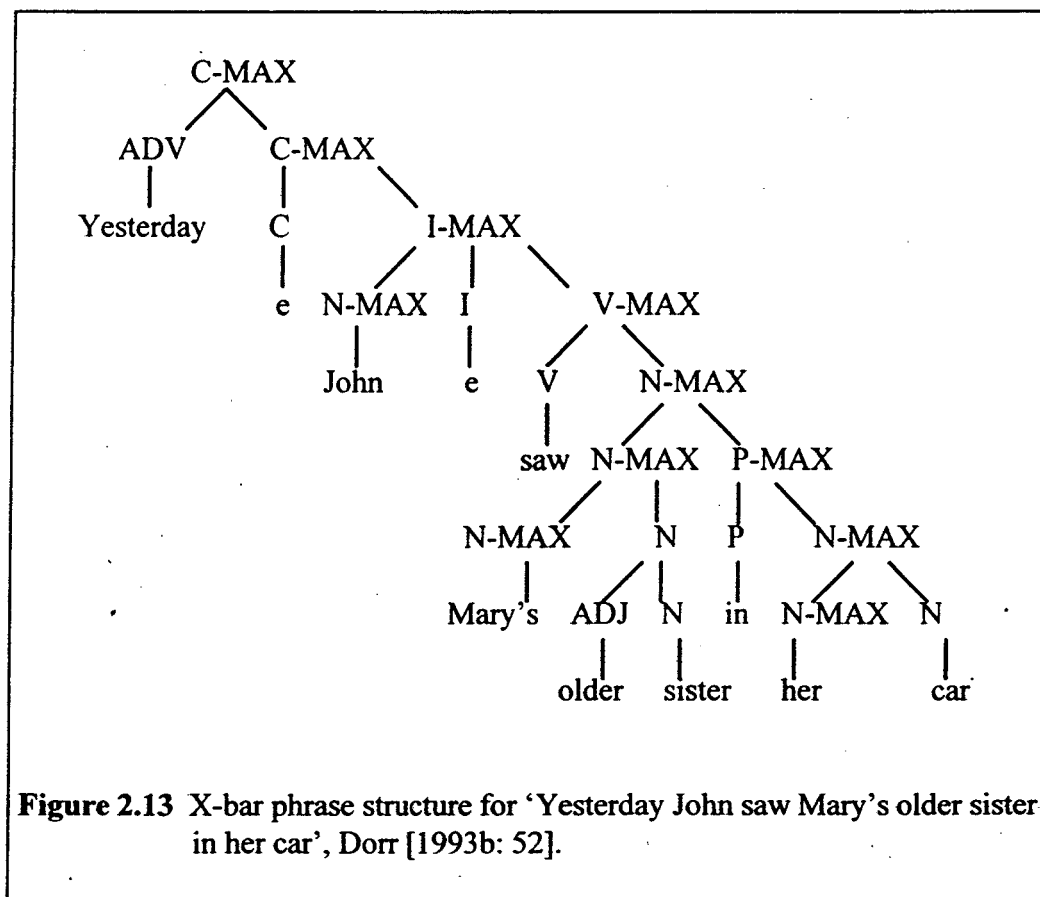
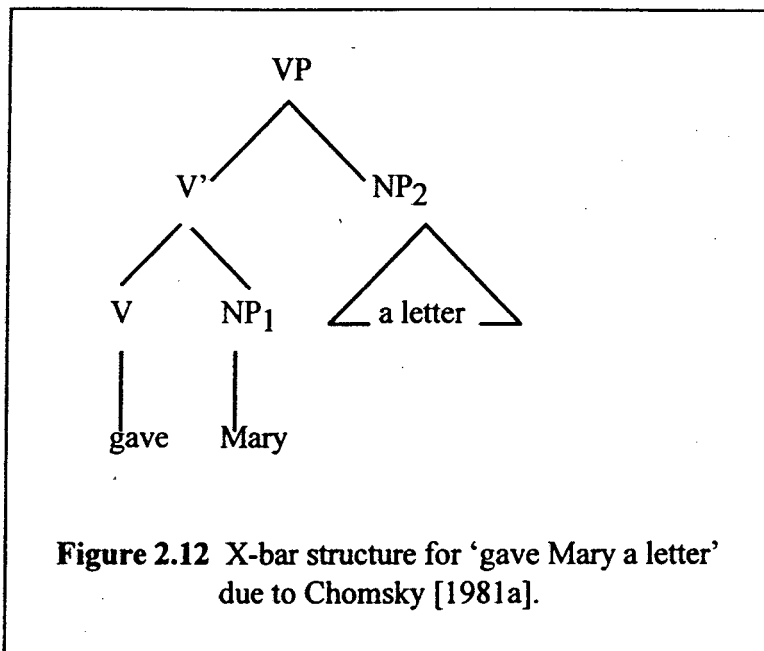
Figure 2.10 S-structure for VP in 'John sent Mary a letter' as taken by Larson [1988].

