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On internal and external syntax mismatches

Subramanian, Uma Maheswari, Ph.D.

The Ohio State University, 1992
ON INTERNAL AND EXTERNAL SYNTAX MISMATCHES

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of the Ohio State University

By

Uma Maheswari Subramanian, B.A., M.A.

The Ohio State University
1992

Dissertation Committee:
David R. Dowty
Brian D. Joseph
Robert D. Levine

Approved by

David R. Dowty
Advisor
Department of Linguistics
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VITA

September 26, 1959 ................................................................. Born - Pudukkottai, Tamil Nadu, India

1979 ....................................................................................... B.A., Fatima College, Madurai, India

1985 ....................................................................................... M.A., The Ohio State University, Columbus, Ohio

1984 - June 1991 ................................................................... Graduate Teaching Associate, The Ohio State University,

September 1991 - present ....................................................... Instructor, The Ohio State University

PUBLICATIONS


FIELDS OF STUDY

Major field of Study: Linguistics

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CHAPTER I

INTRODUCTION

1.0 Statement of Goal  This dissertation examines a collection of constructions from various languages all of which cast doubt on some standard assumptions about the relationship between the external distribution of a phrase and its internal make-up; in particular, the claim commonly made about the 'category of the head' determining the external distribution of a phrase is systematically falsified in these cases. I show that all these constructions illuminate the issue of phrase structure (i.e. the way in which smaller units are put together into bigger units and the relationship that obtain between them in this process of construction) that any syntactic theory has to take into consideration. The particular issues that these constructions raise involve the notion of head, the notion of categories, endocentricity, and the relationship between the constituents in a phrase and the properties of the phrase itself.

1.0.1. This chapter provides the background information necessary for further discussions of the phenomenon. In 1.1, a survey of the currently available literature on this and other related topics is given; in 1.2, the two theoretical frameworks I will be using in developing an analysis - Generalized Phrase Structure Grammar and Categorial Grammar -- are briefly summarized; and in 1.3, some of the terms I will use in further discussions in the rest of the dissertation are introduced and defined.
1.1. I will soon define and illustrate with examples the term 'category change' (section 1.3), by which it is meant that the morphological and syntactic frames or distributions of an expression change as the result of a process such as affixation -- e.g. the affixation of *ness* is said to change the category of adjectives into nouns. Now, it is fairly accurate to say that the notion of category change has been primarily viewed as a lexical, derivational process, a bias that has contributed to the fragmented nature of the treatments of syntactic, phrase-level, category changes, which are considered to be chance exceptions.

The existence of derivational rules or processes in the lexicon, part of whose specification is that the category of their output can be different from that of their input, has seldom been questioned; linguists, ancient and modern, describing different languages, of different theoretical persuasions, have invariably been prolific on the issue and details of word-level processes that change the category of their input. Thus we have an extended treatment of deverbal nouns, deverbal adjectives, denominal verbs, etc. in various languages in ancient grammars -- the ancient Tamil grammarians discuss the three dozen or so nominalizations (each in great detail) and other lexical processes such as denominal verbs, etc. (cf. *Tolkaappiyam* of the pre-Christian era, and *ViiracooRiyam, Neeminaatam, Nannuul*, etc of the post-Christian era); PaNini discusses lexical derivations in Sanskrit at great length (cf. *ASTaadhyaayii*); in the generative tradition, it could even be said that there is an emerging theory of the lexicon, the nature of which, though constantly debated, is also becoming clearer, due to the increasing number of linguists investigating various issues relating to the theory of the lexicon. Thus, derivational morphology and the various derivational processes, in English as well as other languages, are one of the relatively well-studied and adequately described aspects of natural language phenomena at present.
In short, the state-of-affairs regarding lexical category changes is such that there is a reasonably solid frame of reference for describing and understanding the properties of word-level processes, which, among other things, change the category of their input; new instances can easily be described, and are rarely considered so radically exceptional as to warrant a reconception of the basic properties that have been attributed to lexical derivations (Matthews 1970, Anderson 1982, Aronoff 1976).\footnote{Needless to say, there are issues that are heavily debated even in this area of linguistic study. I do not intend to convey that there are no serious disagreements among linguists in this area -- on the contrary, questions such as whether or not there are zero-affixations are at the center of long-standing controversies between the Item-and-Process and Item-and-Arrangement models.}

The treatment of phrase-level category changes on the other hand, is anything but adequate. In fact, the notion of category changes applying to phrasal constituents has not been identified as a general phenomenon. The few discussions relevant to the topic have been on specific instances of syntactic, phrase-level category changes such as gerunds and they are dealt with in a fragmented, ad hoc fashion, and are more often alluded to with special terminology than described or accounted for. For instance, terms such as participle phrases, adverbial clauses, serial verb constructions, complement clauses, etc. have been constantly used to refer to cases which show the internal syntax of VP's or clauses; the existence or the invention of such terms both in traditional and modern treatments has provided a way of alluding to the phenomenon without actually accounting for its properties, without observing the similarities in the various instances of the phenomenon (such as participle phrases, serial verb phrases, complement clauses, etc.). Thus, referring to these cases with terms such as the above seems to have stunted inquiry into the possibility of a generalization of these cases as instances of the same phenomenon; in other words, the possibility of a general phenomenon of category change in syntax, (specific instances of which are cases discussed under the rubric of participle phrases, nominalizations, (some uses of) serial verb
constructions, absolutive constructions, etc.) has not been entertained thus far. However, a few glimpses of a more general view of phrase-level category changes can be found in some works in the structuralist and the generative tradition (Jackendoff 1977, Bloomfield 1933), which will be discussed in Chapter II (section 2.4).

Thus the reasons for why this work should be of general interest to linguists are both empirical and theoretical: first, it places under close scrutiny the basic issue of phrase structure (i.e. the construction of phrasal expressions from smaller units) and the theoretical constructs that are needed to describe the relationship between the parts of a phrase and the phrase itself; it examines a wide range of data that bear on such issues from several languages – Tamil, English, Korean and Chinese; and finally, it offers a viewpoint from which a class of constructions that have been considered unrelated can all be viewed as instances of the same phenomenon, sharing some crucial properties, raising the same issues and to that extent, requiring similar analysis.

1.2.0 A synopsis of CG and GPSG

Since the two syntactic theories I will be most concerned with in this dissertation are CG and GPSG, a brief summary of the salient features of these two theories is in order (see Gazdar et al. 1985, Ades & Steedman 1982, Bach 1982). I will use GPSG as an example of X-bar-based phrase-structure grammars to be contrasted with non-PS grammars such as Categorial Grammars. The differences between PSGs and CGs will be discussed in great detail in Chapter II.

Even though GPSG and CG differ with respect to the treatment of the issues under consideration in this dissertation – phrase-construction, heads, endocentricity, etc., these two theories share many fundamental properties in other respects. They both are non-
transformational, monostratal theories; they both are avowedly committed to the principles of compositional semantics, embodied in Bach's "Rule-to-Rule Hypothesis"; the strategies in one framework can often be simulated in the other, due to the weak equivalence of CF PSGs and bidirectional CGs; they both have incorporated the mechanisms in Unification Grammar (see Shieber 1986), and use fairly elaborate feature-passing mechanisms.

1.2.1 A brief overview of GPSG

The version of GPSG that I will outline here is the one in Gazdar, Klein, Pullum and Sag, 1985, even though GPSG was originally formulated in Gazdar 1982. The GPSG syntax can be said to consist of the major theoretical devices listed:

1.
   a. I(mmediate) D(ominance) rules
   b. L(inear) P(recedence) statements
   c. Metarules
   d. Principles that regulate the instantiation of features on syntactic nodes

The two types of information in classical phrase-structure rules in PS grammars -- (i) dominance relationships that describe the internal make-up of constituents and (ii) precedence relationships that describe word-order -- are factored out into ID rules and LP statements respectively. Thus, in GPSG, the PS rule A --> B C corresponds to an ID rule (given in 2a) and an LP statement (given in 2b).

2a. A --> B, C

2. GPSG, in this respect, is influenced by the trends in Montague Grammar and CG.

3. It is for these reasons that a comparison between GPSG and CG is more likely to be a true comparison of X-bar-based grammars and Categorial Grammars. For instance, a comparison of G and GB, due to the numerous fundamental differences between the two theories, does not allow for an accurate comparison of X-bar-based grammars and CGs.
2b. C < B

2a states that an expression of category A consists of B and C and 2b states that in a local
tree, C precedes B⁴.

A very important aspect of ID rules for the discussions in this dissertation is the designation of
one of the daughters of every phrase as the Head, marked H. Thus, every ID rule specifies
one category on the RKS of the rule as H. This restriction on the format of PS rules in GPSG
expresses the claim that every phrase has a head and has only one head.

Metarules map ID rules into ID rules, thus expanding the basic set of ID rules, with an added
condition that only ID rules with a lexical head in the RHS of the rule can be input to a
metarule (cf. Flickinger 1983) in order to restrict the domain of application of metarules to the
subcategorization domains of lexical items. 3 offers an example of a metarule in GPSG:

3. VP → W, NP
   
   VP[PAS] → W, (PP[by])

3 is a metarule that maps an ID rule that introduces an NP (and any other combination of
categories W) dominated by a VP into one that introduces just the W and an optional by
phrase dominated by VP[PASS]. This metarule serves to relate active VPs with an NP object to
their passive counterparts with one less NP and an optional PP headed by by.

Of the various Feature Instantiation Principles, the most relevant for the discussions in this

---

4. E(xhaustive) C(onstant) P(artial) O(rdering) is assumed to be a property of natural language
syntax, which states that the linear order among sisters is invariant across categories. For
example, the LP statement C < B, if it describes the linear-order relation between C and B in all
constituents, not just A.
dissertation is the Head Feature Convention, which is a default principle that can be overridden. The HFC ensures that, for the set of features called HEAD features, any HEAD feature present on the mother is also present on the head daughter, unless a more particular feature instantiation principle (such as the Feature Cooccurrence Restrictions) overrides the HFC.

Two other feature instantiation principles that figure in later discussions are the Foot Feature Principle and Feature Cooccurrence Restrictions. The Foot Feature Principle requires that, for a set of features called FOOT features, a FOOT feature instantiated on one (or more) of the daughters is also instantiated on the mother. Feature Cooccurrence Restrictions are of the form 'If A, then B'; that is, given the presence of a feature [A] on a category, the presence of the feature(s) [B] on the same category is entailed by the FCR A ) B. 4 provides an example of FCRs:

4. [VFORM] [+V, -N]

4 states that the presence of [VFORM] on a category entails the presence of the features [N: -, V: +]. In GPSG, the values for the feature VFORM are {FIN, PRP, PSP, PAS, BSE, INF}, and this FCR serves to express the generalization that only verbs are marked as finite, passive, infinitive, base, etc.

These are the most relevant aspects of GPSG for the purposes of the discussions in this dissertation. (For more detailed overviews of GPSG, see Sells 1985, Hukari and Levine 1986, and Håkrocks 1987.)

1.2.2. A brief overview of CG:
In Categorial Grammars, as we shall see in the next chapter, categorization of expressions is based on their combinatorial and semantic properties, and not on their inflectional properties; syntactic categories correspond to semantic types; the set of semantic types (and hence the set of syntactic categories) is recursively defined over a small set of basic semantic types (which correspond to the set of basic categories). Definitions of the set of syntactic categories usually are of the form:

5.

a. A is a category

b. B is a category

c. If A and B are categories, then A|B is a category.\(^5\)

Statements of the form \( \alpha \in A \) define the membership of expressions in a category or a set of categories. Finally, a set of operations define the combination of expressions of various categories and specify the category membership of the resultant expression. In bidirectional CGs, the operation is limited to the concatenation of two expressions, one of which is a functor and the other, its argument. The following two rules (called Functional Application) allow the combination of a functor expression with an adjacent argument expression; \( A\backslash B \) represents a functor whose argument precedes it and \( A/B \) represents a functor whose argument follows it:

6.

a. \( B + A\backslash B = A \)

b. \( A/B + B = A \)

In most versions of CG, the operations that define the combination of two expressions are not

\(^5\) Of course, by this definition, \( B\backslash A, (B\backslash A)\backslash B, (A\backslash A)\backslash A \), etc. are all categories. In other words, since this is a recursive definition, the number of categories is infinite.
limited to simple concatenation. For instance, the rule of Function Composition given in 7 (Ades & Steedman 1982) is used in many existing CG frameworks.

7.

a. \( A/B + B/C = A/C \)

In addition, many other operations such as Wrapping (Bach 1979), Backward Mixing Composition, etc. have been proposed in the literature, to account for various natural language phenomena such as discontinuous contituency, word-order variation, etc. In later discussions, operations other than FA and FC will be discussed; each operation will be defined and explained as it is introduced.

It has to be emphasized that the principles of compositional semantics dictate the categorization of expressions, and the analysis of the syntactic structure of expressions (as we shall see in Chapter V).

1.3.0 In section 1.3.1, Some of the differences are laid out that are to be found between what I call word-level category changes and syntactic phrasal category changes alongside a definition of some of the terms I will be using in subsequent discussions of the phenomenon; and I will discuss the common properties that instances of category change exhibit in section 1.3.2 and review the literature to be found on this and related issues in 1.3.3.

1.3.1 Definition of some terms

Below I define some terms that will be used in this dissertation and where the definition involves some assumptions that I will be making, I will provide evidence in favor of such an assumption.
1.3.1.1. Category Change

Derivational or what I shall call **word-level category changing processes** that change the category of the input word from X to Y have the following properties:

a. the output can, but need not, take the arguments of the source word (e.g. *agree with the Press on all issues* — *agreement (with the Press on all issues)*);

b. when the argument structures of the input and the output word are related in that the output takes the same arguments as the input, the category or the government features of the argument categories of the output word need not be the same as the argument category of the source. (e.g. *solve the problem* — *solution to the problem; fond of chocolate — fondness for chocolate*)

c. the category of the modifiers of the output word is one that is appropriate to expressions of the output category, but not the input category (e.g. sudden / *suddenly* declaration of war).

To illustrate, consider the relationship between phrases in 1 and 2,

1. a. *remit the money promptly*

   b. *strongly believe that you are always right*

   c. *solve the problem*

2. a. *prompt remittance of the money*

   b. *strong belief that you are always right*

   c. *solution to the problem*

where the deverbal nouns in 2 a-c, can (but need not) take the same number of arguments as the source verbs do, and when they do take the arguments, the category of the arguments is not always the same as the category of the arguments of the source verb — e.g. the source verb *remit* takes an NP argument, while the deverbal noun *remittance* takes a PP argument.
(and requires, presumably by government, that the PP be headed by of).

And crucially, the category of the modifiers of the source verb *solve* and the output *solution* are not the same -- the former, like other verbs, is modified by adverb phrases, while the latter, unlike verbs and like other nouns, is modified by adjective phrases, suggesting that this phrase is headed by a lexical noun, whose verbal origin has no effect in the syntax.

Compare the above situation which I shall call **word-level category change**, to what I will be referring to as **syntactic or phrasal category change**, a phenomenon characterized by the similarities in the combinatory properties of the input and the output in the following ways:

a. the input and the output both take the same number of arguments, and impose the same selectional restrictions on the arguments (e.g. disclose the news -- disclosing the news (*disclosing 0));

b. the category of the arguments and the features the functor governs on them are the same for both the input and the output (solve the problem quickly -- solving the problem quickly (*solving to/of the problem quickly));

c. the category of the modifiers of the input is the same as the category of the modifiers of the output word (quickly solve the problem -- quickly /*quick solving the problem).

To illustrate, the 'gerundive nominals' as they are called in Chomsky 1970, and Jackendoff 1977, (or 'nominal gerunds', or VP-gerunds, and the various other appellations this construction has received in the literature) exemplified in the sentence *John's washing the car so carefully annoys me* taking the verb+*ing* combination to be the output and the verb to be the input, the source verb and the gerund both take the same arguments, and govern the same form on those arguments, and both are modified by Adverb Phrases. Thus, the phrase
headed by the gerund form of the verb shows all the properties of a VP; in addition to the above similarities, the VP and the phrases that are headed by gerund forms of VP's even show other similarities such as the possibility of negation of the VP similar to VP negation.

Here, the only generalization that seems to account for all the facts concerning these nominal gerunds is that a VP expression with a gerund verb as its head can occur in all positions where a NP expression can. That is, the nominalization of the verbal category happens, not at the lexical level (i.e. at the level of the word), but at the level of the phrase, even though the gerund morpheme is found to attach to the lexical verb. (cf. Abney 1987, Pullum 1991, Emonds 1985, Frank 1990 for a discussion of the English gerunds subsequent to the original discussions in Chomsky 1970 and Jackendoff 1977.)

By no means is this phenomenon of phrasal category changes limited to nominalizations of VP's. The main purpose of this dissertation is to show that this is a far more pervasive device in languages than has been suspected. I would like to add as instances of the same phenomenon, several other constructions: participle phrases (which have the syntax of VP's, but the distribution of nominal modifiers -- e.g. the student impatiently waiting for the class to be over), serial verb constructions (which have the syntax of VP's or clauses and the distribution of adverbials), nominalized clauses, relative clauses, etc. Thus, by "category change" I refer to situations where a configuration as schematized below obtains ((a) uses the X-bar based notion of categories and (b), functor-argument based notion of categories as used in various versions of Categorial Grammar):
1.3.2 Internal syntax

By this term, I refer to the combinatorial potentials of the head of the phrase in the above-mentioned constructions – i.e. the internal syntax of a phrase refers to the category of the head, and the category of the arguments, the form of the arguments that the head governs on them, and the category of the modifier.

1.3.3 External syntax

I reserve this term for the positions in which a phrase may occur in sentences, and the categories the phrase as a whole combines with. Thus, the external syntax of the gerund phrases (e.g. John's washing the car carefully) in English would include their ability to combine with possessive determiners and their ability to occur in NP positions (with or without the possessive determiners). The external syntax of participle phrases would include their ability to be the modifier category for nominal expressions and their postnominal/ pronominal positions and/or predicate positions.

1.4. The layout of the topics in this dissertation is as follows: In Chapter II, I discuss some fundamental issues concerning the relationships between subparts of a phrase and the relationship between the parts of a phrase and the phrase itself. Two very different views on these issues as represented in the X-bar theory and Categorial Grammar will be reviewed, and
a critical evaluation of these views will be made with respect to the phenomenon of category change under consideration in this dissertation.

One type of category change in languages whereby expressions with a verbal head have the distribution of adjectival will be discussed in Chapter III; the examples include the participle construction in Tamil, Korean and English and the relative clauses in English, and the adjectivals in Chinese. The question of how the two theories of phrase structure account for these facts will be taken up and it will be shown that the X-bar view cannot be maintained in the face of these facts without resorting to ad hoc devices to describe them.

In Chapter IV, nominalization and complementation in English and Tamil will be considered. Here expressions with a verbal head gain NP-like distribution when they are marked by either an inflectional affix or a function word. An X-bar and CG description of the facts will be outlined and compared.

Chapter V deals with yet another instance of category change which allows expressions with various internal syntax to serve as adverb phrases. The adverbial serial verb construction in Tamil will be discussed in detail and as with the other chapters, the two theories in question will be compared with respect to the descriptions they allow of this type of category change.

In the last chapter, the main issues that these facts raise will be addressed. These include the putative distinction between affixes and function words, the notion of head, the phenomenon of category change. This chapter will point out the significance of the facts in consideration in this dissertation to these various issues in syntax. It will be concluded that the various axiomatic assumptions in X-bar theory, unlike the assumptions of CG, do not allow a coherent, unified account of the phenomenon of category change.
2.0 Introduction  Almost all current theories of syntax fall into one of the two families of grammars -- Phrase Structure Grammars and Categorial Grammars -- in that they embody one of two very different approaches to the question of how phrases are constructed from smaller constituents. (In other respects, of course, syntactic theories can be grouped in other ways: e.g. transformational grammars vs. monostratal grammars.) While it is a well-known fact that bidirectional categorial grammars and CF PS grammars are (weakly) equivalent\(^1\) (cf. Bar-Hillel 1958, 1960, Pollard 1988), these two kinds of grammars view in fundamentally different ways the basis for establishing relationships among the constituents of a phrasal expression and the phrase itself, since on each approach, the notions that are deemed to be primitives in the combination of constituents into bigger syntactic units are very different (see Bach 1988, Dowty 1989).

In discussing phrase structure grammars, I take into consideration only those variants that

\(^1\) The variants of both Categorial grammars discussed in this dissertation are not restricted to just those operations used in bidirectional categorial grammars since I will be dealing with variants of CG that use operations such as Wrapping (Bach 1979); similarly, the variants of PS grammars discussed here are not just the unadorned CF PS grammars either, since I will be discussing PS grammars such as GPSG, which make use of an elaborate system of features.
incorporate the basic proposals in the X-bar theory of phrase structure\textsuperscript{2}, as sketched in the works of Harris, Chomsky and Jackendoff for two reasons: first, beyond expressing some basic properties such as constituency, linear order, ambiguity and recursion, context-free phrase structure grammars alone do not provide an interesting model of natural language syntax, in that they do not impose any restrictions on the relationship among the co-constituents of a phrase and between the phrase and its parts; secondly, (perhaps due to the above mentioned reason), most of the phrase structure approaches taken in recent syntactic theories adopt only such variants (e.g. GPSG, GB, HPSG, etc.). I shall henceforth refer to this subclass of CF grammars sometimes as phrase structure grammar(s) and at other times as X-bar grammar(s)/theory(ies) (cf. Harris 1946, 1951, Chomsky 1970, Jackendoff 1977, Pullum 1984, Kornai and Pullum 1991). In view of the widely different ways in which the basic claims in these works is embodied in the current X-bar based syntactic theories, it is very difficult to talk about "X-bar theory". But this notion of "X-bar theory" -- the set of essential insights about phrase structure in natural language that this theory is set up to capture and the restrictions it imposes on the form of rules in CF PS grammars -- will figure significantly in my discussions in this chapter and elsewhere in this dissertation. I will explain the role the term "X-bar theory" plays in my discussions and how it differs from any actual X-bar-based syntactic theory in section 2.1.0.1.

The basic assumptions or claims of X-bar based PS grammars are as follows: the internal

\textsuperscript{2} I use the term "X-bar theory" with some reservations, since there is no single "X-bar theory" that is accepted and employed in all the various syntactic frameworks that incorporate the basic claims of the X-bar approach to phrase construction. See section 2.1.0.1 for an explanation of what this term signifies in this dissertation.
structure of all phrasal expressions can be factored into head and nonhead units; the constituents in a phrase are related to each other primarily in a head-nonhead relation; and within every phrase of category XP is an element x (which is said to be the head of the phrase) whose form-class is the same as that of that phrase, and hence, the form-class of this element is crucially connected to the category and the distribution of the phrase. The term form-class is taken from Bloomfield (1933) where it is used to refer to classes of words that are marked for the same morphosyntactic features: for example, the class of words which are marked for the morphosyntactic features of number, gender, case, etc. are said to belong to the same \*form-class*, namely the form-class of nouns.

In categorial grammars, on the other hand, every phrasal expression is divisible into a functor expression and an argument expression and the meaning of the phrase is derived by applying the meaning of the functor to that of the argument. Thus, driven by the tenets of compositional semantics, categorial grammars assign phrases a syntactic structure that is homomorphic to their semantic functor-argument structure, and the primary relation that holds between the parts of a phrasal expression is this functor-argument relation.

In this chapter, I will examine the differences between X-bar based phrase structure grammars and categorial grammars with respect to several descriptive and theoretical issues that bear on the phenomenon of phrasal category change; compare the predictions of the two approaches in certain cases; review the literature on internal and external syntax mismatches; and investigate some possible ways of taking account of the phenomenon that are either available in each of these approaches or are compatible with the fundamental assumptions of each approach.

2.1.0 Category assignment in X-bar syntax and CG
The notion 'syntactic category of a phrase' is a useful one in linguistics since it summons up a collection of distinct properties that commonly coincide with the syntactic category of a phrase -- e.g. its syntactic distribution, the range of grammatical relations it can have, the morphosyntactic features that are semantically (or grammatically) appropriate to such a syntactic category, its internal syntax, and the category of its head. In common linguistic practice, the syntactic category of a given phrase has indeed come to refer to any or all of these properties. The category NP can be effectively used to illustrate the point at hand: the term 'NP' can be used to refer to any combination of the various properties that are prototypically associated with that phrasal category -- that it has the range of distribution of verbal and/or adpositional arguments; it stands in the grammatical relation of subject, object and oblique objects; and in languages that have sufficiently complex morphology, this category bears such morphosyntactic features as number, gender and case; the head of this phrase belongs to the form-class of nouns (i.e. an element that is marked for the morphosyntactic features appropriate to nouns -- number, gender, case, etc.); its internal syntax has adjectival modifiers and determiners (and whatever arguments the head noun may be subcategorized for, though nouns, unlike verbs, most often lack a rich argument structure).

Though virtually all theories of syntax take the classification of expressions into phrasal categories to be a fundamental goal, the considerations that are taken to be basic in determining the category of a phrase are hardly the same in all theories. The simplest situation is to be found in the cases where all the above-mentioned characteristics of a phrase point to the same categorization of an expression. However, a failure of such confluence of all the relevant properties on the same phrasal unit is seen in several situations and I will examine one class of such situations; this subclass constitutes the phenomenon that I call category change in syntax. In these cases, the criteria mentioned above point to a conflicting assignment
of categories to a given phrase, inasmuch as the criteria relevant to the internal syntax of the phrase do not assign the same category to the phrase as do those that pertain to its external distribution.

It is perhaps this situation where different criteria point to different category-assigment that Bloomfield refers to when he notes:

"Form-classes are not mutually exclusive, but cross each other and are included one within the other, and so on. Thus, in English, the nominative expressions (which serve as actors) include both substantives and marked infinitives (to scold the boys would be foolish).... One group of substantives, the gerunds, (scolding), belongs to a form-class with infinitives and with other verb-forms, in serving as head for certain types of modifiers, such as a goal (scolding the boys). For this reason, a system of parts of speech in a language like English cannot be set up in any fully satisfactory way: our list of parts of speech will depend upon which functions we take to be the most important." (Bloomfield, Language, pp. 269 - 271) (italics mine.

Below I will show that in these cases, the question of which of these criteria is/are taken to be definitive of the category assignment function in a grammatical theory is not merely a quibble about points of view, but an issue that has consequences for how the notion of syntactic categories is related to various other syntactic notions such as internal constituency, external distribution, the mapping between the two, form-class or lexical category, grammatical relations, and a related issue -- the semantic relation between constituents, and for how the definition of the notion syntactic category of a phrase in a theory allows (or hinders) a well-knit organization of such constructs in the theory.

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3. One of my discussions with David Dowty helped me better appreciate the import of this observation of Bloomfield's and its significance for the present discussion, and how the categorization of expressions in CG and PS grammars "will depend on which functions we take to be the most important"; he also pointed out the importance given to internal syntax in X-bar theories and to external syntax in CG.
2.1.0.1 "Classical X-bar theory" Vs. "X-bar-based syntactic theories"

At this point, it is necessary to explain and justify the use of the term "Classical X-bar theory" (or "X-bar theory") and the role it plays in subsequent discussions in this dissertation. As Geoffrey Pullum notes (cf. Pullum 1984), "X-bar theory", though widely believed to exist in some well-expounded form, and frequently alluded to in the syntactic literature, had not been rigorously formalized till recently. Pullum 1984, Komai and Pullum 1990 offer an explication of the various properties of X-bar-based PS grammars, the various restrictions X-bar theory imposes on the form of rules in CF PS grammars; these properties will be briefly discussed below in the following section (2.1.1).

In addition, each X-bar-based syntactic framework differs in the details of adherence to the various properties of X-bar theory. For instance, the GKPS instantiation of X-bar theory does not obey the property of Succession, which states that the bar-level value on the head daughter is one level lower than that of the mother. In GKPS, the default value for BAR on the head daughter is assumed to be the same as that of the mother, unless specified otherwise. The instantiation of X-bar theory in GB preserves Succession. Another example of such divergence among theories concerns the property of Lexicality, which states that only lexical items can be the heads of phrasal projections. While the rules in GKPS obey Lexicality, recent proposals in GB where morphosyntactic categories such as NEG, l(NFL), C(OMP) are assumed to have a full set of phrasal projections (even in languages with little or no

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4. The writing of this section is directly based on an e-mail response from David Dowty, which he had put together to help me explain my stance on this matter. With his permission, I have included in this section, parts of his message verbatim, since he had articulated so accurately the general point that I was groping to make.

In addition, observations about the history of linguistic intuitions such as grammatical relations, and their significance for the meta-theoretical issues in this dissertation are Dowty's own observations. I borrow those ideas from Dowty's note because it helps establish the context of the present study.
morphological realization of such grammatical categories), do not observe Lexicality. But the variation in the incorporation of X-bar theory that is most relevant for our discussion is the status of the notion 'head' in different X-bar-based syntactic theories. In GKPS, for example, the head is simply a specially designated daughter node that is identified as the head by a label. The Head Feature Convention, which serves to express the generalization that the properties of the whole phrase are realized on the head, is a default principle and therefore can be overridden. As Pullum 1991 (to be discussed in 2.4.1.4) points out, GKPS does not always force any feature-identity between heads and mothers.

In view of the various differences among the X-bar-based syntactic theories, and in the absence of a set of coherent, explicitly formulated claims that can be said to form *X-bar theory*, the use of the term *X-bar theory* is misleading at best. However, there is a clearly definite, definable set of "intuitions" or insights about phrase structure in natural language that is made explicit to varying degrees in the writings of structuralists -- Bloomfield and Harris in particular -- that has influenced the traditions in generative syntax such as Chomsky 1970 and Jackendoff 1977. The term *X-bar theory*, as it is used in this dissertation, refers to a theory characterized by adherence to the two fundamental insights of structuralists that have been incorporated in different ways in modern theories:

a. normal syntactic phrases (if not all phrases) are endocentric. In this respect, X-bar-based PS grammars differ significantly from non-X-bar-based PS grammars and Categorial Grammars, which treat endocentric phrases as one subtype of phrases in general.

b. (closely related to a) every phrase has a head, where 'head' is "an element of a phrase that determines the syntactic properties of the phrase as a whole".
In addition, there are several other claims which are less central to the conceptualization of X-bar theory, that are probably epiphenomena of the formulation of the above two claims — e.g. claims about the number of bar-levels of the highest projection of phrases, whether or not that number is the same for all phrasal categories, whether or not non-lexical items can be the head of phrases, etc. (cf. Jackendoff 1977, Pullum and Kornai 1990). But it is the position that endocentricity (as described in a and b) forms the core of phrase-construction that most characterizes X-bar theory. Furthermore, these are assumptions in the generative X-bar literature that neither directly follow from the above two claims, nor conflict with them. In theoretical points that neither follow directly from nor conflict with the above two claims, *classical X-bar theory* refers to the proposals of Jackendoff 1977, since it is the most complete among the treatments of X-bar theory in post-structuralist literature, yet early enough for it to have influenced the X-bar-based analyses in generative literature, unlike Pullum 1984 or Kornai and Pullum 1990 which are thorough, technically explicit treatments of the subject.

Thus, my use of the term *X-bar theory* refers to an admittedly HYPOTHETICAL theoretical perspective, in that it is not instantiated in any single published treatment of X-bar theory. It is therefore a straw man, or *worse*, in that it perhaps COULD not be instantiated in a pure form in any detailed actual theory that strove for empirical adequacy. However, that does not matter for the role it plays in the discussions in this dissertation. By the same token, it is vague in many respects, but the important thing to note is that actual theories can nevertheless be concretely described as approaching it to varying degrees.

Now, it could be said that this quasi-historical, meta-theoretical definition of this notion is an

5. As an example of the abstract nature of this, note that in at least one respect, most versions of GPSG could be said to approach classical X-bar theory more closely than Jackendoff 1977 itself: namely, the Head Feature Convention imposes a more specific and detailed instantiation of claim b than anything suggested by Jackendoff.
unusual one, if not a questionable one. Why use such a notion in a theoretical discussion? It could of course turn out to be the case that a version of X-bar theory like those found in GKPS is not only more descriptively adequate for English, but for all the languages than any *purer* theory like the above: if so, the GKPS theory is ultimately of more interest, since *pure* theoretical ideas almost always get *diluted* when linguists try to make theories descriptively accurate in describing all the details of grammars.

The appropriate response is, I think, that generative linguistics and its more scientifically well-founded structuralist and traditional-grammar antecedents have been in business long enough for us to see that again and again, certain intuitions that arise among diverse linguists dealing with diverse languages are first proposed as keystones of theories, then sometimes become radically altered and/or made much less significant in subsequent developments of those theories, but then reappear as key concepts in new theories. It is therefore of interest to try to conceptualize the strongest instantiation a theory could possibly make of such an intuitive notion. Thus when I make comparisons in later discussions such as "The proposed modification of classical X-bar theory in GKPS represents a weakening of classical X-bar theory (by comparison to the unmodified version) in that it permits heads to share fewer syntactic properties with their phrase (i.e. their mother node) than the unmodified theory", I do not necessarily mean that the modification is inferior to the earlier theory -- it may be just what is called for empirically and may be leading us to a theory that is closer to the nature of natural language phenomena than classical X-bar theory. But that cannot be attested for a long time. At present, such comparisons are a valid, if somewhat more distant, meta-theoretical observation: that by taking this step, we make one of the basic arguments for the foundations we originally gave for our theory just a little bit less strong; and such observations

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6. A familiar example is the notion of "Grammatical Relations" which figured significantly in Chomsky 1965; yet grammatical relations subsequently found little actual place in TG, but later they were resurrected as fundamental notions in RG and LFG.
can be cumulatively very important.

2.1.1 Category assignment in X-bar syntax

In X-bar based theories of syntax, the category of a phrase is primarily dependent on the lexical category of its head that it ultimately contains within itself; the lexical category of the head in turn depends on its "form-class" - i.e. the lexical classification based on similarities and differences in the set of morphosyntactic endings words exhibit. This accounts for the familiar rule schema given in 1 in X-bar syntax, which can be traced to suggestive discussions in Harris 1946, 1951 and Bloomfield 1933 of the notion of category-identicality of the lexical head and its projections.

\[ X^0 \rightarrow \ldots X^{n-1} \ldots \]
(ignoring the bar-level indices \( n \) and \( n-1 \), this means that every phrase has an element inside it which is of the same form-class as the phrase)\(^7\)

This schema serves to express the claim that most phrases are endocentric. This conceptualization of the category of a phrase as being the same form-class, or the same category\(^8\) as its lexical head stems from the view that the construction of a phrase is centered around the head. This view takes the lexical head, the categorization of which depends on its form-class, as forming the basis for the construction of the phrase since the other constituents 'depend' on the head for their occurrence in the phrase. Thus the construction of a phrase grows out of its head, the category of its complements and its modifiers being determined by the category of the head; the construction of a phrase starts

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\(^7\) It must be noted that GPSG assumes that the property of Succession, i.e. the mother node having a bar-level value which is higher than that of the head-daughter by one, is in fact the marked case, and the default is where the bar-level values remain the same between the mother and head daughter.

\(^8\) Here I use the term 'category', not to refer to a feature-value matrix as is done in GPSG and other theories, but to refer to the major category features alone.
from the word-level and extends upward and outward in stages, as represented in the familiar schema referred to in X-bar syntax given below\(^9\) (cf. Chomsky 1970, Jackendoff 1977, Emonds 1975):

\[ 2. \]
\[ \begin{array}{c}
\text{Specifier} \\
X^2 \\
\text{Modifier} \\
X^1 \\
\text{Complement(s)} \\
X^1 \\
X^0
\end{array} \]

In the above schema, unrepeatable non-head elements (i.e. arguments and specifiers) are distinguished from repeatable non-head elements (i.e. modifiers) by the assumption that the former alone, when they combine with the head, raise the bar-level of the head category (analogous to the switching of states in the automata that correspond to CF grammars), while the latter do not. Arguments change the bar-level of the head \(X^0\) to \(X^1\) and specifiers change \(X^1\) to \(X^2\), while modifiers leave the bar-level of the head category unaltered.

The assumption that the category of a phrase is the same as that of its lexical head has also been motivated in X-bar-based theories by the observation that if an expression of category \(XP\) has the same distribution as one of its subconstituents, it is a basic expression of category

\[^9\text{I make no particular claims about the details of the schema given here. For instance, there can be modifier constituents to }X^1\text{ as well as }X^2\text{, or even }X^0\text{. The schema given here is only one representation consistent with the X-bar view of phrase structure.}\

\[\text{Also, notice that the rule schemata in 1 and the schema in 2 are different in preserving the Succession property.}\]
X that has this distribution (compare *ran* and *persuaded Mary to leave* in *I ran, I persuaded Mary to leave*; and compare *printers* and *these fancy printers* in *These fancy printers cost a lot of money, Printers cost a lot of money*). In other words, the head is distributionally equivalent to the whole phrase of which it is the head.

Given this conceptualization of how phrases are constructed, the various properties of X-bar syntax, listed in 3 a - f, can easily be seen as derivative of this basic viewpoint: (The terms in parenthesis in the following list are taken from Kornai and Pullum 1990, and Pullum 1984.)

3.

a. every phrase has a head (endocentricity);

b. the category of the phrase is the same as the category of its lexical head (endocentricity);

c. the head is the obligatory element in a phrase;

d. for phrases of various kinds, the range of relationships among the non-head constituents to the head constituent at each level of projection is taken to be the same (every phrase has a head, complements, modifiers and specifier); because of this, the highest level of projection from the lexical head for all phrasal categories is the same -- in other words, every maximal projection has the same number of bar levels (uniformity);

e. (for the same reason as d) there is a maximum level of projection for every phrasal category (maximality).

f. every constituent in a phrase except the head must be a maximal projection (maximality); in other words, it is not the business of syntax to put words together, but constituents.

The above properties of X-bar grammars encode essentially a subset of the same assumptions about natural language syntax as those made in the following assertions in Bloomfield (1933):
If all of the syntactic constructions which go to make up a phrase are endocentric, then the phrase will contain among its ultimate constituents some word (or several words, members of coordination) whose form-class is the same as that of the phrase. This word is the center of the phrase. ... Since most of the constructions in any language are endocentric, most phrases have a center: the form-class of a phrase is usually the same as that of some word that is contained in the phrase. (Bloomfield, *Lg.* 194 - 195).