While dealing with modifiers, Larson [1988: 350] (refer pages 345-46, foot note 11; pages 349-50, and 382; page 384, foot note 49) concludes that time and manner PPs are not "outermost adjuncts (as is standardly assumed) but rather must be complements". He gives following structure (Figure 2.11) for 'writes a letter to Mary



in the morning' (see Larson's structure (ii), foot note 11, pages 345-46). We note that here the time modifier is treated as a Complement rather than as an Adjunct.

As another example, let us see the X-bar structure for Double Object Construction due to Chomsky [1981a] (see also Barss and Lasnik [1986], Duarte



[1991], Haegeman [1991: 132], Jackendoff [1990b], Larson [1988: 337], and Larson [1990: 590]), as shown in Figure 2.12.

Here, the second internal argument of V, the direct object, is treated as Specifier instead of as a Complement.

Interestingly, X-bar phrase structure representations for the same sentence

'Yesterday John saw Mary's older sister in her car.'

are not identical in Dorr [1993b: 52] and in Dorr [1991b: 3] (see Figure 2.13 and Figure 2.14). In Figure 2.13, 'Yesterday' is taken at C-MAX level whereas in Figure 2.14, it is taken as a part of I-MAX.

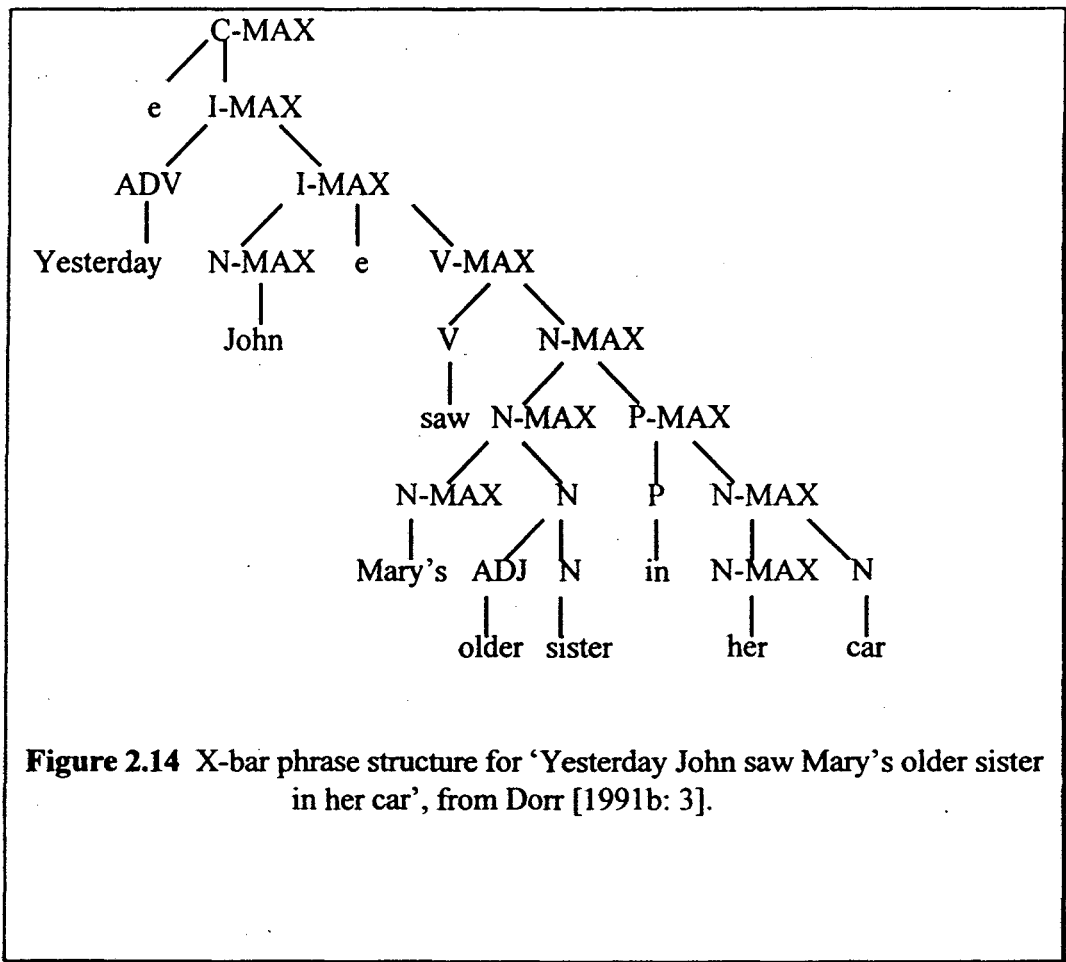
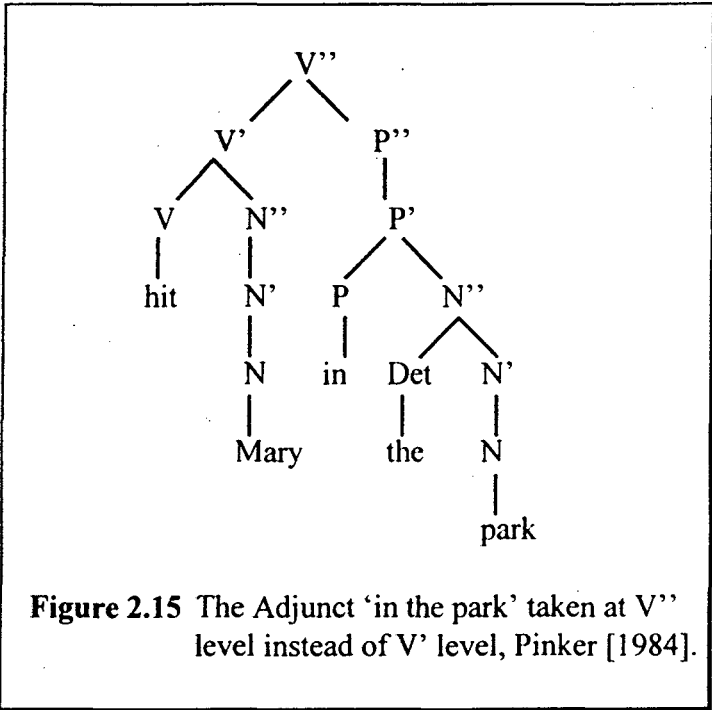
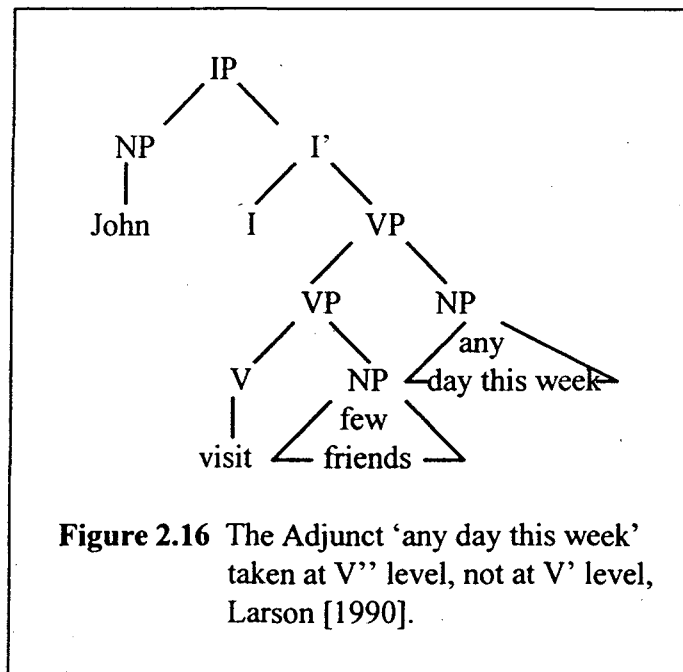


Figure 2.14 X-bar phrase structure for 'Yesterday John saw Mary's older sister in her car', from Dorr [1991b: 3].