### 2.1.1.1 Internal and external syntax in X-bar syntax

As noted above, in X-bar based theories, the assignment of category to phrasal expressions is automatically determined by some criteria that identify a particular word (or words, in coordinate structures) in a phrase as its lexical head, as its center, and some morphosyntactic concerns that decide its form-class.

While this approach to category-assignment to a phrase very thoroughly covers several aspects of the internal syntax of a phrase, it leaves out the external syntax of that phrase entirely. Before discussing how the external syntax of expressions is handled in X-bar theory, I would like to point out that even with respect to the internal syntax, there are still a few things that need to be stipulated for each instantiation of the schema: it does not predict, for instance, that N\(^0\) takes PP arguments and not NP arguments in English; that AdjP's can be the modifier of N\(^1\), but AdvP's cannot; this is because the only aspects of the internal syntax about which a general claim is made in the above schema are: (1) the grammatical relationships between the head and the non-head elements; and (2) the correlation between the bar-level of the head and the grammatical function of the non-head element(s).

Thus, the category label on a phrasal expression in X-bar syntax is roughly a summary of its internal syntax, and the external syntax is not generally predicted by the category of a phrasal expression. In order to facilitate further discussion on the relationship between the internal and the external syntax of a phrase, let us call the PS rules that expand a phrasal category XP (i.e.
those PS rules in which XP occurs on the LHS) the \textit{internal PS rules of XP}; and let us call
those PS rules that specify the distribution of XP (i.e. those PS rules in which XP occurs on the
RHS) the \textit{external PS rules of XP}.

Now, one of the functions that the external PS rules of a phrase XP serve in a PS grammar is
to link the external syntax of XP to its internal syntax: for instance, the category NP is
characterized as having the distribution of verbal and adpositional arguments by such external
PS rules as the ones in 4.

4.
\begin{itemize}
\item a. VP $\rightarrow$ V NP
\item b. S $\rightarrow$ NP VP
\item c. PP $\rightarrow$ Prep NP
\end{itemize}

and the fact that the NP's have a noun as their head (as well as other facts about the internal
construction of the NP) is enforced by the assumptions of the X-bar theory mentioned above
in a-f. To the extent that category assignment to phrases in X-bar theories is entirely based
on the internal syntax of that phrase, it is true that the theory crucially relies on the external
syntax of a phrase to be a function of its internal syntax, in the sense that for every phrase of
category XP with a set of internal PS rules that conform to the X-bar conditions, there is a
unique set of external PS rules for that XP. It is precisely this assumption that systematically
fails in the instances of phrasal category change, where the external syntax of a phrase is not
predictable from its internal syntax, from the form-class of its head.

One of the ways in which X-bar syntacticians have tried to link the external syntax of a phrase
to its (unusual) internal syntax in some instances of category changes in syntax (to the extent
that these have been dealt with) is by positing PS rules such as

5. XP $\rightarrow$ YP
where a phrase exhaustively dominates a phrase of a different category. But this internal PS rule of XP is not consistent with the properties mentioned in a - f. (cf. Jackendoff 1977 and Pullum 1991).

2.1.2 Category assignment in Categorial Grammar

As mentioned above, categorial grammars aim to reflect the insight that the meaning of complex expressions is a function of the meaning of its parts and how they are put together; every sentence can be factored into constituents such that the meaning of each constituent is a function of its parts; assuming also that all phrases have a binary structure, as is commonly assumed in CG, this means that the meaning of every phrasal constituent can be factored into a functor expression and an argument expression, and its meaning is arrived at by applying the function to the argument. Once the set of primitive categories is posited, further categorization of basic as well as phrasal expressions is enforced by their combinatorial possibilities of expressions and syntactic and/or semantic considerations on which of the constituents of a phrase is to be treated as the functor, and which, the argument. Therefore, it is the external syntax rather than the internal syntax of a phrase that determines the category that is assigned to it. Thus, when an expression is assigned the category \textit{CN/CN} (i.e. a common noun modifier), or \textit{S/(S/NP)} (i.e. a subject NP) in CG, the category label itself (or any assumption about the connection between the category of a phrase and its internal syntax) does not restrict the internal syntax of such an expression, which, as I will argue below, is advantageous in describing the cases of category change. (In fact, as we shall see later, the task that needs to be carried out in CG is narrowing down the internal syntax of phrases in certain cases.)

In addition, some functions on categories such as type-raising (also known as type-lifting)
assign an expression a secondary category which is predictable from the category that was originally assigned to that expression based on the considerations outlined above (Lambek 1958, Ades and Steedman 1982, Partee and Rooth 1983, van Benthem 1984, Dowty 1988). In several works in CG, it is also assumed that expressions could be *category-shifted* — i.e. it could be specified that expressions of a category X could also be assigned another category Y.

2.1.2.1 Internal and external syntax in CG

In CG, since the categorization of expressions is a direct representation of their combinatorial potentials the category of an expression is an index of its external syntax; in the absence of any crucial, substantive assumptions about heads and the relationship between the category of heads and their phrasal projections, the category of an expression in CG says virtually nothing about its internal syntax. For a given phrasal category XP, different functor categories could result in an XP taking expressions of different categories as arguments, thus allowing a range of internal constituency for each phrasal category, which is precisely what is needed in the case of category change. Hence, the problem that the phenomenon of category changing poses to CG is in some sense an inverse of the problem X-bar syntax has to resolve (see section 2.4.1) in predicting the relationship between internal and external syntax. The lack of endocentricity (in terms of form-class identicality) implicit in CG predicts the non-endocentric cases. The generalization that CG needs to capture is the one that X-bar syntax does capture very well — the sameness of form-class of the heads of expressions of the same category (excepting the category-changing phenomenon). For instance, X-bar syntax captures the generalization that various sub-categories of verbs (which are analyzed as heads of VP's) are of the same form-class, whereas in CG they are assigned different categories due to the fact that they have different combinatorial potentials.
An attempt to express this generalization could be made within CG by referring to the resultant categories of functors -- it could be said that all functors of the category \( XP|YP \) (where \( YP \) could be null, and where \( XP =/= YP \)) are of the same form-class. This would predict, for instance, that all subcategories of verbs are of the same form-class.

The complications that arise in this situation are common to both X-bar and CG, though they take on different forms in the two theories. First, in AUX+VP combinations, as was discussed earlier, the AUX can be (and in most recent accounts, has been) treated as the head, and relatedly as a verb. The CG account cannot straightforwardly predict the fact that auxiliary verbs are verbs, but the X-bar account can, if auxiliary verbs are treated as the head of VP’s.

### 2.2.0 Heads

Pretheoretically, the following properties coincide with the element that is traditionally called *the head* of a phrase; in other words, the term head is commonly understood as referring to the element(s) in a phrase that have the properties listed in 6 (cf. Zwicky 1985).

6.  
   a. it is the morphosyntactic locus -- i.e. the grammatical properties of the whole phrase are realized on this element;
   b. this element is the semantic functor;
   c. this element is the obligatory one in its phrase (and relatedly it is distributionally equivalent to the whole phrase);
   d. this element is of the same form-class as the phrase (category-identicality);
   e. this element is the governor inside the phrase;

These assumptions are made by both structuralists and generativists (see Harris 1946, 1951, Bloomfield 1933, Chomsky 1970, Jackendoff 1977).
However, as it has been shown in subsequent work on heads, not all these properties coincide on the same element but are often found on different elements in a phrase (see Zwicky 1985, Hudson 1987, Warner 1989). A list of constructions that have been debated over regarding the identification of the head is given in (7).

7.

**Auxiliary verb + VP:**

The Aux category is analyzed as the head of the VP (and not a specifier in a VP) in most recent accounts\(^\text{10}\), since it bears the markers for features such as finiteness, and it can be analyzed, without further ado, as the functor which is subcategorized for VP arguments. Yet, its VP argument behaves like a head in at least one respect -- the subject selection properties, which is external to the VP constituent on most accounts, necessarily come from the head of the VP complement in a AUX + VP combination (compare *It snowed last night*, *The weather snowed last night*, *It could snow*, *The weather could snow*). The AUX daughter has the head-like properties of being a functor, being a subcategorizer, and being the morphosyntactic locus, while the grammatical property of the VP daughter (which ultimately goes back to the lexical head of the VP) of allowing or not allowing a dummy subject is still relevant at the level of the higher VP that has the AUX+VP combination\(^\text{11}\).

**DET + N\(^1\):**

Although the N\(^1\) shows most of the head-like properties, a case can be made for the

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\(^{10}\) In the recent GB accounts that treat AUX as a category label, it is treated as head of S (i.e. IP, in the current transformational terminology).

\(^{11}\) Bob Levine points out that the subject selection properties of auxiliary elements are also associated with Raising verbs. If one takes subject selection to be a semantic property, as in Sag 1982, then the reason for the transparency of both Raising and auxiliary verbs to the selectional restrictions of their complement is due to their interpretations as properties of propositions.
determiner as the head in this construction. There are revealing disagreements over the
determination of the head constituent in this construction (see Zwicky 1985, Hudson 1987,

COMP + S:

Both constituents in this construction can be analyzed as heads, and as with the previous
cases, both contribute to the grammatical properties of the whole phrase – i.e. \( S^1 \), the
distribution of which cannot be predicted solely based on the properties of the \( S \) category.
Presumably the feature \([+\text{WH}]\), which determines the distribution of the embedded clause
comes from the COMP daughter (cf. \( I \) \text{ wonder if}!\*that fish sleep; \( I \) \text{ think that}!\*if I've always been
lazy). For example, in the GKPS analysis, this situation is handled by postulating that the
COMP daughter of the \( S^1 \) category shares the value of the COMP feature, while the second
daughter shares all the other features\(^{12}\). It is interesting to note that in the post-Barrier
transformational frameworks, \( S^1 \) is headed by COMP.

Copular predicates (i.e. COPULA + PREDICATE PHRASES)

Yet another construction where two elements in a phrase each show some properties of the
head is the copular predicates in languages like English, where the copular verb behaves like
the head in that it gets the inflectional endings such as tense and agreement with the subject
NP, but the syntactic properties of the complement of the copula are preserved. For instance,
the AdjP in a copular predicate still retains its selectional properties in English, even though it
is not the head (e.g. \( \text{There is likely to be a riot, *There is probable to be a riot} \)). (We will return
to this and some related aspects of copular predicate constructions later.)

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\(^{12}\) Bob Levine points out that there are co-ordination facts that show that COMP must be a
head feature. (e.g.* \( I \) \text{ had waited for Robin and that she didn't show up made me very annoyed})
In the context of the present discussion, an evaluation of the empirical need for the notion of head and the theoretical status of this notion in various frameworks is necessary since the category of a phrase is crucially linked to the category of the head in X-bar theories. Thus the phenomenon under discussion here (namely category change) cannot be sensibly discussed separately from the issues of whether every phrase has a head; whether it has only one head; and how to decide these questions. Furthermore, regardless of the primacy a syntactic theory might attribute to such a notion, this notion is an important one in both CG and PS grammars, due to the empirical need to identify the element(s) which serve(s) as the morphosyntactic locus/loci.

2.2.1 Heads in X-bar syntax

It must be noted at this point that the notions endocentricity and head are not the same across the different variants of the X-bar view of phrase structure. Hence it becomes necessary to distinguish between such variants of the X-bar theory as classical X-bar syntax and the GKPS version of GPSG since the treatment of heads is not the same in the two representations of the X-bar notion. As GKPS point out, the definition and the identification of heads is almost circular in classical X-bar theory, where all the properties in 6a-f were uniquely and simultaneously attributed to the head element. The head is the element that shares the categorial features with the mother, but the category of the mother is determined by the form-class (i.e. the lexical category) of the head daughter.

This circularity is circumvented in GKPS by the definition and the status of the head element. Among the various syntactic theories -- both of the X-bar based and non X-bar based kinds -- GPSG is unique in its treatment of head categories in a local tree. In GPSG, (and HPSG, modeled after GPSG in this respect) the head category is uniquely identified as that daughter category which is labeled $H$ in an ID rule, to which the values for those features that are called
head features on the mother are passed on by the default feature-passing mechanism Head Feature Convention. In other words, this element is not forced to share the values for those features that are called head features; it is only the default situation in which such a feature-sharing holds; the identification of the head element is taken to be a primary step and the feature-sharing is defined on such identification. Thus, the head is more or less a primitive notion in GKPS.

In Pullum 1991, to be discussed below (sec. 2.4.1.3), brings out this prediction implicit in the definition of head in GKPS by showing that, within GKPS, a phrase can be endocentric while still differing from the head category in major categorial features. This interpretation of the notion of head is further divorced from any restrictive link the head element is assumed to have with the phrasal projection in classical X-bar theory, since the head element is not restricted by any feature-sharing, and to that extent is even more primitive in GKPS. On this interpretation (implicit in GKPS, as Pullum points out), a daughter node is labeled H, but not even category identity is required of this element, and the identification of one element in a phrase as the head is not even induced by the need to identify the morphosyntactic locus for the purpose of passing features from the mother category. Section 2.4.1.3 presents a more detailed discussion of Pullum 1991.

Thus, the GKPS definition of heads is very different from the definition of the notion head is the classical version of X-bar theory. In GKPS, the head is only a designated locus that gets the morphosyntactic properties of the mother by a default convention (i.e. the HFC) which can be overridden (as it is in Pullum 1991). While it is a more flexible notion, it is also much weaker and substantively much less interesting (see section 2.1.0.1 regarding such metatheoretical comparisons). In addition, there is no notion which replaces the head notion in those cases where the category-identicality between the mother and the head daughter fails;
there is no characterization within GKPS, of the situations in which this default convention fails. Finally, it must be noted that while GKPS adopt a weaker notion of head than the one that classical X-bar claims would allow, the fundamental premises on which the GKPS definition of head are still the same as those in classical X-bar theory.

2.2.2 Heads in CG: The issue of how to represent in CG this notion crucial to X-bar view of phrase construction has been discussed in Bach 1984, Chierchia 1985, Dowty 1989. The proposals in all these works can be informally summarized as follows: in a constituent, the functor is the head unless that functor is of the category XP/XP (i.e. a modifier functor). The cases that are problematic to this characterization are the AUX + VP combinations, where the AUX's are functors of the category VP/VP, but are not modifiers -- instead they are heads (see Dowty 1989). But the details of the relation between AUXs and their VP complements clearly shows that AUXs cannot simply be categorized as VP/VP. The AUX governs the VP complement (cf. have written, * have wrote, *have write, etc.), and thus, unlike true modifiers, governs the inflectional features on its VP complement. If these features are taken into account, the category of AUXs would not be simply VP/VP, and thus would differ from modifiers.

This situation could perhaps be avoided in the following way. The difference between auxiliary verbs and other VP modifiers, expressed informally, is that auxiliary verbs can be assumed to subcategorize for the VPs and govern them, unlike true VP modifiers. Perhaps related to this is the fact that AUXs are lexical items (as lexical heads in a phrase all are), while no VP modifiers are necessarily lexical. (Indeed ALL modifier categories, not just VP modifiers, are phrasal expressions.) Thus, in excluding the modifier functors from the identification of heads, if this distinction between auxiliary verbs and heads could be incorporated, it seems to me that the above definition of heads could be made sufficiently accurate. I give a modified version of the
above definition to reflect the restrictions on subcategorization and government.

In \( ab \) of category A, where \( a \) belongs to A/B, \( a \) is the head except where

(i) \( A = B \) (this condition rules out the classic modifiers)

(ii) \( a \) does not govern \( b \) and \( a \) does not belong the basic expressions of category A/B\(^{13}\);
then \( b \) is the head

On this definition the determiner in the DET+N combination and the complementizer in the COMP+S combination must be analysed as the head, which is different from the classical X-bar analysis of headedness in these constructions. But it ought to be noted that these are also the constructions where any decision about the identification of head is problematic or non-standard, as seen in sections 2.3.0, 2.3.1, and 2.4.1.4 (e.g. Abney 1987).

2.3.0 The so-called "Specifiers"

I hope to show in this section that the treatment of the elements that have been termed 'specifiers' in X-bar theories (e.g. DET, COMP, AUX, etc.) expose some basic flaws in the X-bar conception of phrase-construction. In particular, I will argue that the centrality of the notion head in X-bar syntax and the uniqueness that the X-bar view attributes to the head element cannot be maintained in the examples of Specifier + Head combinations. Empirically, the term specifiers is used in Chomsky 1970 and Jackendoff 1977 to identify the outermost and unrepeatable satellite that combines with the phrasal unit that consists of the head, its complements and its modifiers.

\( ^{13} \) "Basic expressions of category A/B" refers to lexical items of that category and excludes complex expressions of the category A/B. -- e.g. the category S\( \rightarrow \)NP includes run, sleep, laugh, etc. but exclude loves Mary.
Now, the identification of the head within the $X^1$ category is not very controversial since there have been no reported cases of the grammatical properties of the arguments or the modifiers necessarily shared by the phrasal category $X^2$ (except through government or agreement in which case it is the head, and not its modifiers or arguments that share these properties with the phrase). It seems that the primary use of the notion specifier is to give the sister constituent of an $X^1$ a non-head status such that the uniqueness of the head category can still be maintained. In other words, inventing a non-head element specifier is the way X-bar syntax attempts to give the $X^1$ +SPEC combination the status of being as undubiously headed as the $X^1$ category.

In addition, it ought to be noted that the historical development of X-bar theory suggests that the notion specifier is not central to the conception of the X-bar view of phrase construction. It seems that the crucial cross-generalizations that Chomsky 1970 aims to capture concern the following constructs: form class of the head element, the dependent status of arguments and modifiers; (cf. destroy the city ruthlessly, the ruthless destruction of the city; *ruthlessly destruction of the city, *destroy the city ruthless); the distributional equivalence of the head and the phrase (cf. I ran/ran quickly/ left the books in your mailbox; Printers/These printers/ These fancy printers cost a lot of money). The alleged generalization about this category called specifier appears to be an epiphenomenon in that it tries to give the basic proposals of the X-bar view maximal generality and in doing so, it perhaps tries to impose a cross-categorial generalization beyond the $X^1$ category in an attempt to maintain the uniqueness of the head element and calls the element that vies for headhood in the $X^1$ category the specifier.

The issue of what is the head within the $X^2$ category sharply contrasts with the above situation with $X^1$ in that the head cannot be uniquely identified within the $X^2$ category since both the
element that is termed 'specifier' and the element that is termed 'head' share some crucial properties listed in 6 a-f, and the grammatical properties of the whole phrase \( X^2 \) cannot be determined solely based on the properties of the element that is termed head. In this section, some notions in X-bar syntax, especially "bar-levels" and "specifiers", and examine the empirical motivation (or the lack of any empirical motivation, in some cases) and compare CG and PS grammars in the way they cover the territory in this respect.

2.3.1 Specifiers in X-bar syntax

The issue of specifiers is relevant to the present discussion because the cases that have been analyzed in traditional X-bar theory as SPECIFIER + HEAD combinations are similar to the cases of phrasal category change marked by a separate word in that in both these constructions, the standard X-bar notion of head cannot be maintained straightforwardly for very similar reasons as will be seen below. In both kinds of constructions, the properties of the phrase cannot be determined solely based on the properties of the head category, but

In X-bar syntax, specifiers are treated as a non-head category in a phrase, and therefore as a kind of a dependent element, a satellite, in a phrase. However, the status of the classic examples of specifier categories as dependents is not at all as unquestionable as classic X-bar theory would have it, as becomes evident from the constant debates on the constructions containing what have been called specifiers in X-bar theory, an issue I will pursue later in this section (cf. Zwicky 1985, Hudson 1987, Warner 1989).

I would like to point out that pretheoretically there are several respects in which the specifier element in a phrase is not like the other dependent elements in a phrase. There are three peculiarities of elements that have been termed specifiers, and it seems that they are different aspects of the same basic property of specifiers -- namely they are grammatical or functional
This property of being a functional element underlies the fact that so-called specifiers are particular to the phrases in which they occur (e.g. the category DET is particular to the phrase NP, and does not occur in any other phrase; the category COMP is not found in any phrase other than S1, and so on); First, unlike modifiers and complements in a phrase, the specifiers in a phrase are particular to that phrase — that is, they do not occur outside of that construction. Compare, for example, adjective phrases and determiners. Though both these categories are dependents in an NP, adjective phrases are not bound to an NP as determiners are — the former occurs in copular VP's. Similarly, modals and auxiliaries are particular to VP's, and complementizers to embedded clauses.

The non-lexical nature of specifiers also gives rise to the well-known fact that specifier categories do not have bar-level projections unlike other categories such as N, V, ADJ, ADV, etc. (In GKPS terms these are 'minor' categories which lie outside of the bar-level projection schema.) In Jackendoff 1977, which takes bar-level projections to be so axiomatic to cross-categorial similarities that it is claimed that even categories such as M(odal), Art(icle), etc. have as many bar-level projections as full-fledged phrasal categories such as VP's and NP's do, and therefore such categories are assigned a necessarily vacuous internal structure such as the one(s) below14:

14. This structure is probably motivated for determiner expressions like some of the, ten of the seventeen, etc.
The fact that Jackendoff 1977 has to maintain such an awkward position regarding bar-levels of categories such as Art, and M probably has to do with another assumption about natural language syntax made in X-bar syntax. Kornai and Pullum 1990 term this property of X-bar grammars maximality, which requires that all the elements except the head in the right hand side of a PS rule be maximal projections. This condition, as Kornai and Pullum correctly point out, can be trivially satisfied in a grammar by making lexical categories which cannot have bar-level projections have maximal projections exhaustively dominating (through intermediate levels of projection, as shown above) the lexical category.

Relatedly, specifiers are the only non-head categories that are not maximal projections in the right hand side of the rule, (unless one maintains the above-mentioned, empirically unmotivated position that ALL categories, including specifiers have bar-level projections). In other words, of the non-head constituents in a phrase, a specifier is the one which is not a phrasal constituent. Conversely, this also undermines the alleged uniqueness of the head in a phrase (an issue that I will turn to presently), since phrasal categories are assumed to be projections from a lexical head category, which is the only lexical category in the right hand side of a PS rule. (Of course, this does not rule out the possibility that the head category is a non-lexical category as in N^2 --> DET N^1.)

And most importantly, unlike the other dependent elements in a phrase, the specifiers vie with the head (or, to be more specific, the element traditionally identified as the head) for
headhood, since they exhibit some of the properties that have been attributed to heads. For instance, the category AUX which has been traditionally called the specifier in a VP is the element on which the morphosyntactic features of the VP are realized (such as tense and subject agreement); the 'main verb' however, still seems to retain some head-like properties such as the restrictions on the subject NP they impose (e.g. *It could rain, *you could rain, it has rained, *you have rained, etc.). Semantically, specifiers are typically functors and non-modifier functors in a phrase often coincide with the head of that phrase. (see Warner 1989 for a discussion of COMP + S constructions where two elements in a phrase exhibit head-like properties.)

Given all the above properties of specifiers, their status as dependent elements, as satellites in a phrase is not at all clear, as evidenced by the debates over the headedness issue in phrases with specifiers. For instance, in GIKPS, auxiliary verbs are treated as the heads (and not as specifiers) which take a VP complement. The determiner is analyzed as the head of what has been traditionally called NP in several recent works (cf. Abney 1988, where NP's are called D(eterminer) P(hrase))\(^{15}\). Similarly, in embedded sentences, the complementizer is taken to be the head by some linguists while S has been traditionally viewed as the head of S'. Warner 1989, recognizing the tension for headhood between the two constituents of an embedded sentence (i.e. COMP and S) that have been analyzed in X-bar syntax as specifier and as head, argues that complement clauses are multi-headed\(^{16}\). It seems to me that for almost every construction analyzed in classical X-bar syntax as having a specifier, there are alternative analyses advanced in the literature where the specifier is analyzed as the head. I

\(^{15}\) But see Pollard and Sag 1987, where N' selects the Determiner.

\(^{16}\) In fact, Warner considers coordinate structures as evidence for multi-headed constructions; but I shall ignore coordinate structures, not because I don't think that they are multi-headed, but because I think they are undeniably multi-headed, but multi-headed in a very different way from the constructions I am discussing here and elsewhere in this dissertation.
borrow the term *double-headed constructions* from Warner 1989 to refer to the class of constructions where two elements show head-like properties.

However, I would like to point out that such reanalyses have been done in an ad hoc fashion in that no single work generalizes this tension over headhood between two elements in a phrase to constructions with specifiers. Perhaps it is not significant that most of the constructions where headedness is a problematic issue are also constructions with specifiers. But I would like to pursue the putative connection between specifiers and double-headed constructions.

For the reasons mentioned above, the relationship between the specifier and the head posited in X-bar theory and the notion specifier itself, merit closer inspection. The few questions I would like to consider are: does the notion specifier truly reflect some cross-categorial generalization about the relationship between a kind of dependent and the head? Or does the relationship between categories that have been called specifiers and their heads vary from one phrase to another? If it is the case that the specifiers across different categories do not have the same properties or do not warrant the same analysis, can it still be maintained that there is a distinct type of dependents called specifiers? Why are specifier categories typically minor categories and relatedly, functors? Since the specifier in a phrase is unique to that phrasal category, why is it necessary to maintain that they are dependents, and not heads? And finally, for the import of the term *specifier*: is it a term referring to categories or is it a grammatical relation?

First, let us look at the specifier category AUX. In classical X-bar theory, this category is analyzed as the specifier category, whereas in GKPS, which adopts X-bar syntax in other ways, it is treated as the head, as a verb with a special feature, subcategorized for and governing
VP complements. This move is empirically supported by the fact that auxiliary verbs are of the same form-class as verbs in that they take tense markers. Since in GKPS, the primary use of the notion head is to enforce value identity for certain morphosyntactic features, and since in the AUX+VP cases the AUX is the daughter that shares these the values for the 'head' features, this analysis (namely choosing AUX as the head) is forced by the way the Head Feature Convention works in GKPS; furthermore, semantically they are functors and therefore it is easy to treat them as heads.

This decision in GPSG to make auxiliary verbs heads probably explains a curious gap in the X-bar version used in GKPS which as far as I know has not been discussed anywhere in GKPS -- the category VP is the only one where an intermediate single-bar level is not used. This, I think, is because the category VP has no specifier in GKPS and therefore there is no need to separate $V^1$ from $V^2$ unlike in the other phrasal categories where the single-bar level projections have the head and its complements and can be recursively modified. In the category VP, GKPS has rules such as $V^2 \rightarrow H[2], NP$, where one would expect the left hand side to be $V^1$ rather than $V^2$ in accordance with the X-bar view of phrase structure, since in X-bar theories it is the category $X^1$ that contains the lexical head and its complement. GKPS is still able to describe the relevant facts about auxiliaries by making them the heads of the construction.

In AUX + VP combinations, the presence of the inflectional endings on the AUX forces the GKPS analysis of AUX as the head, contrary to the traditional X-bar analysis. In other constructions, since the facts about inflectional markings are not as clear-cut as in the case of the auxiliaries, GKPS is not forced to treat other specifiers as it does auxiliaries, and presumably retain the X-bar-based phrase structure for all other phrasal categories since they do not pose the same problems for the HFC as auxiliaries would if they were analyzed as non-
heads. GKPS stick to the traditional X-bar format in other cases, failing to inquire into the notion of *specifier* and the nature of the relationship between the elements labeled as specifier and head in X-bar theory. However, the above-mentioned peculiarities of specifier categories are not satisfactorily handled in GKPS, as the following discussion on Warner 1989 shows.

In COMP + S combinations, it is an interesting oddity of the X-bar view that the "specifier" of S is found only when the SPEC + HEAD combination has a different distribution from that of the "head" (i.e. that of S), a situation which is unusual for the following reason: the X-bar approach partly motivates the notion head by claiming that the head is the element which has the same distribution as the whole phrase; of course, this definition of the head has to be interpreted to mean that there is a subcategory within the form-class of the head element which has the same distribution as the phrase (e.g. the subcategory of intransitive verbs can occur where a transitive verb + object combination can occur; a VP without a modifier can occur where a VP with one can occur, etc.). In S, the specifier is not entirely optional, and the category (or the semantic denotation) of S and S is not the same, unlike in other phrasal categories with specifiers (e.g. AUX + VP).

In view of all the above facts and questions, the only phrases for which a distinction between single-bar and double-bar levels can be reasonably argued for are NP's and embedded clauses; even in these cases, to maintain that the DET and COMP are Specifiers and not heads, one ought to ignore the fact that they also show head-like properties (e.g. determiners in English are marked for number). Even if one does so, it is not clear if these two categories (DET and COMP) have enough similarities to be grouped together into a special kind of dependent in a phrase. Moreover, even assuming that AUX is a specifier category, the notion
'specifier' still seems to lack a coherent, definitive description\textsuperscript{17}.

2.3.2 "Specifiers" and "Heads" and CG:

The notion of specifiers in traditional X-bar theory is one that has no direct correspondence in other theories of syntax (but see Bouma 1988)—not even GPSG which is X-bar based in several other respects. The Aux category in VP, the Det in NP, and COMP in $S'$ are the standard instances of the Specifier relationship. It seems to me that the specifier relationship cannot be readily translated into a system that uses only functor-argument relationship (and presumably certain syntactic / morphosyntactic features) to describe constituency. The specifier category in X-bar theory has the properties of both heads and non-head categories. The question of which category is the functor is systematically debatable in these constructions since both the category that is categorized as a specifier and its sister category which is typically classified as the head in X-bar theory can be viewed as the functor. Of course, these 'specifiers' have to be distinguished from modifier functors since, unlike the latter, they are not repeatable. These cannot be straightforwardly called heads because, as will be argued below, the specifiers, as well as their sister categories, show some necessary feature-identity with the mother, and hence are both headlike in non-overlapping ways.

Finally, I would like to remind the reader of the relevance of the specifier - head relationship to the present discussion: in both specifier-head constructions and in the category change constructions, there is a grammatical element (e.g. an affix, a 'minor' category, a clitic, a functional word) which realizes some grammatical features which are crucial to the distribution

\textsuperscript{17} Other elements that have been analyzed as specifiers in Jackendoff 1977 are degree and measure phrases; these phrases have the semantics of modifiers—since it is not clear to me what the semantics of specifiers is, I cannot say that they are not specifiers because they have modifier-like semantics. In any case, I will not discuss degree and measure phrases since it is beyond the scope of this dissertation.
of the head in addition to the properties of the head. In other words, the categorial features or
the distributional properties of the phrase cannot be determined by the properties of the head
daughter alone, but by the properties of the head and those of another element. It is this
multiplicity of head-like elements that share some features with the phrase that characterizes
both SPEC+HEAD constructions and category changing cases of the type in (a).

2.3.3 Bar-levels in X-bar syntax

Classical X-bar syntax maintains that every lexical category (X°) has a maximal projection (X¹,
X², etc.). Though this condition is not retained in X-bar based PS component in ALL recent
syntactic theories, it is assumed in the earlier discussions of bar levels and heads that even
categories such as DET(entifier), (or ART(icle)), T(ense), M(odal), etc. have phrasal categories
projected from them. In recent versions of Transformational Grammar, Functional Categories are
posed which include KP (case phrase) and IP (Inflection Phrase). In the following discussion,
I will have nothing to say about projections from 'abstract' heads such as Infl and Modal;
instead, I shall focus on the notion of bar-level projection with respect to lexical heads (both
of major and minor categories).

The purpose of the following discussion is to investigate the (alleged) commonalities in
expressions of various categories at the same bar-level. In other words, the question is, the
sameness of bar-level in the categories N¹, V¹, Adj¹, etc. empirically valid, significant or
necessary? In X-bar theory, the difference between single-bar projections and double-bar
projections is that the former, and not the latter, can combine with specifiers appropriate for
such a category. However, in the light of the above discussions on Specifiers it appears that
the expressions of various categories with the same bar-level do not share similarities
compelling enough to be grouped together and the same bar-level across different categories
does not capture any cross-categorial similarities as has been claimed. As was shown above,
the Specifier category for VP's cannot be convincingly argued for and relatedly the distinction between $V^1$ and $V^2$ cannot be maintained.

Semantically, it is questionable if expressions of the same bar-level have any properties in common; as Dowty 1989 points out, with respect to the distinction between the single and the double bar levels posited in X-bar syntax, the only category where such a distinction seems to be semantically motivated is the category \([N : +, V : -]\), since $N^1$ and $N^2$ are not of the same logical type (Dowty 1989).

2.3.4 "Bar-levels" in Categorial Grammar

The existing versions of Categorial Grammars do not use bar-level distinctions on category labels (but see Bouma 1988). For instance, both transitive verb + object combinations and lexical intransitive verbs would be assigned the category \((S | NP)\) (or IV, in MG) whereas in X-bar syntax, the former would be $V^1$ (or $V^2$ due to the complications with AUX discussed above) but the latter, $V^0$.

However, there is a distinction made in Categorial Grammar which, to a limited degree, is analogous to bar-levels in X-bar syntax -- namely the distinction between *basic* expressions and *phrasal but not basic* expressions (e.g. *run* is a basic expression of the category IV, and *buy the book* is a phrasal but not basic expression of the same category).

2.4.0. Theoretical options for describing Category change in syntax

The essential characteristic of the structures under consideration is that a phrase with a lexical head of category Y and some feature \([F]\) realized on the head (as in (8)) or some other specific locus (such as the edges), or a separate word as a sister to YP (as in (9)), has the distribution of phrases of category XP, which can be schematically represented as (8) and (9).
Any adequate analysis of such categorial mismatches has to do the following:

(10).

a. establish a correlation between the category of the head, the presence of F and the category of the phrasal projection of the lexical head (i.e. treat (the combination of) Y, F and XP as covariants);

b. limit the range of values for X and Y in the above schema;

c. express any similarities there might be between constructions of type (1) and (2) by giving an analogous treatment of the two.

Given the various aspects of the phenomenon of phrase-level category changes discussed above, a few alternatives exist both within X-bar syntax and CG. In this section, I lay out the various possibilities within X-bar grammars and Categorial grammars for accommodating the various aspects of the phenomenon of phrasal category change in light of the previous discussions on the issues this phenomenon raises. The issues with respect to which the two approaches to phrase construction will be examined are listed in (11); in the following discussions, some of the possibilities in each approach are more or less directly predicted by that approach while some others are extensions or modifications that are consistent with the basic assumptions of that approach.

11. a. the relationship between the internal and the external syntax of expressions;
b. the relationship between grammatical categories and grammatical relations;
c. the definition and the status of the notion *head*
d. the operations corresponding to category changes -- affixations, function words.

2.4.1 Category change in X-bar syntax

As mentioned earlier, X-bar syntax relies on some predictable connection between the internal and external syntax. In the cases of category change, the connection between the internal and the external syntax is not as predictable or as straightforward as in this above case and the unusual internal syntax of NP's which consist of, say gerund VP's, cannot be linked to the category label of NP's as ordinary NP's can be.

Within X-bar syntax, Abney 1987, Pullum 1987, Jackendoff 1977 all discuss the English gerund VP's, the basic observations about which are due to the discussions in Chomsky 1970 on gerundive nominals. Due to the fundamental differences in the assumptions made about syntax (and about morphology, to a large extent), I will not discuss some of the analyses in detail, such as Abney's or Lefevbre and Muysken 1988.

2.4.1.1 Jackendoff (1977), in a general discussion of the properties of a X-bar based theory of phrase structure grammar, observes that the gerundive nominals (as gerund VP's are termed in Chomsky 1970, which Jackendoff takes as his point of departure) and coordinate phrases are an exception to some of the claims and have to be treated somewhat differently since these are an exception to some of the properties which, he assumes, otherwise characterize the phrase-structure component of human language syntax. In this context, he sketches an analysis of the gerundive nominals in English with either one of the PS rules given in 12 below (Jackendoff 1977, pp. 52 - 53):
12. a. \( N'' \rightarrow V''' \)
   b. \( N'' \rightarrow \text{ing} - V'' \)

He then makes a brief statement about how the rules in (12) can be generalized to the one in (13) given below to cover all deverbalized phrases:

(13) \( X^i \rightarrow af - V^i \)

This analysis, though brief and sketchy and regardless of the degree of accuracy, is suggestive of a more general system of category change in the syntax of human languages. But a rule such as the one in 12 or the rule schema in 13 violates the prohibition of the manipulation of the internal structure of words by the syntax that the Lexicalist Hypothesis tries to enforce, since it allows direct manipulation of morphological elements though it accurately reflects the fact that the syntactic domain of an affix, whose morphological domain is a word, is the whole phrase and semantically it is the functor which takes the VP as an argument.

2.4.1.2. Another analysis that has been commonly given to such cases uses unary-branching rules such as the ones in (14) (taken from Jackendoff 1977).

(14) \( \text{NP} \rightarrow S' \)
   \( \text{NP} \rightarrow \text{VP} \)

which violate endocentricity, a crucial property of X-bar syntax, in that these phrases do not have a head (or they have a head in the trivial sense since the only daughter can be interpreted to be the head), and the head is different from the mother in categorial features.

2.4.1.3 Pullum's 'Heterocategorial heads'

One of the more successful analyses of a classic example of such construction -- the nominal gerunds in English -- is found in Pullum (1991), which, after an evaluation of the internal and external syntax of the English nominal gerunds, gives an analysis of the gerunds that crucially relies on the interaction between FCR's and the HFC (namely that the FCR's override the
He introduces rule that expands an N* as follows:

15. \(N^* \rightarrow (N^* [+POSS]), H \{VFORM:GER\}\)

The independently needed FCR that states \([VFORM]: [V : +, N : -]\) (the only category that can bear values for the feature VFORM is Verb) overrides the HFC which would otherwise impose feature identity on the N* mother and the H category with respect to major categorial features; but the H category still gets the \([BAR: 2]\) specification through HFC because it does not carry any conflicting values for the BAR feature (in fact it bears no value for that feature).