Some authors place Adjuncts generally taken at X' level to XP level. For example Pinker [1984] takes the following structure (see Figure 2.15) for VP in 'John hit Mary in the park' as follows:



Larson [1990: 591] while giving the X-bar representation for 'John visited few friends any day this week.', also, puts the adverb 'any day this week' at VP level (see Figure 2.16).



Generally, these Adjuncts are taken at V' level (see, for example, Haegeman [1991], Radford [1988]).

Barriers assumes the existence of zero or more Specifiers whereas other works do not take more than one Specifier.

These different treatments of Specifier, Adjuncts, and Complements lead us to have different X-bar structures for same construction in different works. The problems sighted above as regards to Specifier, Adjunct, and Complement are partially due to the definitions of the Specifier, Adjunct and Complement, and the associated rule schemata. Larson treats one of the Complements as Specifier and uses the Specifier Rule (2) instead of the Complement Rule (3), leading to the different structure. In case of Double Object Construction, we take both the Complements as internal arguments (also taken, for example, in Duarte [1991], Grimshaw [1990], and Haegeman [1991]), whereas Chomsky [1981a] and Larson [1988, 1990] take one of the arguments as Specifier (external argument). This attributes to different X-bar structures for the same phrase.

For uniformity, we need to define precisely each of the Specifier, Adjunct, and Complements.

Let us define the terms Specifier, Complement, and Adjunct. A Complement is an internal argument of the head. It is both c-selected and s-selected. A complement is always a compulsory construct. A Specifier is s-selected but not c-selected. It is an external argument of the head. An Adjunct is neither c-selected nor s-selected. An Adjunct is an optional construct. An Adjunct is a non-argument construct (i.e. neither external nor internal argument). There are three parameters associated with X-bar Theory: the Specifier Parameter, the Adjunct Parameter, and the Complement Parameter. For each phrase in a language, Specifier, Adjunct and Complement are to be defined more precisely in terms of their parametric values.

Hornstein and Lightfoot [1981: 21] defines Specifier, Adjuncts and Complements in terms of structural differences (also see Duarte [1991: 28], Haegeman [1991: 95], and Radford [1988: 176, 187, 193, 196-97, 279]):

- (a) Specifiers are sisters of X' and daughters of X'' .
- (b) Adjuncts are both sisters and daughters of X' .
- (c) Complements are sisters of X^0 and daughters of X' .

This definition for Complements violates the Binary Branching Requirement for Double Object Constructions. But for this, we have proposed a solution above.

2.5 Different Rule Schemata

We observe different authors assume different X-bar rule schemata. They use one or the other rule without mentioning them explicitly. Larson [1990: 591] represents 'John visited few friends any day this week.' as shown in Figure 2.16. This structure uses a rule of the form $XP \rightarrow XP ZP$ (with $X = V$ and $Z = N$), but the author does not include this rule in the rule schemata taken by him. Also the rule $X' \rightarrow X' TP$, the so called Adjunct Rule, is not taken at all.

Barriers takes the rule schemata as:

$$X'' = X'' * X'$$

$$X' = X X'' *$$

Note that the Adjunct Rules are absent here, however the book mentions about Adjuncts repeatedly.

Radford [1988: 277] takes the rule schemata as follows:

$$X'' \rightarrow X', (YP) \quad (\text{Specifier Rule}) \quad \text{--- (A)}$$

$$X' \rightarrow X', (YP) \quad (\text{Adjunct Rule}) \quad \text{--- (B)}$$

$$X' \rightarrow X, (YP)^* \quad (\text{Complement Rule}) \quad \text{--- (C)}$$

Radford does not include Rule (1) taken here (see Section 2). This rule schemata cannot satisfy Binary Branching Hypothesis for Double Object Constructs. We treat Rule (B) here as Adjunct or Complement Rule depending on whether X is non-ditransitive or ditransitive. Here it is treated as Adjunct Rule.