In other words, Pullum's analysis amounts to the equivalent specification in (16):

16. \(N^* \rightarrow (N^* [+POSS]), H \{V : +, N : -, BAR : 2, VFORM : GER\}\)

This analysis crucially relies on the instantiation of F (in this case VFORM : GER) on the head category, since it is the instantiation of F to which some categorial features are typically associated by FCR's, which in turn override the HFC resulting in 'heterocategorial heads' (as Pullum terms this phenomenon). While Pullum's analysis works rather well for the nominal gerunds in English, it remains to be seen if it has the potential to be extended to other cases involving heterocategorial heads.

Pullum's analysis is essentially a strategy to induce the failure of feature-identity between the mother and the head by the invocation of a more specific condition (namely FCR's) that would override the HFC. The specification of the feature-value pair \([VFORM:GER]\) on the head category in the ID rule thus achieves two goals: (a) it guarantees that the head is a \([V : +, N : -]\) category through the FCR associated with \([VFORM:GER]\); (b) therefore it allows a NP node to be headed by a VP node without enforcing (categorial) feature-identity between the mother and the head daughter since the application of the HFC cannot assign values for the
categorial features that would conflict with the more specific FCR’s.

Pullum notes that “there is some plausibility to a hitherto unnoticed prediction of the GKPS theory of syntax, namely that there can be heterocategorial heads: constituents which act as heads for the purposes of the passing of feature specifications by the HFC but which do not receive their values for [± N] or [± V] via this principle. ... If my suggestion is here is tenable, we should expect to find other examples of constituents with heterocategorial heads, identifiable by virtue of having all the external syntactic characteristics of one category and all the internal syntactic characteristics of some other category. However, contrary to what some have suggested concerning clines of properties from category to category (cf. e.g. Ross 1973), we should not expect to find arbitrary mixtures of syntactic characteristics from different categories in any constituent type.*

This analysis, which I must concede is the simplest one advanced in the literature, makes a prediction that all cases of internal-external syntax mismatches are characterized by some marking on the head (such as the gerund -ing in the English nominal gerunds). Since the analysis relies crucially on the feature that would override the HFC to be present on the head—i.e. since the internal and external syntax mismatch is a result of the head getting categorial feature values different from that of the mother due to some feature ([VFORM:GER] in the present case) on the head—this analysis can be extended to all cases of such categorial mismatches only if it is true that some feature on the head is the only kind of realization that such mismatches have in languages. It cannot be extended to situations where the category change is marked by a functional element which is not realized on the head as in the case of Chinese pronominal modifiers (see Chapter 3, sections 3.1.3, and 3.4.2). The Chinese
adjective phrases are not marked by an inflectional ending on the head, but by a separate
word (or some element with a morphological status closer to that of a word than an affix) de.
Secondly, where the category change is marked by a separate word, as in the case of
embedded clauses in English or the nominal modifiers marked by de in Chinese, the category
of the mother cannot be determined solely based on the category of the head. (see section
2.2.0 and 2.3.0 above and 2.4.1.4 below for a discussion of the headedness in such
constructions.) Thus in both types of category changing, the notion head is weakened.

Pullum claims that even though the NP mother and the head daughter do not share major
categorial features, there is a head-like link between the NP mother and the head daughter in
that they share some other head features such as [SUBJ], [BAR] and [SLASH] and therefore
the HFC is still in effect with respect to these features.

Now, for the feature [SUBJ:-], which Pullum claims is passed by the HFC: the empirical
motivation for the presence of this feature on the VP node is that, given the GPSG assumption
that this feature is associated with VPs by an FCR, the VP could have [SUBJ:+] unless
specified negatively for this feature, and thus generate strings like *John's John leaving the
room abruptly annoyed me.

There are some theory-external reasons why this feature [SUBJ:-] on the NP node is ad hoc
and unconvincing. It is purely for theory-internal reasons that the NP mother must be
[SUBJ:+], since this feature cannot be freely instantiated on a [V:-, N:+] category. Moreover,
there are good reasons to analyze the possessive NP as the subject of the VP rather than as
the determiner of the NP as we shall now see.

(i) Pullum concludes that the possessive NP which is a sister to the head-VP is not the subject
because it is not in the nominative case as subject NPs are in English. In the literature on English gerunds, however, there are numerous analyses which treat the possessive NP as the subject of the gerund VP since the possessive NP shows some subject-like properties: it acts as the controller as is evidenced by sentences such as John's labeling himself as a neo-fascist didn't hurt his campaign at all.

(ii) The other evidence that Pullum puts forth for his analysis of the possessive NPs as non-subjects is the fact that the possessive NPs in gerund constructions are optional whereas real subjects are not. But he also notes that the subjects of infinitival VPs are optional. GKPS do allow for the optionality of infinitival Ss, so it is not clear why the gerund VPs, like infinitival VPs can have optional subjects and why the optionality argues for their non-subjecthood. In addition, very much like the subjectless infinitival VPs, gerunds without the possessive NPs also are interpreted as having a subject which is coreferential to an NP in the VP (e.g. Breaking the record surprised me = my breaking the record surprised me) or is interpreted as the nominalization of a predicate (e.g. Breaking the record is difficult, To break the record is difficult).

(iii) Another observation that Pullum makes about the possessive NPs in English gerunds is relevant to the issue here: Pullum notes that in this construction, it is not accurate to call the possessive NP a determiner since (syntchronically) not all determiners can occur in this slot. (cf.*al/*the/John's leaving the room abruptly) and thus restricts the slot to possessive NPs and determiners in general. The fact that NPs which do serve as subjects, and not determiners,

18. Bob Levine points out that the controller-like properties of the possessor do not warrant an analysis that treats them as subjects, as is evidenced by the case of verbs which have VP PP complements in a control relation, such as I appealed to Robin and Leslie to look after themselves, I shouted to Robin to hide himself when I saw the police car approaching, etc. These cases indicate that control for the purposes of reflexivization is may be a necessary but certainly not a sufficient property of subjects.
which do not, offers significant support to the assumption that the possessive NP is the subject.

(iv) In addition, the contrast between the sentences in a and b below shows that the gerund VP with the possessive NP has the meaning and co-occurrence restrictions of the nominalizations of sentences (i.e. it is similar to the combination of a subject NP and a predicate VP) and gerund VPs without the possessive NPs is like the nominalization of a predicate VP.

a. John's breaking the record was a surprise (*? breaking the record was a surprise)
b. Breaking the record is difficult (*? John's breaking the record is difficult.)

(v) Another related issue is the nature of the grammatical relation between the possessive NP and the gerund VP. If it is not a determiner and not a subject, what type of grammatical relation exists between the VP and the possessive NP? Recall the discussion in Chapter 2 section 2.3 on what grammatical relation(s) is/are encoded by the term 'Specifier'.

For all these above reasons, the treatment of the possessive NP as the subject is more easily defended than the one that treats it as a non-subject. All properties except the case marking on the 'subject' NP suggest that such a treatment is correct. Given the construction-specific, language-specific variations in the case-marking of NPs in different languages (including English), it is not at all clear if this morphological difference alone warrants Pullum's conclusion that this NP is not the subject.

It could be said that the feature [SUBJ] is technically just a feature, which has little or nothing to do with the linguistic notion 'subject-of' (as Pullum in fact says (Pullum, p.c.).
If one analyzes the possessive NP as the subject of the gerund VP, then the ID rule to reflect such an analysis would be as follows:

\[ N:+,V:-,BAR:2,\text{SUBJ:+} \rightarrow (NP[\text{POSS:+}]),H[V\text{FORM:GER}, \text{SUBJ:-}] \]

which is prohibited on theory-internal grounds alone. This analysis, which is as viable and empirically and theoretically sound as Pullum’s own, shows that the feature [SUBJ] cannot be used to motivate the head-like behavior of the VP daughter.

But there is one empirical difference between nominal gerunds and Ss that Pullum notes that could support the analysis of the possessor as non-subjects: Ss, but not nominal gerunds, tolerate preposed adverbials.

In order not to make the specification of one daughter as [H] in the ID rule in 4 above entirely vacuous, Pullum makes the claim that there is still some feature-sharing between the mother and the head daughter in the gerunds since both the mother category (i.e. N’) and the head (i.e. V’) are bar-two categories; and this feature is passed down from the mother to the head. But this is just one more of the highly ad hoc coincidences of his analysis. Given the small range of values for the feature [BAR] on verbs -- two values to be exact, [BAR:0] and [BAR:2] -- the fact that the ‘head’ daughter is [BAR:2] is not a crucial argument in favor of this head-like link between the VP daughter and the NP mother. One could very well argue that his analysis would work for cases where the bar-level of the mother and the (heterocategorial) head is not the same since the analysis does not rest on any feature-identity between the mother and the head in these cases of category change, and the fact that the mother and the head daughter share the same value for the bar-level gives the appearance of the verbal head of the NP category having some head-like link with its NP mother; his analysis does not predict that there will be some feature-sharing between the mother and the head and it does not prevent
all feature-sharing between the mother and the daughter from being blocked either.

The other feature that Pullum argues as being shared by the NP mother and VP head daughter is [SLASH], which is not only a FOOT feature in GKPS, but also a HEAD feature\(^{20}\). Pullum argues that the NP mother and the VP daughter share this feature, since gerundive NPs show the same parasitic gap phenomena with respect to their VP constituents that full clauses display with respect to ordinary finite or infinitive VPs. But this argument is not sufficiently overwhelming to rule out the alternative view, for the following reasons: first, Pullum’s argument is based on a particular analysis of SLASH propagation, which not everyone shares (cf. Jacobson 1987, but also see Hukari and Levine 1990), and the evidence is rather indirect and theory internal; and second, as Pullum himself notes, judgements on the data are rather delicate.

In sum, Pullum’s claim that the gerund constructions in English are strongly endocentric as all other ordinary constructions in the language is rather far-fetched and one that is strongly motivated by theory-internal, language-specific considerations. The ad hoc nature of several of the assumptions suggests that it might be simpler to consider the possibility that some constructions in human languages might not be entirely endocentric and address the issues that such a possibility raises.

At this point, it is necessary to discuss some aspects of Pullum’s analysis of gerundive nominals in English that were mentioned earlier. Recall that his claim that the notion ‘head’ is not entirely devoid of substantiative content is based on another claim he makes about feature-sharing between the NP mother and the daughter labeled ‘Head’. He claims that, despite the

\(^{20}\) Bob Levine helped me correctly interpret Pullum’s arguments in this respect, and also pointed out the arguments in favor of or against the treatment of SLASH as a HEAD feature in GKPS.
blocking of the HFC with respect to major category features, the head still shares all the other
relevant features with the mother, since both the NP mother and the head daughter are
[SUBJ: -] and [BAR: 2]. Given the marginal character of these two features which are both
language-specific and theory-specific, the claim that the mother and the head daughter share
all other features is rather moot. The sameness of value for the features [SUBJ] and [BAR] in
an NP mother and a VP daughter, when offered as the only argument for claims about feature-
sharing between the mother and the node labeled 'Head' and about the substantive content
of the notion 'head', only suggests the lack of strong evidence for such claims.

It appears that Pullum's interpretation of the notions head and endocentricity (which rests on
the notion head) in Pullum 1991 is so weak that it is hard to defend its substantive or empirical
basis since the only requirement that needs to be satisfied for a phrase to be endocentric is to
have a head element, which, within the framework he is using, can simply be satisfied by
labeling some daughter node inside that phrase as [H].

Finally, Pullum brings out and stretches the predictions of GKPS far enough to account for
category changes that are marked by an inflectional ending on the head such as English
gerunds. But weak as the GKPS definition may be, it still cannot be maintained in the face of
situations where the category change is not marked by an inflectional affix, but by a separate
word as is the case with Chinese adjective phrases (see Chapter III, sections 3.1.3 and 3.4.2)
and complement clauses in English (Chapter IV).

In sum, Pullum's analysis describes the English VP gerunds, by stating that the head of the
NP in these cases is some category that can bear the feature [VFORM] (which of course
uniquely identifies projections of +V, -N) without stating that the head of an NP is a VP in
these cases. It is an attempt to make category changes compatible with a very weak
interpretation of the X-bar claims, which modifies the classical X-bar claim "the category of the phrase is the same as that of the head" to "usually the head and the mother have the same category features."

2.4.1.4 Warner's Double Headed Constructions

It is interesting to note in this connection that Warner (1989) independently proposes yet another modification of the HFC in GPSG, which indirectly weakens the notion of 'head' in GPSG (and X-bar theory of phrase structure in general) the motivation for which is significant to my present concerns. He proposes that multiple headed constructions be allowed in the grammar of natural languages. Warner primarily discusses the COMP + S constructions in English, the GKPS account of which postulates feature-identity between the mother category S¹, and, not only the putative head S, but also the other constituent COMP. While the feature-identity between S' and S would be expected in the standard GPSG analysis since the latter is the category labeled H in the ID rule, any sharing of feature-values between the S' node and the COMP node is and essentially interpreted to be accidental and therefore has to be stipulated (as it is, in the GKPS version of the S' analysis which has an ID rule S [COMP: @, W] -> [SUBCAT:@], H[COMP: NIL, W], in which the value for the @ in the mother category and the non-head daughter category is stipulated). Warner discusses the ambiguous application of the standard criteria for determining head-hood in a construction to the two constituents of the COMP+S construction and takes it to be evidence that there are hitherto unrecognized double-headed constructions, an instance of which is the COMP+S constructions. In his account of this construction, both the COMP and the S nodes are marked H, and since the S node is marked [COMP: NIL], the other daughter (i.e. SUBCAT) has to share the value @ for the feature COMP on the mother, and he proposes to treat COMP as a member of the set of head features so as to make it available for the H[COMP] category via
inheritance. He also tries to relate the unusual double-headed nature of this construction to the fact that COMP is a minor category, (i.e. it cannot bear the features N or V).

Despite the apparent differences between the Pullum's and Warner's analyses, I think the problem that they both address in the above-mentioned works is the same. Both the nominal gerunds and the COMP + S constructions in English are instances of categorial mismatches as schematized above, the former fall under the schema in (8) and the latter under the one in (9) above. The relevance of these two analyses to the issue of categorial mismatches is rather obvious. In the case of the nominal gerunds, the feature which is crucial to the distribution of the mother (in addition to the categorial features on the head) is realized as an inflectional ending on the head, whereas it is a separate word in the COMP + S constructions.

Warner argues that the feature-identity between the mother and the COMP constituent is essentially a stipulated, accidental property of the construction in the GKPS analysis, a situation which, as he correctly points out, is characteristic of ad hoc solutions. However, there still remain some ad hoc stipulations even in Warner's analysis (though they are not particular to his analysis), since the underlying issues are not addressed. The ID rule for COMP+S constructions, both in the GKPS and Warner's versions is S [COMP:@, W] \rightarrow [SUBCAT: @] , H [COMP:NIL, W], except that in Warner's version the first daughter is also labeled H. Now, one of the seemingly accidental properties of this rule is the necessary lack of feature-identity between the mother and the second daughter though it is marked H in both these analyses. This disunity is achieved by the stipulation [COMP:NIL] on the second H daughter, which overrides the conflicting assignment of [COMP : @] where @ ranges over lexical items such as *that*, *for*, etc. Warner has no suggestions about which features of the mother are shared by which of the two head categories in double-headed constructions. His suggestion that COMP be a head feature seems to be well motivated on at least two counts:
first, the value for head features cannot be passed on to more than one daughter unless another (nonhead) category gets it by something other than the HFC, say by agreement with the head and the modifier as in adjective-headnoun agreement, and in this case the first daughter necessarily has the same value for the feature SUBCAT as the value for COMP on the mother while the H daughter in the GKPS analysis must not have the same value. second, coordination facts such as "I had waited for Robin for so long and that she didn't show up annoyed me, show that the following configuration must be ruled out in the grammar:

```
* S[COMP:@]  
  |  |
  S[COMP: NIL] CONJ S[COMP:@]  
```

which supports the analysis of COMP as a head feature.

2.4.2 Category change in Categorial Grammar

In Categorial Grammars, there are several possible ways of approaching the general issues listed in 1a, and carrying out the tasks in 10 a - c, which I will try to outline in the remainder of this section. It will be shown below that instances of category change which are marked by a separate word (schematized in 9) such as Chinese adjectivals can be straightforwardly accounted for simply as concatenations of the functor category YP|XP with an expression of category XP to yield YP. Where the category change is marked by an inflectional affix on the head, the semantic functor-argument structure does not surface syntactically as simple concatenation since the category-changing affix (the functor) is not concatenated to phrases but is realized on the heads of phrases.
2.4.2.1 In this section, one of the ways of describing category-changing inflections on the head within CG will be discussed. This approach is exemplified in two CG accounts of nominalizations: Hoeksema 1985 and Frank 1989 account for some data that relate to nominalizations in English within the framework of Categorial Grammar; Frank 1989 discusses the English gerunds and is concerned with category-changes at the phrasal level; Hoeksema discusses nominalizations of synthetic compounds (verb+object combinations). Before discussing the inadequacies of this approach for phrasal category changes, I hasten to point out that this analysis does account for the phenomenon that Hoeksema is dealing with, namely synthetic compounds, while it is not an adequate description of phrasal category changes, which Frank 1989 aims to account for. Both Hoeksema and Frank account for the nominalization of verb+ argument combinations by assigning the nominalizing affix a category as is often done in Categorial Grammar. Hoeksema discusses what are sometimes called synthetic compounds -- i.e.compounds with deverbal nouns as their second members and the argument (of the source verb of the deverbal noun in the second stem) as their first member (e.g. tax-evasion, penny-pinching, etc.). In his analysis, the category assignment to affixes such as *ion, -ance, -ing*, is such that these morphemes turn the verbs (which are functions from NP arguments to S) into a function from NP arguments to N, instead of S.

\[
\begin{array}{c}
\text{17. } -ion, -ance, -er \\
\text{= } - \\
\text{S $N$} \\
\text{S $S$}
\end{array}
\]

where $S$ represents the arguments that the source verb takes.

Before examining the viability of this analysis for phrasal category changes, I would also like to briefly sketch the CG analysis of gerund phrases in Frank (1989) which is very similar to the one in Hoeksema. Though Frank is concerned with both lexical nominalizations (i.e.
nominalizations of verbs), and phrasal nominalizations (i.e. nominalizations of VP's and clauses), his analysis works very much like Hoeksema's account described above. The nominalizing affix -ing in V-gerunds is assigned a N / V category; the VP-gerund -ing is assigned a N-bar / (S/NP) category, and the S-gerund -ing, the category NP / S category, closely reflecting his pretheoretical analysis that the differences between these three types of nominalizations is one that stems from the differences between the input units.