Haegeman [1991: 95, 369-70] takes the rules as:

$$XP^* \rightarrow XP ; YP$$

$$XP \rightarrow \text{Spec} ; X'$$

$$X'^* \rightarrow X' ; YP$$

$$X' \rightarrow X ; YP$$

Note that second rule here indicates that Spec is not treated as full phrase. Haegeman [1991: 95] mentions, that 'Complements combine with X to form X' projections'. The author overlooks the case of Double Object Constructions with Binary Branching Hypothesis in mind. This statement indicates: (a) Complement is defined structurally (b) Binary Branching Requirement can not be satisfied, (c) This rule schemata is different from the one proposed by us though this looks to be the same. This rule

schemata differs our one in terms of usage. We treat Rule (3) here as Adjunct or Complement Rule depending on whether X is non-ditransitive or ditransitive. Here it is treated as Adjunct Rule.

Cook [1988: 103] takes the Rule Schemata as:

$$X'' \rightarrow \text{specifier } X'$$

$$X' \rightarrow X \text{ complements}$$

Note here that there are no Adjunct Rules. Further this rule schemata cannot satisfy Binary Branching Hypothesis for Double Object Constructs.

Thus different authors take some or the combination of the four rules thus leading to different X-bar structures for the same phrase. Further, these rules do not indicate where the second complement in a Double Object Construction should be attached.

Since the rule schemata is the basis for assigning the syntactic phrases, these different rule schemata adopted by different authors obviously will lead to dissimilar X-bar phrase structure for the same sentence. If X-bar Theory is to be universal and to be applicable cross-linguistically, the rule schemata must be made standard.

2.6 Justification of the Solution Proposed

Keeping the different issues in mind, we have proposed to adopt three-level symmetric X-bar rule schemata. These rules are rewritten below:

$$*X'' \rightarrow (Y'') ; X'' \quad \text{--- (1) (The Outer Adjunct Rule)}$$

$$X'' \rightarrow (Z'') ; X' \quad \text{--- (2) (The Specifier Rule)}$$

$$*X' \rightarrow (T'') ; X' \quad \text{--- (3) (The Adjunct or the Complement Rule)}$$

$$X' \rightarrow (W'') ; X^0 \quad \text{--- (4) (The Complement Rule)}$$

The associated X-bar structure is shown in Figure 2.17.

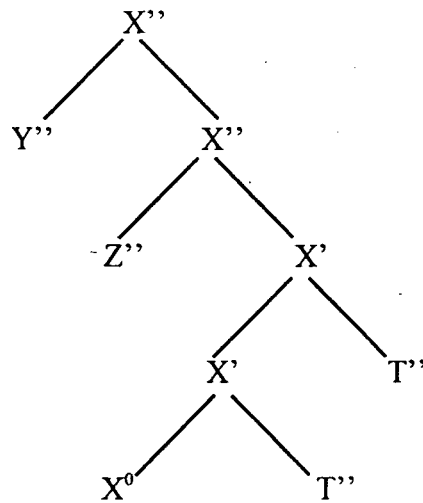


Figure 2.17 A well-formed syntactic structure conforming to the proposed rule schemata.

The rule schemata and the proposed X-bar structure is capable of handling not only up to 3-place predicates (as found, for example, in English) but is also capable of handling 4-place or in general n-place predicates (In contrast to English, Punjabi and Hindi, as will be seen in next chapter, have 4-place predicates also which correspond to causative forms of the Verb). Note that in the rule schemata and the corresponding X-bar structure here, T'' is not necessarily the Adjunct rather it is decided by the Argument structure of the lexical item X⁰.

Applying the proposed Rule Schemata, the canonical or the basic X-bar structure (i.e. leaving aside the Adjuncts) for a 1-place, 2-place and 3-place predicates (Double Object Constructs) respectively look as shown in Figure 2.18, Figure 2.19, and Figure 2.20 below.

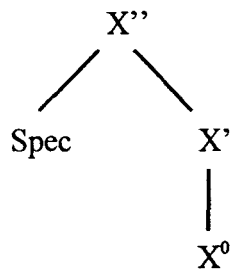


Figure 2.18 Canonical X-bar structure of a 1-place predicate.

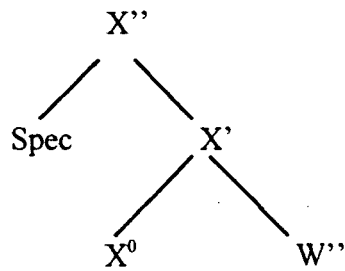


Figure 2.19 Canonical X-bar structure of a 2-place predicate.

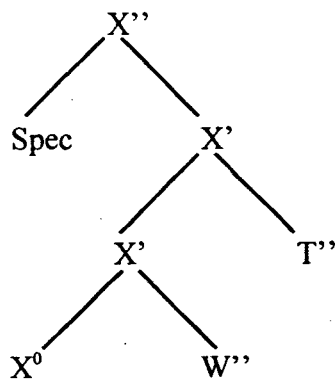


Figure 2.20 Canonical X-bar structure of a 3-place predicate.

Though we have deviated from the structural differences between a Complement and an Adjunct due to Hornstein and Lightfoot [1981] but this departure is justified as argued below. Note that we do not impose the ‘sisterhood condition’ on the Complements.

"The phrases in a sentence are tied into the lexicon via their heads" (Cook [1988: 95]). There is a close interaction between syntax, Theta Theory, Case Theory, the concept of Government, the argument structure, and the Projection Principle. Chomsky mentions: "I omit consideration here of possible further structure and assume that the basic properties of phrase for particular languages are determined by fixing parameters of case theory and theta-theory and by lexical properties" (Chomsky [1986a: 3]). This implies X-bar structure is not only determined by the X-bar rules but must be validated in terms of Theta Theory, Case Theory, and the concept of Government.

Obviously, in case of one-place or two place predicates we do not have any problem. We need to justify our solution for three or n-place predicates.

We attempt to justify below the proposed solution in the light of each of Theta Theory, Case Theory and the Government Theory.

2.6.1 Theta Theory

There is a relationship between syntax and theta-roles. Syntax and theta-roles must be integrated. The structure proposed for the 3-place predicates (Double Object Constructs) satisfies the Theta Criterion otherwise the Projection Principle will get violated, i.e., the arguments will not get saturated. The Theta Criterion requires: "Each argument bears one and only one θ -role, and each θ -role is assigned to one and only one argument" (Chomsky [1981a: 36]). The Projection Principle requires that the thematic (argument) structure associated with lexical items must be saturated (realized) in the syntax: "Representations at each syntactic level (i.e., LF, and D- and S-structure) are projected from the lexicon, in that they observe the subcategorization properties of lexical items." (Chomsky [1981a: 29]), or equivalently "Lexical structure must be represented

categorially at every syntactic level" (Chomsky [1986b: 84]). In the proposed structure, the head X^0 assigns internal theta-roles to both (each in case of n-place predicates) of its internal arguments and the external theta-role to its external argument. It satisfies (a) Duarte's statement: "No X^0 can assign an internal θ -role to a position outside its one bar-level projection" (Duarte [1991: 38-39]), and (b) Cook's statement: "The Agent is an external θ -role that goes outside the maximal projection of the verb; other roles such as Goal, or Patient are internal within the maximal projection" (Cook [1988: 115]). The condition (a) here does not stop us to assign internal theta-role to the second internal argument, and the condition (b) here confirms this. In this light our proposed solution (the rule schemata as well as the structure) is justified. Moreover, both the Complements are governed by X^0 (as will be seen below) implying thereby X^0 theta-governs (i.e. it assigns internal theta-role and governs) both (each) of its Complements. We cannot assign the second Complement the external θ -role due to the fact that "Only the external θ -role is not governed by the verb" (Cook [1988: 154]), or in general by any head. In our case both the θ -roles are governed by X^0 , and therefore must be internal. The argument is further strengthened by the fact that " θ -roles are assigned under government" (Duarte [1991: 41], and Riemsdijk and Williams [1986: 242]). Note that we differ here from Chomsky where he assigns external θ -role to one of the internal arguments. It happens so because he treats the second Complement as the Specifier (the external argument), and accordingly he assigns different structure.