In the remainder of this section, I will point out the drawbacks of this particular analysis within CG. Though Frank includes, among the differences between V-gerunds (lexical nominalizations) on the one hand, and VP-gerunds and S-gerunds on the other, the fact that the latter types (and not the former,) an be modified by adverb phrases, his analysis cannot account for that fact for the following reason. If there are adverb phrases (which presumably are VP/VP or S/S, for VP and sentential adverbs respectively) which are not at either end of their argument expression (VP or S as the case may be), they cannot be combined, and hence the observation that VP and S-gerunds can be modified by AdvP's is not captured by this account. A sample derivation is given in 18 below:

18. VP-gerunds: (Frank 1989, pp. 27)

\[
\text{walk \hspace{.5cm} ing \hspace{.5cm} the \hspace{.5cm} dog}
\]

\[
(S/NP)/NP \hspace{.5cm} N-bar/(S/NP) \hspace{.5cm} NP \hspace{.5cm} \text{compose}
\]

\[
N-bar / NP \hspace{.5cm} \text{apply}
\]

Now, the category assignment of these expressions is such that the AdvP cannot combine...

\[21\] I would like to note that Frank's use of the category label \textbf{N-bar} is somewhat unusual within CG, since the notion of bar-levels is extraneous to the basic assumptions of CG (but see Bouma 1989)
with the rest of the (nominalized) VP in any way, either by Functional Application (FA) or by Function Composition (FC). It cannot combine by FA because it cannot find an expression of its argument category (i.e. (S/NP)) in an adjacent position and it cannot combine by FC because there is no adjacent expression whose domain category is the same as the domain category of the AdvP. The following derivation in 19 illustrates this point.

19. walking the dog slowly
   (S/NP)/NP N-bar/(S/NP) NP (S/NP)/(S/NP) compose
   __________________apply
   N-bar
   __________________________cannot be combined

This approach does not work for S-gerunds for the same reason. In fact, the reason why it does not work has a deeper and more general explanation than being particular to these gerund cases. The reason, as far as I can see, is that the category changing affix first combines with the word on which it appears and thus the resultant category has a range which is not the domain of the modifier category. In other words, Frank's analysis, though meant to account for phrase-level category changes, works very much like an analysis for word-level category changes in that it changes the resultant category the head yields when given its arguments, and it does so at the level where the category changing affix combines with the head -- i.e. the level of the word, before the head combines with its arguments and modifiers. Thus, any category assignment to category-changing affixes of the kind (X/$)/(Y/$), as in Hoeksema 1985, or of the kind (X/Y) as in Frank 1989, cannot guarantee that a modifier of the expression of category Y will find a Y to combine with, before the category of that expression is changed to an X. Since the category of the modifier expression crucially distinguishes word-level category changes from phrasal, syntactic category changes, I wish to note that this approach is not a viable treatment of the phenomenon under consideration here.
2.4.2.2 Wrapping

The purpose of the following discussion is to show that the operations involved in internal and external syntax mismatches are very similar to several other syntactic and morphosyntactic operations. From the collection of category changes examined here, it appears that the operations associated with phrasal category change are clearly specifiable. In all the cases, there is an element which marks the internal and external syntax mismatch (i.e. the category change at the phrasal level) which appears at some locus internal to the phrase—the common choices in languages are the lexical head and the edges—the beginning or the end of the phrase. The status of the element that marks the category change also falls into a familiar class of objects: the marker of category change is either an affix (in which case the locus is often the head), or a morphologically somewhat less bound element such as a clitic or a grammatical word. Both in terms of the operations and in terms of the morphological and syntactic status of the elements that mark this phenomenon, then, the characterization of phrasal category changes should be very similar to the characterization of most other rules that take phrases as inputs with a non-lexical (i.e. a grammatical, functional) element as the functor. However, the facts examined here on phrasal category change also suggest that some of the other options that are usually employed in phrasal operations such as second-position cliticization, (Wackernagel's principle), or stem alternations such as umlaut, are not among the operations involved in marking phrasal category change, and thus the full range of possibilities found in phrasal operations is not used in marking phrasal category change. (See Carlson 1984 for a review and discussion of the range of operations and the range of semantics that are specified on phrasal constituents.) This issue will be discussed in more detail in Chapter 7.

The operations involved in the phenomenon of category change can all be described adequately within the Categorial Grammar framework. There have been proposals within CG
for describing discontinuous constituents that use non-concatenative operations to combine functors and arguments. The wrapping operation proposed in Bach 1982 and the Head Adjunction operation in Hoeksema 1984 (which differs from the wrapping operation in an important respect) can be effectively employed in describing discontinuous constituency, the former to describe discontinuous constituency in syntax, and the latter in morphology.

The wrapping operation described in Bach 1984 (and in Bach 1979 which differs slightly from the later versions), which he uses to describe facts about control in English, is mainly a syntactic operation - i.e. one that combines words (or phrases) into larger syntactic units. The functor - argument structure of persuade John to leave is \(<\text{persuade to leave} \ (\text{John})>\), even though the functor category appears as a discontinuous sequence, with the argument category infixed after the head (or the first element) of persuade to leave. The two constituents are not combined by concatenation, but by infixation of the argument inside the functor category or alternatively, circumfixing - wrapping - the functor around the argument.

The wrapping operation is formalized in Bach 1984 as follows:

20. If \(\alpha \in A/B\) and \(\beta \in B\), and \(wxy = \alpha\), then \(\text{Wrap} <\alpha, \beta> = w\beta xy\) where \(x\) is the head of \(A/B\).

The Head Adjunction opertaion in Hoeksema (1984) is an operation that affixes a morphological element (e.g. a suffix or a prefix) on the lexical head of the phrase and the affix is a functor that takes the phrase (headed by the lexical element on which the affix appears) as its argument. In Bach's terms, the functor in this case is infixed inside the argument, or the argument is wrapped around the functor. Hoeksema proposes this operation to account for the definite determiner that appears on the head noun as a prefix in Iraqi Arabic, which is
formalized as in 21 below (Hoeksema 1984, pp. 60 - 61):

21. Definition

If A and B are categories, then A//B and A\B are also categories.

Head Adjunction

a. If x belongs to category A//B and y belongs to category B, then vxwz belongs to A, where vwz = y and w is the lexical head of y.

b. If x belongs to A\B and y belongs to A, then vxwz belongs to B, where vwz = y and w is the lexical head of y.

In Iraqi Arabic, the determiner (of category NP/N) is prefixed to the common noun and other functors such as adjectives that take the common noun as the argument appear external to the combination of the determiner + common noun. Thus the determiner cannot be allowed to combine with the lexical common noun to form an NP since further combinations need the categorial information inside the determiner + noun combination. The following diagram in 22 illustrates this:

```
22. NP
   haa5a imeez
  /           \
NP/N          CN/CN
   haa5a   meeze
```

This is very similar to the situation with the gerund -ing (see review of Frank 1989 on English -ing nominalizations and of Hoeskema 1984) and the problems in allowing the category
changing affix to directly combine by concatenation at the lexical level. The following analysis diagram shows how VP nominalizations in English with -ing can be described using the Head Adjunction operation in Hoeksema 1984:

23. washing the car carefully

Using Hoeksema's Head Adjunction, the VP and S gerunds in English can be described similarly; an example of the nominalization of VP's by the affix -ing is given below:

Now the question is whether wrapping operations can be or have to be restricted in terms of which constituent (functor vs. argument) is to be wrapped around the other argument: in Bach's original suggestions in Bach 1979, the argument is inserted after the head element in the functor category, and in later versions, the argument is inserted after the first element (which is equivalent to the earlier version since English is head-initial in VP's). But in both cases, the functor is wrapped around the argument. In Hoeksema 1984 the argument is wrapped around the functor. One could make the hypothesis that if the functor is a syntactic constituent, it is wrapped around the argument; otherwise (i.e. where the functor is an affix, the argument is wrapped around the functor). While this has the ring of an ad hoc disjunctive specification, I think the rationalization for this hypothesis is the uncommonality of discontinuous morphemes which sharply contrasts with the various phenomena in several
languages that exhibit syntactic constituents that are discontinuous. It is true that discontinuous morphemes (or circumfixes as they are termed in the literature) are found, in which case an affix-functor will have to be allowed to be wrapped around its argument. But it seems unlikely that affixes which take phrases as arguments (such as the phrasal category changing affixes) are circumfixes.

Having noted this important difference between Bach's Wrapping operation and Hoeksema's Head Adjunction operation, it must be mentioned that both these operations aim to describe cases where the constituency is not straightforwardly reflected in the operation that combines the constituents; where the functor and the argument are not combined by the operation of concatenation, but rather by some kind of infixing. The infixing operation which inserts one of the constituents into the other (or wraps one constituent around the other (inserted) constituent) can be thought of as concatenation to the left of the inserted constituent (e.g. John in the control example) to some final substring (i.e. to leave) of the other constituent; or as concatenation to the right of the inserted constituent to some initial substring (i.e. persuade) of the other constituent. Furthermore, since the head is commonly peripheral in its phrase, right wrap would be equivalent to head wrap to the left in head-initial languages, and left wrap would be equivalent to head wrap to the right in head-final languages. The following diagrams illustrate these two possibilities:

a. Left wrap = head wrap on the right (e.g. wash ing the car carefully)

\[(\text{XP})\]

\[x \underbrace{w \ y \ z} \text{(where } x \text{ is the initial element and the head of } \text{XP and } w \text{ is the inserted element)}\]
b. Right wrap = head wrap on the left

\[ XP \]

\[ yzwx \] (where \( x \) is the final element and the head of \( XP \) and \( w \) is the inserted element)

c. Concatenation to the right (e.g. that John was always late in returning things)

\[ \begin{array}{c}
XP \\
\downarrow \\
w \\
xyz
\end{array} \]

d. Concatenation to the left (e.g. zai zhuo shang de)

\[ \begin{array}{c}
XP \\
\downarrow \\
xyz \\
w
\end{array} \]

Therefore wrapping (or infixing) in general describes discontinuous constituents, or non-concatenative combination of constituents, where the functor could be either a syntactic element (as in the English control data in Bach 1979, 1982) or a morphological element (as in the Iraqi Arabic data in Hoeksema 1984, and in all the cases where phrasal category changes are marked by affixes that will be discussed in this dissertation). The question of whether there is a correlation between the type of operation (wrapping, concatenation, etc.) and the kind of functor (i.e. affix, functional word, phrase, etc.) will be discussed below.

The relevance of these wrapping operations to category change is that in those cases of category changes marked by an affix, the affix takes the whole phrase as its argument, but is not concatenated to the phrase, it is affixed to some word (most commonly the lexical head)
inside the phrase. As mentioned above, the situation involves discontinuous constituency of some sort, because the (semantic) functor-argument structure is not straightforwardly reflected since the semantic scope (and the syntactic domain) of the affix is the whole phrase, but its morphological domain is a word.

Now, the wrapping operation is an appropriate tool in the description of phrasal category-changing affixes (such as the English -ing in VP and S nominalizations) for two reasons. The first is empirical: as has been shown above, simple concatenation of a phrasal category changing affix of the category XP/YP and Y (where Y = YP/$, i.e., the lexical head of Y) does not yield the right results for phrasal, syntactic category change, only for lexical category change where the resulting lexical item inherits the argument structure of the input to affixation. (See the review of Frank 1989 and Hoeksema 1984 in 2... above.)

In general, the problem with attaching the category changing at the level of the word are schematized below:

The schema in 24 represents the problems with combining the phrasal category changing affix at the lexical level, since the phrasal units formed out of the head+affix combination cannot be assigned any category:
24. \[ YP \]

\[ XP/XP \] (cannot be assigned a category)

\[ WP \]

\[ YP/WP \] (using FC)

\[ XP/WP \]

\[ YP/XP \]

(where XP/XP is the XP modifier, XP/WP the lexical head of XP, WP its argument, and YP/XP the category changing affix (suffix in this case.)

Other devices such as Function composition (cf, Ades and Steedman 1982) which serves to describe some word-order phenomena by delaying functional application cannot be used to describe the problem at hand (more on this later). Wrapping is appropriate because, as pointed out above, the problems involved in describing the facts about English -ing and other such affixes that mark phrasal category change are the same as those involved in Bach 1979, 1982 and Hoeksema 1984.

Secondly, from a metatheoretical point of view, it is desirable to treat in at least partially similar ways two operations that have the same semantic and syntactic specifications. The discussion on possible and existent GPSG analyses of category changing phenomena above on Pullum 1987 and Warner 1989 shows that the present assumptions and/or devices in GPSG do not serve to capture the similarities between nominalizations with -ing and the COMP + S constructions in English.

Apart from the differences in the way in which the category change is marked, the similarities between various instances of category change can be schematically described in the following way: An expression of category XP combines with a grammatical element -- an affix, clitic or a functional word -- to form an expression of category YP. In Categorial Grammar, the
grammatical element that marks this category change would be assigned a category YP/XP while in phrase-structure grammars it is either treated as a feature on the XP expression (especially if the marker is an affix on the head) or a unique category is assigned to both the expression that I call YP here (e.g. the category S') and the grammatical marker of such a category change (e.g. the category COMP). The schematic tree diagrams in 25 a - c illustrate the situation:

25 a. YP  
   \[ \text{YP/XP} \quad \text{XP} \]

b. YP  
   \[ \text{XP} \quad \text{YP/XP} \]

c. YP  
   \[ \text{XP/XP} \quad ? \text{ (cannot be assigned a category)} \]
   \[ \text{WP} \quad \text{YP/ WP (using FC)} \]
   \[ \text{XP/ WP} \quad \text{YP/ XP} \]

We have no evidence of some operations being used to mark category changes. The options that are used in other morphosyntactic/ inflectional operations that are not used in category changing are second position and penultimate position (second position from the right), stem alternations, etc. The locus of the marker of a phrasal operation is also determinable in another way in that it is not within any of the phrasal categories inside the XP, e.g. the XP/XP or the WP in the above schema. The locus of second position elements, if they occur inside any such phrase inside the higher XP at all, can be specified with reference to edges of the XP rather than the phrase within which it occurs. Thus, the range of the locus of such markers
shows that they are not embedded. To illustrate, the positions marked # in a are likely positions for the affix that marks a phrasal operation whereas the ones marked * in b are not.

a. XP
   # ZP
   YP # H #

b. XP
   ZP
   YP H
   u v * w a b c

(where H is the head of XP, ZP is the modifier of H, and YP, the argument of H.)

For a similar discussion and for an apparent counterexample with definiteness markers in Amharic NP’s, see Chierchia 1984.)

2.4.2.3 Now, I will discuss a miscellaneous collection of issues related to the present discussion:

First, it still has not been demonstrated that wrapping is necessary, not just suitable, for describing category changing affixations. There are two possibilities within CG that would appear to be potential tools in the analyses of category changing affixes. First, one could try to use Functional Composition (Ades and Steedman 1982, Dowty 1985) by composing the affix of category YP/XP and the modifiers of XP of category XP/XP to get YP/XP. But there are at least two reasons for not pursuing this possibility: first, this would be applicable only in those situations where the affix and the modifier are contiguous as the following derivations show; secondly, it could be argued that this trivializes the notion of constituents since the status of an affix on the previous word and the following modifier combination (the italicized
segment in word₁ word₂ affix phrase₂ as a syntactic constituent cannot be defended even on a moderately unconventional interpretation of the notion.

Now consider the derivations in 26. In 26a functional composition can be effectively used to describe the facts because the adverb is contiguous to the verb and can be combined with the verb before the category changing affix applies to the verb, but in (b) it cannot, because the adverb is not adjacent to the verb:

26.a

| carefully | wash ing | the car |
| VP/VP     | VP/NP    | NP/VP   |
| FC        | VP/NP    | NP      |

26.b

| wash ing | the car | carefully |
| VP/NP    | NP/VP   | VP/VP    |
| FC        | NP/NP   | FA       |

At this point, the adverb cannot be combined with the expression washing the car because the argument that the adverb can combine with can only be a VP, not an NP.

The second option is to make the modifiers themselves input to a category-changing rule from XP/XP to YP/YP. This would allow the affix to combine with the lexical head of XP (which is XP/WP in the above schema) to form a YP/YP which when it combines with the argument
would form a YP. Since the modifier is category-shifted to YP/YP, the string would be generated. But this analysis would overgenerate (e.g. adverbials in English nominalizations would be category-shifted to NP/NP which then could (ungrammatically) modify ordinary NP’s and generate, for example, *ruthlessly destruction of the city); in addition, this certainly would be an ad hoc analysis.

2.4.2.4. Before leaving the issue of how CG can account for the phenomenon of category change in syntax, I would like to briefly discuss how CG could account for category change marked by no overt element – i.e. so-called *zero-affixation*. Category-changes that are marked by an overt element – a functional word or an inflectional affix – exhibit the functor-argument structure that CG imposes on complex expressions and are therefore easily accounted for within CG, whereas if the category-changing process involves no overt marking, an expression with the external syntax of YP and the internal syntax of XP cannot be factored into a functor of category YP/XP and an argument of category XP. Without the functor category, the change from XP to YP cannot be defined without additional assumptions/mechanism.

The bare-NP adverbials in English could be argued to be an example of category change without overt markers. However, the difference in the grammaticality of 27a and 27b can be taken as evidence that this is not an exceptionless, productive category-change and therefore not syntactic in nature (cf. Michael Geis, p.c.).

27. a. I wouldn’t do it that way.
   b. *I wouldn’t do it that manner.

If these are restricted to some lexical items, they could be listed in the lexicon due to the idiosyncracies.
2.5.0 Grammatical functions and grammatical categories

Furthermore, since the category of a phrase is a function of its external syntax and the functor-argument relationship between the constituents, category assignment in CG allows for a direct reflection of the grammatical relations that hold between constituent expressions (see Dowty 1982 for a discussion of grammatical relations in Montague Grammar.)

In X-bar grammars, the question of how grammatical relations are related to syntactic categories is presumably left to some other component of the grammar, since the X-bar conception of phrase-structure has nothing to say about how grammatical relations and syntactic categories are related. A syntactic theory that uses an X-bar phrase-structure component could define grammatical relations in several different ways: as functions of the structures in which phrases occur (e.g. Chomsky 1965, where NP of VP refers to the object NP, but NP of S is the subject NP); as primitives (as in Relational Grammar, and Arc Pair Grammar); as features on the phrasal node (e.g. NP [SUBJ], NP [OBJ] etc. as in Gunji 19xx); or the question could be entirely eschewed (as is done for the most part in the GKPS version of GPSG, except to note that they adopt Dowty 1982).

In CG on the other hand, the grammatical relations that hold between constituents are not separable from the notion of syntactic category. These various differences between the assignment of categories to phrasal expressions turn out to be rather crucial, as I will try to show in the remainder of this section. Below, I will discuss two examples which illustrate this difference.

First, I will take the two kinds of embedded clauses, complement clauses and adverbial clauses. In X-bar syntax, the category $S^1$ is assigned to both complement clauses and subordinate adverbial clauses. It should be mentioned here that any variation of this category
assignment which treats complement clauses and adverbial clauses both as higher projections of S is at issue here. (This includes the GKPS version of category assignment to the two types of clauses.) Such a category assignment is an inevitable result of the assumptions made in X-bar theories (cf. 3a - f above). Thus in X-bar theories, the two different semantic relationships of the $S^1$ to its sister constituent in the two constructions in 28a and 28b cannot be distinguished by the category assignment alone in X-bar theories:

28a

```
inform Mary that S
```

28b

```
cut the edge as you roll the side
```

Obviously, in 28a, the $S^1$ is the complement of the head verb while in 28b it is the modifier of the verb. Though the exact nature of the category $S^1$ is not clear to me, it is still a problem for X-bar syntax that it gives expressions the same category while their grammatical relation to their sister constituents are not the same in different constructions (or, as mentioned earlier, an X-bar syntactician might respond that these matters are to be accounted for in a different component).