For example, in a sentence like '*Mohan Surinder nuun kitaab devegaa*' ('Mohan will give Surinder a book'), the entry: *de*[-, CASEP, NP] <Agent, Goal, Patient> for the ditransitive verb '*de*' ('give') specifies three theta-roles: Agent, Goal, and Patient (also sometimes referred to as Theme). The internal arguments CASEP '*Surinder nuun*' and NP '*kitaab*' are both directly theta marked and are respectively assigned the internal theta-role of Goal, and the internal theta-role of Patient. NP '*Mohan*', the external argument, is assigned the external theta-role of Agent to Grammatical Function (GF) subject. This also satisfies the argument hierarchy due to Grimshaw (see Grimshaw [1990]). The head '*de*' theta-governs both of its internal arguments (Complements) namely CASEP '*Surinder nuun*' and NP '*kitaab*'. The external argument NP '*Mohan*' is not governed by '*de*' and hence not theta-governed.

2.6.2 Case Theory

There are two requirements of Case Theory: (a) Case Filter, and (b) Adjacency Requirement on Case Assignment. Let us see that each of these criterion is satisfied by our proposed solution.

The Case Filter requires that each NP must be assigned a Case. Let us visualize the possible appearances (positions) of an NP in a sentence:

- (i) it can be part of an NP (like in 'Mohan's brother). In this case, the Case assigner " 's " assigns Genitive Case to the NP. We treat 'Mohan's' as Case Phrase not as NP like for example in Dorr [1993b: 52] or Haegeman [1991: 119]. We do not treat 'Mohan's' as NP as in this case there will be no one to assign the Case to this NP.
- (ii) it can be a constituent of a Prepositional/ Postpositional Phrase or Case Phrase. In this case the Preposition/ Postposition or the Case Assigner in the respective phrase will assign respectively the oblique or ACCUSATIVE Case to the NP. Note that we treat phrases with *daa*, *ne*, and *nuun* as postpositions as Case Assigners since the respective Case Phrase leads to give a grammatical function like Agent or Goal, but not as postpositions as the respective Postpositional Phrase acts as an Adjunct.
- (iii) it can be part of AP (like in 'beautiful than Preet'). Here again preposition/ postposition will assign the Case to NP.
- (iv) it can be a part of VP, where V will assign the ACCUSATIVE Case to the NP.
- (v) NP could be the subject Grammatical Function (GF). The Subject GF is assigned the NOMINATIVE Case by I.
- (vi) Now think of a Double Object Construction where both Complements are NPs (like 'He sent Mary a letter'). V assigns ACCUSATIVE Case to one of the

Complement NP. The other Complement NP is treated as Case Phrase with Case Assigner as Null (see Iwakura [1987], Kajiwarra [1989]).

Thus in all cases, each NP is assigned the Case, hence satisfying the Case Filter.

The Adjacency Requirement on Case Assignment expects that the Case assigner must not be separated from the Case assignee which they case-mark by the intervening Adjuncts. If the internal arguments of a head X^0 uniformly originate in the order specified in the Argument Structure for X^0 , then X^0 will assign the structural ACCUSATIVE Case to its direct object, and the Case assigner (or the Preposition in case of English) (which may be Null as mentioned above) will assign the Case to the indirect object of X^0 . In case the constituents in a phrase do not follow the Adjacency Requirement, this is considered to be a derived order. In such a case, internal arguments are taken to the left/ right of Adjunct(s) determined by the parameter settings of the head with a trace at the Complement positions and are adjoined to the XP (Haegeman [1991: 540, 543]). In such a situation the internal arguments are case-marked via their traces. Note that the Cases are assigned under the structural relationship of government.

As an example, in a sentence like

'Mohan Surinder nuun kitaab devegaa.'