(A possible X-bar defense on this issue might be to maintain that a distinction could be made between cases 28a and 28b in the case of the embedded clause cases X-bar syntax, not through category-assignment, but by differences in tree configuration. One could possibly represent the situation in 28a above with the trees in 29a or 29b below, and the situation in 28b above with the tree in 29c.)
But even assuming that the cases 28a and 28b can be differentiated by the configuration of constituents and tree structures, there still remains one question: Can two distinct structures be assigned to every such case where two different grammatical relations obtain between two expressions? Furthermore, regardless of what the answer to this above question turns out to be, the general point is that X-bar syntax does not assign any straightforward commonality in external syntax (or function) between "Adverb P" and "Adverbial Subordinate Clause" or "NP complement" and "S¹ complement" and "AdverbP" and "NP used adverbially". Of course, a possible X-bar response to this objection would be to maintain that grammatical relations and grammatical categories are distinct notions which must be stated distinctly in the grammar and category assignment to expressions is not and should not be made dependent upon the grammatical relations.

A second example is the case of "bare NP-adverbials" as they have been called (see Dowty
1989 for a discussion of the data and related issues), exemplified by the data in 30 (taken
from Dowty 1989)\textsuperscript{22}:

30. John met Mary every Thursday.
    Thursday morning.
    this Thursday
    the first Thursday
    Easter Sunday

where an NP stands in the modifier relationship to the VP.

In CG, however, the two types of clauses cannot be assigned the same category, because the
differences in their external syntax, as well as differences in the semantics of the combination
of these clauses with their co-constituents. The adverbial clauses (as in (b) above) would be
assigned \textbf{TV/TV}, or \textbf{IV/IV}. (Since these clauses can modify not just verbs, but VP’s and
clauses as well, such modifiers can have a more general categorization.) The complement
clauses on the other hand, are assigned a category that allows them to combine with verbs to
form VP’s. For the sake of simplicity, I will assume that they are assigned the category \textbf{S}\textsuperscript{1}, and
the verbs that take them as arguments have the category \textbf{IV/S}\textsuperscript{1}. The attempt within X-bar
theories to define grammatical relations such as (subject, object, etc.) in terms of the syntactic
structures and the grammatical categories has been abandoned since Chomsky 1965.
However, all informal representations of the X-bar schema define the differences between bar-
levels in terms of the grammatical functions that obtain between the head element and its
coclonstituents as shown in (31) below:

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\textsuperscript{22} Brian Joseph brought to my attention another instance of category change, where PPs occur
as arguments of other prepositions -- e.g. \textit{from before noon, from around noon}, etc.
The assumptions underlying the above schema can be spelled out borrowing the suggestions made within the CG tradition in Dowty (1982). The grammatical functions of arguments and modifiers can be straightforwardly defined in terms of the syntactic structure in which the constituents occur. In general, a category that is a sister and a daughter of the same category with the same bar-level specifications is a modifier -- e.g. AdjP is a sister to and a daughter of N\(^1\) and hence is a modifier.

If AUX's are treated as heads taking VP arguments to give another VP, then according to the definition above, they would have to be analyzed as modifiers. Notice that the same problem arises in the Categorial Grammar in defining grammatical functions in terms of grammatical categories: if modifiers are of the category XP/XP then, AUX's (which are VP/VP in most categorial accounts) are problematic to such an approach to defining the grammatical relation of modifiers. This fact that this is problematic on both approaches is due to the fact that PS grammars and CG being weakly equivalent, are using, in the above definitions of grammatical functions, exactly the same configurational information: the argument category in CG corresponds to the sister category in PS grammars and the resultant category in CG, to the
mother category in PS grammars. Of course, CG also identifies the functor-argument relationship among the co-constituents while PS grammars do not.

Furthermore, more specific grammatical relations can similarly be defined along the following lines:

(32) a. An NP dominated by an S is the subject;
    b. An NP dominated by a VP is the object;

2.5.1 Grammatical functions and grammatical categories in CG:

CG seems to be particularly efficient in providing a direct and simple characterization of grammatical functions since the categorization of expressions is primarily based on the external syntax. More specific grammatical functions such as the grammatical relations of subject and object can also be defined in terms of grammatical categories as has been suggested in Dowty 1982, 1983. In the absence of any arguments to the contrary, I will assume that all grammatical functions can be defined in terms of grammatical categories in CG.

2.6. Coordination in X-bar syntax and CG:

The long-held claim about coordination is that only expressions of the same category can be conjoined. In the context of the discussions in this chapter, where I have shown that the category label on an expression differs based on the criteria used in categorizing expressions, the above claim could either signify that only expressions with the same internal syntax can

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23. But Borsely argues that, contrary to the claims in Dowty 1982, that the subject is not the least oblique argument.
be conjoined, or that only expressions with the same external syntax can be conjoined. The first interpretation is consistent with the X-bar approach to categorization of expressions and the second, with the CG approach. Within the X-bar tradition, the first discussion of the inaccuracy of the first interpretation appears in Sag, Gazdar, Wasow and Weisler (1985), where facts such as those in 33,

33. a. Kim is a Republican and proud of it.
   b. Lee is on his way up and looking to take over.

where two expressions that would be categorized as NP and ADJP by the X-bar criteria are conjoined in 33a and a PP and a VP are conjoined in 33b. In GKPS, following Sag, Gazdar, Wasow and Weisler (1985) these facts are accounted for by subcategorizing the copular verb be for the underspecified category $X^2$. On the CG approach, since external syntax and the combinatorial potentials of expressions decide their category, both a Republican and proud of it can be assigned the same category -- namely $(S|NP)|V_{\text{copula}}$. With respect to these facts, both X-bar grammars and CG crucially use the subcategories of verbs.

However, there are similar facts where the external distribution, rather than the internal syntax that seems to determine conjoinability of expressions. Consider the facts in 3424.

34. An irresponsible and out of control person.
   He laughs nervously and with no joy.

In the above cases, expressions of "different" category are coordinated; CG predicts these facts since the coordinated elements are not of different category in CG.

24. Once Bob Levine was citing these facts while arguing that the GPSG account of coordination is inadequate. I was led to think about the differences between a grammar, such as CG, that takes the external distribution to be the primary criterion in category assignment and a grammar, such as GPSG, where category assignment is done based on form-class criteria.
Related facts about non-constituent coordination (Dowty 1984) and sluicing (Steedman 198x) all illustrate a similar point about the differences between X-bar syntax and CG in the way they can handle coordination. These facts cannot be accounted for in strict accordance with the X-bar assumptions about categories and about constituents since (the conventionally so-called) non-constituents cannot be assigned any category at all on the X-bar approach. Very often, within the X-bar conception of coordination and constituency, it has been claimed that coordination is not a test of constituency (see Steedman 1989, for a need to question the traditional notion of constituency).

2.7 A comparison of X-bar syntax and CG: A summary of differences and similarities

As a point of comparison of Categorial grammars and phrase-structure grammars, it has been known that bidirectional categorial grammars and context-free phrase structure grammars are weakly equivalent (see Pollard 1988, original proofs in Bar-Hillel 1958 and 1960). If in Categorial Grammars, it is necessary to use wrapping operations that are trans- CF, then, it could be asked if phrase structure grammars that try to observe context-freeness (such as GPSG) would need to enhance the CF grammar with 'mildly context sensitive' operations. As Pollard 1988 notes, the inadequacy of unadorned CF phrase structure rules and rules of combination in bidirectional categorial grammars have made the two traditions look for very similar devices to enhance the power of CF grammars in restricted ways. The HFC is used in GPSG to describe facts very similar to what the Head Adjunction (morphological wrapping) operation can describe. It was argued earlier that the present mechanisms in GPSG do not provide for a unified analysis of the various operations involved in category change.

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25. With the SLASH feature in GPSG, non-constituents can be assigned a category -- but notice that the insight behind the use of the SLASH feature is inherent to CG and is borrowed into GPSG though with slightly different significance.
especially the two subcases of category change – one marked by an affix and the other by a separate word. Several other syntactic phenomena such as Right Node Raising and extraposition also are still problematic within the GPSG literature. Thus, the necessity for the wrapping operation in CG, in contrast to the lack of such non-concatenative operations in GPSG, does not necessarily argue for the superiority of the analysis (analyses?) of category change that GPSG allows.

2.8 Conclusion

It has been shown that the differences in the basis for categorization of expressions in CG and X-bar syntax has consequences for how other theoretical constructs are defined and handled in the theory. In particular, CG takes the external syntax (i.e. the combinatorial possibilities) of the expression as the basis for categorization while X-bar syntax takes the notion of form-class and the notion of head as the basis for categorization. In CG, the primary relationship that holds between constituents of an expression is the functor-argument relationship while in X-bar syntax, the primary relationship between constituents is the head-nonhead relationship.

The aspects that prove to be problematic to X-bar syntax are the following:

a. the relationship between the internal and external syntax of an expression and its category;

b. the relationship between the category of an expression and the grammatical relation that obtains between that phrase and its co-constituents;

c. accounting for the phenomenon of category change and the various aspects of SPECIFIER+HEAD combinations while maintaining the fundamental claims of X-bar theory;

The aspects that prove to be problematic to CG are the following:

a. formalizing the notion of form-class or lexical category;

b. identifying the head of a phrase for purposes of morphosyntactic percolation;
In other words, since CG takes the external syntax of an expression to be the determinant factor in categorizing expressions, the aspects that do not straightforwardly follow the assumptions are those that pertain to the internal syntax. Similarly, since X-bar syntax takes the internal syntax to be crucial to the categorization of expressions, the aspects that do not straightforwardly follow the assumptions of X-bar syntax are those that pertain to the external syntax of expressions.
CHAPTER III

VERB PHRASES AS NOMINAL MODIFIERS

3.0. Introduction

This chapter examines a familiar class of constructions in languages where expressions with a verbal head – VP’s and clauses – serve adjectively, as nominal modifiers. This class includes the participles, (or reduced relative clauses, as they are sometimes called in Indic linguistics (cf. Nadkarni 1968, 1971)) and relative clauses. Section 3.1 gives examples of participle phrases in a variety of languages (Tamil, English and Chinese in 3.1, and Korean facts to be discussed later); a description of the Tamil facts (and some parallel facts from Korean), Chinese adjectivals and of English relative clauses within the framework of Categorial Grammar is outlined in section 3.2. In 3.4, a phrase-structure description of these facts is discussed; and in 3.5, the conclusions are summarized and a comparison is drawn between CG and PSG where it is shown that the similarities between relative clauses and participles can be expressed in a CG account of the two constructions whereas a phrase-structure account of the facts does not capture the commonalities the two constructions have.

Some of the issues (such as discontinuous constituents, obliqueness and word-order) which are discussed in this chapter are not germane to the phenomenon of category change; however, they are addressed in this chapter (cf. section 3.3), since these problems cannot be entirely side-stepped in giving an actual analysis of the facts examined here.
3.1.0. Tamil Participles (or 'reduced relative clauses'): The participle construction in Tamil is characterized by the following:

a. the head of the phrase is a verb, which is marked for tense (past or present)\(^1\), but not for subject-verb agreement; the participle marker -a attaches to this tensed form of the verb; these expressions with a verbal head -- verbs, verb phrases, and clauses (gapped or gapless) -- can all occur as pronominal modifiers when the head verb has a participial ending

b. the phrase headed by the verb has the distribution of pronominal modifiers

c. in Tamil participles, unlike English relative clauses, the only arguments that can be relativized are subjects and objects (including objects of complement VPs)

Some examples of Tamil participles follow:

1. paRag - in - a iTam
   use - PST -PRTP place 'familiar place'

2. it-ai ppaar-It-a paiyan
   this-ACC see-PST-PRTP boy 'the boy who saw this'

3. naan vaang-in-a pustagam
   l-NOM buy -PST-PRTP book 'the book I bought'

4. en -akku romba ppiDi-cc-a iTam
   I -DAT much like-PST-PRTP place 'a place I really like'

5. naan avan-e paaDikka cco-nn-a pustagam
   l-NOM he-ACC read-INF tell-PST-PRTP book
   'the book I told him to read'

6. naan antappustagatt-e ppaDikka cco-nn-a paiyan
   l-NOM that book-ACC read-INF tell-PST-PRTP boy
   'the boy I told to read that book'

\(^1\) There is also a future participle form which will not be discussed here. The future participles differ from the present and past participles in the realization of the participle-formation process: the form of the future participle form of a verb is phonetically identical to the form of the verb marked for future, and marked for agreement with a third, singular neuter subject.
In all of the above examples, the head verb of the prenominal modifier expression is in the participial form. In 1, the modifier phrase consists of just the verb; in 2, it consists of a VP; in 3, and 4, an object gapped clause (the difference between 3 and 4 being the case marking on the subject induced by the type of predicate -- in 3, we have an object-gapped clause with a nominative subject and in 4, an object-gapped clause with a dative subject); in 5, an object-gapped clause where the gap is in the complement (infinitival) VP; in 6, an object-gapped clause where the gap is the direct object position of the matrix verb which also has an infinitival VP complement; and in 7, a gapless clause. As with relative clauses in English, the modifying adjectival phrase can have gaps in subject or object positions as in 1 - 4; or have no gaps at all as in 7. (This is parallel to the noun complement clauses in English noun phrases 'the fact that S, the rumor that S, the claim that S' etc. The putative distinction between relative clauses/participles and the so-called noun complement clauses will be addressed shortly.) Notice that in all of these cases the element that marks these units as a modifier stays the same (i.e. it is -a in all the above examples). (Compare this fact with the use of the relative pronoun that in English, which marks noun complement clauses as in 'the fact that S' as well as relative clauses (see van der Auwera 198 for a survey of the literature on the issue of whether that is a true relative pronoun in English, or just a complementizer).

Incidentally, Tamil, unlike English, does not allow oblique arguments to be relativized, and thus subjects and direct objects (including direct objects of VP complements, as will be seen below) are the only arguments that are usually relativized in the participle construction. Oblique arguments are relativized only in the so-called "co-relative clauses", a construction which will not be dealt with here.
3.1.1 English participles: Similarly, English has participle phrases which exhibit the properties of adjectival phrases (especially, adjective phrases consisting of head adjectives and their complements). As Lapointe (1988, ms.) points out, participle phrases show the same kind of distributional variations as adjective phrases do. Both participle phrases and adjectival phrases occur prenominally and postnominally depending upon the presence or absence of the complements of the head adjective. Compare 8 and 9:

8. the old house (* the house old)
9. people angry with the administrators (*angry with the administrators people)

Similarly, lexical (vs. phrasal) participles (i.e. participle forms of verbs without their complements) can occur in prenominal positions, but participial phrases (participles with complements) cannot.

10. the sleeping child
11. the child sleeping on the floor (*the sleeping on the floor child)

For these reasons, the English participles (both active and passive) can be considered as adjective phrases.

3.1.2 Chinese adjectival phrases with de

In Chinese, expressions of various predicate categories (such as PP’s, VP’s) distribute like adjective phrases when they have the marker de (see Sheu 1990). Notice that de attaches to the end of such phrases, irrespective of the category of the last word in that phrase -- cf. 16 where de occurs after shang which is not a verb in Chinese; de also occurs after what seem to be adjectives and verbs in English, but it is a well-known fact that the distinction between adjectives and verbs is a moot one in Chinese. Thus it could be said that de occurs at the
end of phrases (which, in the examples below end with verbs/adjectives and postpositions, and is appropriately analyzed as an edge clitic.

12. zoutian lai de ren wo renshi
    yesterday come de person I know
    'I know the person who came yesterday'

compare 12 and 13:

13. ta zoutian lai
    he yesterday come
    'he came yesterday'

14. zhege yongong de xuesheng mei kaoguo
    this diligent de student not pass
    'this diligent student did not pass'

compare 14 and 15:

15. zhege xuesheng yongong
    this student diligent
    'this student is diligent'

16. zai zhuo shang de zian ni kanjian mei
    at desk top de money you see not
    'did you see the money on the desk?'

compare 16 and 17:

17. zian zai zhuo shang
    money at desk top
    'the money is on the desk'

3.2 A Categorial account of the participle marker -a

Before discussing the CG description of the Tamil facts, I would like to point out a few facts about Tamil word-order and casemarking that are relevant to any discussion of participle phrases and other embedded clauses. The constituents of matrix clauses can occur in roughly any order, but embedded clauses are strictly verb-final and the other constituents can occur in any order with respect to each other. Subject NP's are typically marked in the nominative (except in the so-called dative-subject constructions), direct object NP's in the accusative and
indirect objects in the dative; finite verbs agree with nominative subjects (but not with dative subjects) in person, number and gender.

In CG, as pointed out in Chapter II, phrase-level category changes can be accounted for by assigning a category of the type YP/XP (where X =/= Y) to the marker of the category change. In this section, I will try to flesh out this approach in describing the set of related facts about the participial marker -a in Tamil. As seen above, this affix can attach to all verbs (i.e. the form-class of verbs in X-bar terms) which have the distribution of prenominal modifiers.

Now, the ability of CG to capture the notion of form-class, or at least to identify all verbs in an elegant manner, is crucial in satisfactorily describing the Tamil facts, since the generalization about the affix is that it can attach to all verbs with or without their argument(s) and with or without modifiers. The categories of the expressions (in CG terms) to which -a attaches are listed below with corresponding examples:

18. $\text{SNP}_\text{nom}$ (or $\text{SNP}_\text{nom}$) (subject-gapped clauses)
   a. siricc - a mukam
      smile - a face 'smiling face'
   b. eliyai tturattin -a poonai
      rat-ACC chase-PST-a cat
      'the cat that chased the rat'
   c. nannaa ppaaTin -a kuRantE
      well sing-PST -a child
      'the child that sang well'

19. $\text{SNP}_\text{acc}$ (or $\text{SNP}_\text{acc}$) (object-gapped clauses)
   a. John paTicc -a pustagam
      John read-PST-a book
      'the book that J. read'
   b. John Mary-kku kkuTutt -a pustagam
      J. M.-DAT give-PST -a book
      'the book J. gave M.'
c. Mary John-e ppaTikka cconn -a pustagam
   M. J.-ACC read-INF tell-PST-a boook
   'the book M. told J. to read'

d. J. Mary - e paa -kka cconn -a paiyan
   J. M. -ACC see-INF tell -a boy
   'the boy who J. asked to see M.'

20. S_ (gapless clauses)

   a. nii vant - a viSayam
      you came - a matter
      'that you came'

   b. nii peesin -a vitam
      you speak-PST-a way/manner
      'the way you spoke/ the manner in which you spoke'

3.2.1. Participles/relative clauses vs. noun complement clauses

Even though all the three kinds of participles in 18 - 20 have the same marker and the same
prenominal distribution, it could be argued that the expressions in 18 and 19 are modifiers of
the head noun while the ones in 20 are complements of the head noun. For reasons that will
be discussed below, I will treat all of them alike -- as modifiers.