Mohan Surinder DAT book give-fut.ms

(‘Mohan will give Surinder a book.’)

with ‘*Surinder nuun kitaab devegaa*’ as VP the Double Object Construct ‘*deNaa*’ (‘give’) assigns ACCUSATIVE (Objective) Case to the NP ‘*kitaab*’, and the Case assigner ‘*nuun*’ assigns Case to the NP ‘*Surinder*’.

In a sentence like

'Mohan Surinder nuun kitaab kall devegaa.'

Mohan Surinder DAT book yesterday give-fut.ms

(‘Mohan will give Surinder a book tomorrow.’)

where the Adjacency Requirement on Case Assignment is not met, the structure will be

'Mohan Surinder nuun kitaab_i kall t_i devegaa.'

Note that some authors treat a phrase like '*Surinder nuun*' ('to Surinder') as Postpositional Phrase (PP), others as Noun Phrase (NP) (According to Bhatia, and Gill, *ne*, *nuun*, and *daa* mark NPs). It is wrong to treat it as PP as PPs act as Adjuncts. It is wrong to treat this as NP, because if treated so there will be no one to assign Case to this NP. We treat this phrase as Case Phrase. The markers *ne*, *nuun*, and *daa* act as grammatical functions and therefore must be treated distinctly from other prepositions/ postpositions. Phrases with these prepositions/ postpositions should be treated as Case Phrases (Jackendoff [1977: 80-81]).

2.6.3 Government Theory

The concept of Government also influences the structure of a phrase: "The projections from the lexical entry onto the syntax also depend on government." (Cook [1988: 153]). "The verb governs the elements that it projects onto the sentence" (Cook [1988: 35]). This statement is true for all lexical heads; a head must govern its Complement(s).

In a Double Object Construction, the head X^0 governs each of its internal arguments (Complements). X^0 will not govern the internal constituents of its Complements. They will be governed by their respective heads. X^0 will not be able to govern its external argument (the Agent) as it can not m-command the external argument: there will be a maximal projection XP of X which dominates X and does not dominate the external argument.

In the sentence '*Mohan ne Surinder nuun kitaab ditti*' with '*Surinder nuun kitaab ditti*' as VP, V '*de*' governs both of its internal arguments (direct object NP '*kitaab*', and indirect object the Case Phrase '*Surinder nuun*') since (i) it is a governor, (ii) it m-commands them, and (iii) the minimality condition is satisfied. V does not govern any element within '*Surinder nuun*' since the barrier Case Phrase intervenes.

Within '*Surinder nuun*', '*nuun*' will govern '*Surinder*'. The head V ('*de*') will not be able to govern its external argument '*Mohan ne*' as the external argument is not m-commanded by V: there is a maximal projection VP of V which dominates V and does not dominate the external argument '*Mohan ne*'. In other words VP will act as a barrier. Thus, the structure generated by X-bar rules satisfies the definition of Government (Haegeman [1991: 152], and Duarte [1991]).

2.7 Conclusions

In trying to provide an answer to the raised issues the chapter has concentrated more on illustrating the types of difficulties that the X-bar Theory has due to the highly indiscriminate and ad hoc use of the terminology and the rule schemata which leads to different syntactic configurations for the same phrase. The aim of the present study is not to criticize the X-bar Theory or to conclude that this theory be abandoned, but it realizes the need for the standardization of the X-bar Theory and sets forth certain issues for the linguistic community so that the X-bar Theory is consistent and applicable cross-linguistically in the true sense.

We have proposed to adopt the three-level symmetric X-bar Theory for its linguistic and computational motivations.

Another important issue within the X-bar Theory is the treatment of Double Object Constructions. The existing studies work well for 1-place or 2-place predicates, they are simply insufficient for 3-place predicates (the Double Object Constructions). A major problem in dealing with such constructions has been that the existing studies take Complements to be sisters of the head. This obviously cannot be satisfied in view of Binary Branching Requirement. We propose a solution for the Double Object Constructions which brings us out of this dilemma. We have deviated from the existing standard general notion of structural differences between Adjuncts and Complements, but this departure is not as much as found elsewhere in GB Theory. The chapter concludes that this distinction not merely be based on the structural differences but on more fundamental principles of GB Theory. In fact these differences remain no longer relevant when we deal with Double Object Constructions in the light of Binary Branching Requirement.