According to the distinction standardly made between relative clauses/ participles and noun
complement clauses, the participles in 20 (i.e. the gapless clauses with a prenominal
distribution) should be treated as complements of nouns like viSayam 'matter', vidam,'way'. These expressions can be assigned the category $S_{prp}$ combine with nouns of the
category $N/S_{prp}$ to reflect the fact that not all nouns can combine with the gapless participles
(compare 20 with *niil naTanta pustagam '**the book you walked' which is anomalous in
English too, for the same reasons). This is similar to the situation in English where both
relative clauses and noun complement clauses are marked by that as in the book that I asked
him to read, the fact that he read the book.
But, the distinction traditionally made between noun complement clauses and relative clauses need not be along the lines of complements and modifiers. An example of an analysis which does not treat gapless adnominal clauses as complements is Delacruz 1976, where, they are, in effect, treated as modifiers. A brief summary of the proposal made in Delacruz 1976 is given below.

Delacruz attempts to capture the similarities between two postnominal appositional constructions in English exemplified by the poet Shakespeare, and the fact that John walks. On his analysis, both these types of adnominal expressions combine with common nouns to yield common nouns, just as modifiers like relative clauses/participles do. He makes a distinction between proposition level expressions (e.g. that John walks) and individual concept level expressions (e.g. Shakespeare). Basic expressions of various categories such as nouns, verbs, adjectives, etc. are divided into two types -- those that combine with proposition level expressions and those that combine with individual concept level. For example, the common nouns fact, rumour, etc. are proposition level CNs whereas book, poet, etc. are individual concept level CNs. Both the proposition level and individual concept level expressions combine with basic common nouns (the former with proposition level CNs and the latter with individual level CNs) to yield common nouns; but the semantics of these adnominals restricts the set denoted by the common noun expression to a singleton set, as will be seen below.

The syntactic and semantic rules are given below:

(Propositional level apposition:)

If \( a \in P_T \) and \( \zeta \in B_{CN} \), then \( F_{22}(\zeta, a) \in P_{CN} \), provided that whenever \( a \) is of the form that \( \phi \), where \( \phi = P_T \), \( F_{22}(\zeta, a) = \zeta a \); otherwise \( F_{22}(\zeta, a) = \zeta \).

If \( a \in P_T \), \( \zeta \in B_{CN} \), and \( \zeta, a \) translate into \( \zeta', \alpha' \), respectively, then \( F_{22}(\zeta, a) \) translates into \( \zeta' \).
if $\alpha$ is not of the form $\text{that } \phi$, where $\phi \in P$, otherwise $F_{22}(\zeta, \alpha)$ translates into

$$\lambda P \left[ \zeta'(P) \land P = \uparrow \alpha' \right]$$

(Individual concept level apposition)

If $\alpha \in B_\tau$ and $\zeta \in B_{CN}$, then $F_{21}(\zeta, \alpha) \in P_{CN}$ provided that whenever $\alpha$ is of the form $\text{he}_n$,

$$F_1(\zeta, \alpha) = \zeta; \text{ otherwise, } F_{21}(\zeta, \alpha) = \zeta \alpha.$$  

If $\alpha \in B_\tau$, $\zeta \in B_{CN}$, and $\zeta$ translates into $\alpha'$, $\zeta'$ respectively, then $F_{21}(\zeta, \alpha)$ translates into $\zeta'$

if $\alpha$ is of the form $\text{he}_n$; otherwise $F_{21}(\zeta, \alpha)$ translates into

$$\lambda x \left[ (\zeta'(x) \land x = \alpha') \right] \text{ (i.e. } \lambda x \left[ (\zeta'(x) \land x = \alpha') \right]$$

On this analysis, the translation of the fact that John walks surprises Mary is

$$\exists q \left[ \forall p \left[ \text{fact'}(p) \leftrightarrow p = q \right] \land q = \uparrow \text{walk'}(j) \right] \land \left[ \text{surprise'}(m)(q) \right]$$

As an example of individual concept level expressions as appositions to common nouns, the translation of the expression the poet Shakespeare wrote Hamlet is

$$\exists y \left[ \forall x \left[ \text{poet'}(x) \land s = x \right] \leftrightarrow \uparrow \text{past \[write'(h)(s)\]} \right]$$

Notice that both these adnominal expressions map sets of individuals to a single individual, i.e. a singleton set, due to the unique description expressed by the identity predicate ($q = \uparrow \text{walk'}(j)$ in the example the fact that John walks above and $S = x$ in the example the poet Shakespeare). Compare these adnominals with the relative clauses or participles such as the book I read was boring which translates as

$$\lambda x \left[ \text{book'}(x) \land \uparrow \text{past \[read'(x)(i)\]} \right] \land \uparrow \text{past \[boring'}(x)\]$$
Relative clauses/participles translate into
\[ \lambda y_n [Q(y_n)] \]
Unlike noun complement clauses, they do not map sets of individuals into singleton sets, but into sets of individuals, which is reflected in the lambda abstraction \( \lambda y_n [Q(y)] \). The lambda abstraction creates the abstract property whose denotation is a set of individuals, and is the semantic correlate of a syntactic extraction in the clause. In the case of noun complement clauses, there is no syntactic gap, and there is an identity predicate that uniquely defines the noun, restricting the range to a single entity.

The relative clause/participle + head noun combination translates into
\[ \lambda x \ [ (x) & \lambda y_n [Q(y)] (x)] \]
Notice that relative clauses or participles are similar to intersective adjectives (such as red, feathered, etc.). Compare the translation of the relative clause/participle phrase + head noun combination the book I read with the above translations of noun complement clauses
\[ \lambda x \ [\text{book} (x) & \text{Past} \ [\text{read'} (x) (I)] \]
Despite this difference in the semantics between noun complement clauses and relative clauses/participles, they still show the following similarities: syntactically they are optional adnominal expressions -- i.e. nominal modifiers; semantically they restrict their domain (i.e. sets of individuals): in the case of noun complement clauses, to a singleton set, and in the case of relative clauses/participles, to a set of individuals which is the intersection of the domain set (\( x[\text{book'}(x)] \) in the above example) and another abstract predicate (\( \lambda x[\text{read} (x) (I)] \) in the above example).

Thus, the proposal in Delacruz 1976 allows the so-called noun complement clauses to be treated on a par with nominal modifiers such as relative clauses/participles, since on this
analysis, the so-called noun complement clauses combine with common nouns to yield common nouns just as modifiers do, even though the semantic rules for relative clauses are not entirely parallel to the ones above for gapless clauses as adnominal modifiers.

This analysis has two desirable consequences: first, it is able to explain the otherwise coincidental identicality of the relative pronoun that and the that of (putative) noun complement clauses in English; cross-linguistically, it is also significant that the marker of relativization is the same as the 'complementizer' in the so-called noun complement clauses in Korean and Tamil, as seen in this chapter. In addition, in English, both relative clauses and so-called noun complement clauses act as islands for the purposes of extraction.

Secondly, it enables us to express one of the generalizations about -a. One of the peculiar characteristics of affixes such as -a which serve to mark phrase level category changes is that the units to which these affixes attach range from whole (gapless) clauses, gapped clauses, VP's, to lexical verbs and in a handful of cases, sub-word units such as acategorial roots in the language. The serializing affix in the serial verb constructions also has the same range of units as its input (to be discussed in Chapter 5). The P(re)-N(ominal) E(nding) -n in Korean (as it is sometimes called in Korean linguistics), which is closely similar to the Tamil -a in its syntactic, semantic and morphological behavior, also has this property of attaching to units of various sizes and to sub-word elements (cf. Ahn 1989). The Tamil nominalizing element -tu attaches to the same range of input expressions (to be discussed in Chapter 4). Thus, these unrelated processes, not just within Tamil, but also in Korean, having the same range of input units remains suspiciously accidental, if one decides to treat the three kinds of prenominal expressions in 18 -20 not as instances of the same process.

For these reasons, both gapless clauses (as in 20) and gapped clauses (as in 18 and 19) that
combine with nouns will be treated as modifiers, and the proposal in Delacruz provides semantic motivation for this (cf. Lasersohn 1988 for a discussion of nominal appositions and nonrestrictive relative clauses along the lines of the proposal in Delacruz 1976).

In 3.2.2. and 3.2.3 below, a few issues preliminary to an analysis of the facts will be discussed such as the categorization of participle phrases, the characterization of the input to participle formation by -a affixation.

### 3.2.2. Categorization of participle phrases

The participle phrase as a whole can be categorized either as N/N (i.e. as functors); or as $S_{prt}$ (i.e. as arguments) which combine with nouns of category $N\backslash S_{prt}$ (analogous to treatments of English relative clauses such as Steedman 1985 where relative clauses are given the (argument) category $S_R$ and nouns the (functor) category $N/S_R$). The resultant category of the functor -a, then, is either N/N or $S_{prt}$, depending on the categorization of the participle phrase. To reflect the modifier nature of the participle phrases (evidenced by their recursiveness and optionality, and the semantics), I will assume that they are of the category N/N.

### 3.2.3. Categorization of the input to participle-formation

The generalization that the participle marker -a attaches to all verbs, with or without all their arguments, can be captured by categorizing this functor affix as follows:

- $-a \in (N\backslash N) \backslash (S\backslash S)$, where $S\backslash S = S$ (in the case of gapless clauses as in 20) or $S\backslash A$,

$(S|A_1)|A_2|...A_n$ where $A_1...A_n \in NP, VP$ (i.e. the arguments of the verb) (in the case of
subject or object gapped clauses as in 18 and 19)$^2$.

The syntactic and semantic rules for the affixation of -a for gapped clauses are given below:

If $\alpha \in (N|N) \setminus (S|S)$ and $\beta \in B(S|S)$ where $S|S = S|A$, $[((S|A_1)|A_2) \ldots A_n]$, $F_{18}(\beta, \alpha) = \beta$ -a

If $\alpha \in (N|N) \setminus (S|S)$ and $\beta \in B(S|S)$ where $S|S = S|A$, $[((S|A_1)|A_2) \ldots A_n]$, $F_{18}(\beta, \alpha)$ translates into

$\lambda P \ \lambda x \ [p^n(x_1) (x_2) \ldots (x_n) \wedge P(x_n)]$ where $n \geq k \geq 1$

The syntactic and semantic rules for the affixation of -a for gapless clauses are as follows:

If $\alpha \in (N|N) \setminus S$ and $\beta \in B(S|S)$ where $S|S = S|A$, $[((S|A_1)|A_2) \ldots A_n]$, $F_{19}(\beta, \alpha) = \beta$ -a

If $\alpha \in (N|N) \setminus S$ and $\beta \in B(S|S)$ where $S|S = S|A$, $[((S|A_1)|A_2) \ldots A_n]$, $F_{19}(\beta, \alpha)$ translates into

$\lambda P \ \lambda p [p^n(x_1) \ldots (x_n)] \wedge P(p)]$

An important aspect of the CG analysis outlined here concerns the notion of head and form-class in X-bar terms. Note that in specifying what the affix -a attaches to (i.e. basic members of the category $S|S$ where $S|S = S$, $S|A$, $S|A_1 A_2 \ldots A_n$, where $A \ NP$ or $VP$), we have, in effect, specified the head of these participle phrases, i.e. the form-class of verbs. In this case, the ability of CG to identify the right element in a phrase as the head, and to generalize over various subcategories of verbs has been demonstrated. (See Chapter 2, section 2.2.2 for a

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$^2$ It would seem that this category schema for the input to -a affixation is too general since it makes it possible for any verb -- even those that lack all their arguments -- to be made into a participle, especially in view of the observation that participle phrases have only one gap in them -- either a subject gap or a direct object gap. But there are good reasons why such a general schema is not entirely unjustified: the "pro-drop" properties of Tamil allow the overt absence of a verb's arguments which are nevertheless made available for semantic interpretation by the context (discourse context, pragmatic context, etc.). Thus the participle marker can attach to verbs irrespective of the number of arguments that are overtly absent.
3.2.4 A CG analysis of VPs as adjectivals:

Below I sketch a CG analysis by giving some derivations of participle phrases of the different types seen above. In this section, I will discuss Tamil and Korean participles, (and English participles in passing) and in 3.4 Chinese adjectivals, English participles and relative clauses. The analysis of all these adjectivals can be essentially summarized as follows: the category assignment to the marker of the participle phrase or the relative clause is such that it combines with gapped or gapless clauses to yield attributive adjectives (i.e. the affix -a in Tamil, -n in Korean, the relative pronoun that in English and de in Chinese are all assigned the category \((\text{N} | \text{N}) | (\text{S} | \text{NP})\) or \((\text{N} | \text{N}) | \text{S}\)). Unlike PS grammars, CG does not make use of empty categories and hence some problems arise that need to be addressed regarding word-order and the site of the relativized NP in the participle phrase (see 3.3).

The English participle phrases which act as nominal modifiers (e.g. The child sleeping in the crib is Mary's), which I will not discuss in detail in this section are accounted for in a way similar to the Tamil and Korean participles except that the -ing in English participles does not always attach to the end of the VP (since head verbs in VPs are not necessarily phrase-final, unlike in Korean and Tamil). Thus a different operation such as Head Adjunction seen in Chapter 2 (cf. Hoeksema 1985) will be necessary in describing the mode of combination of -ing and the VP in English participles. In addition, there are other differences between the languages in question -- Tamil and Korean on the one hand, and English on the other: the constituent order is relatively free in the former, while it is almost fixed in the latter. But I take word-order facts to be rather irrelevant to the present topic, and hence, except for the potential difference in the operation used in combining the marker of category change and the input phrase, the analysis of English participles as adjectivals will be similar to Tamil and
Korean adjectivals. The marker of category change -ing is assigned the category (N|N)|(S|NP) whose syntactic and semantic specifications are essentially the same as those for the participle marker for gapped clauses in Tamil. In all aspects most relevant to the issue of category changing, the English participles are treated analogously to Tamil and Korean participles.

In the following discussions of Tamil and Korean, both directional slashes (\ and /) and non-directional slashes (|) are used in the following discussions to describe the strict ordering between constituents in some cases, and the free ordering with respect to some other constituents. The categorization of the affix -a is represented by the schematic category (N/N)|(S|$) (where $ is either null or NP) as discussed above, and different instances of this category schema are used where necessary. (For instance, (N/N)|(S|NP) is used where the affix combines with gapped clauses and (N/N)\S is used where it combines with gapless clauses, and so on.) In addition, since the distinction between NP and N is not always overtly marked in languages like Tamil which have no determiners, I have used the category labels NP and N interchangeably in the following examples. Finally, the derivations in 21 - 25 represent only the desired result and are not actual derivations since they cannot be arrived at due to some problems concerning word-order and obliqueness which will be discussed in

\[3\] There are two issues that I have not dealt with in detail here:

First, the participle phrases are postnominal modifiers in English, while participles (i.e. the verb alone in the participle form without arguments) are prenominal modifiers. In English, the criteria determining whether a modifier is prenominal or postnominal are the same for both adjective phrases and participle phrases and thus rather than being problematic to the analysis of participle phrases as adjective phrases, it corroborates such an analysis. I assume here that the positioning of the participle phrase with respect to the head noun is to be accounted for by the same considerations as the positioning of adjective phrases and that it is sensitive to whether or not the head of the modifier phrase has complements.

Second, in the case of English participles, there are two varieties; active participles and passive participles. The former for subject gapped participles and the latter for object gapped participles (e.g. the child sleeping in the crib, the child reported as lost by the parents). The Tamil and Korean, the same affix marks both subject relativization and object relativization.
detail in 3.3.

21.
I - NOM read - PRTP book
S/(S|NP) (S|NP) (N|N) \ S|NP N

S|NP FA

S|NP FA

N/N FA

N FA

'the book I read'

λx [book (x) & read (x) (I)]

22.
I - ACC see - PRTP boy
NP (S|NP) (N|N) \ (S|NP) N

(S|NP) FA

(N|N) FA

N FA

'the boy who saw'

λx [boy (x) & see (I) (x)]
23. 
I him read-INF tell -PRTP book 
S| (S|NP) NP VPinf\NP ((S|NP)\NP)|VPinf (N/N)|(S|NP) N 
_________________________ FC 
((S|NP)\NP) 
_________________________ FA 
((S|NP)\NP) 
_________________________ FA 
(S|NP) 
_________________________ FA 
(N/N) 
_________________________ FA 
N
'the book I asked/told him to read'

λx [book (x) & ask [read (x)] (he) (!)]

24. 
I book-ACC read-INF tell PRTP boy 
S| (S|NP) NP VPinf\NP ((S|NP)\NP)|VPinf (N/N)|(S|NP) N 
_________________________ FA 
VPinf 
_________________________ FA 
(S|NP)\NP 
_________________________ FA 
(S|NP) 
_________________________ FA 
(N/N) 
_________________________ FA 
N
'the boy I told/asked to read the book'

λx [boy (x) & ask (read (book) (x)) (x) (!)]
In working out an actual analysis of the Tamil facts within CG, it is necessary to address the issue of word-order and obliqueness that does not directly relate to the main concerns of this dissertation. The discussions in 3.3 deal with the details of that issue while at the same time show how the Tamil and Korean data can be derived within CG.

3.3 Obliqueness and word-order

Now, it is necessary to address an issue which is not directly related to the main concerns of this dissertation; but in order to give a fairly concrete account of the facts above within CG, some working assumptions about word-order and obliqueness of arguments must be developed.

In the case of subject relativization (cf. the derivation in 22 above) the order in which the arguments combine with the verb is easy to account for. But in the case of object extractions, (cf. 21, 23, and 24) the subject (which is less oblique than the extracted argument) has to
combine with the verb before the object.

3.3.1: Morrill 1987, in a description of various phenomena where the verb and the subject have to be treated as a constituent (e.g. topicalization, object relativization, right node raising, etc.), uses a combinator \( R \) (mnemonic for Right Node Raising) which ensures that the argument that combines first with the verb is interpreted as the \textbf{subject}, not as the object. \( R \) is defined on two other operations \( f \) (Forward application) and \( b \) (Backward application). The syntax and the semantics of these operations are as given below\(^4\):

\[26\]
\[\begin{align*}
\text{a. } f &: A/B + B \implies A \quad (\text{e.g. } (S\NP)/NP + NP \implies S\NP) \\
&= \lambda v \lambda y [v(y)] \\
\text{b. } b &: B + A\backslash B \implies A \quad (\text{e.g. } NP + (S\NP) \implies S) \\
&= \lambda x \lambda v [v(x)] \\
\text{c. } Rfb &: C + (A\backslash C)/B \implies A/B \quad (\text{e.g. } NP + (S\NP)/NP \implies S/\NP) \\
Rfb &= \lambda x \lambda v \lambda z [bx(fvz)] \quad (= \lambda x \lambda v \lambda z [vzx])
\end{align*}\]

By the definition of \( Rfb \) above, the subject and the verb can be combined into a constituent before the object combines with the verb: for instance, in the object gapped participles seen above, the sub-expression I read in \textit{the book I read} is of the category \( S/\NP \) and its semantic translation is

\[\lambda x [\text{read}(x)(l)].\]

\(^4\) I have changed the original rules in Morrill 1987 in an extremely inconsequential way: I have used the variable \( v \) in the above rules as standing for verbs for mnemonic convenience (rather than the several variables \( y \), etc. in the original rules in Morrill 1987) and shall continue to do so in similar rules in the rest of this section.
Secondly, in Morrill (1987), the distinction between the English relative pronouns who and whom, a distinction that many dialects of English do not have, crucially figures in distinguishing subject relativization from object relativization, since the former is categorized as (N/N) / (S\NP) and the latter as (N/N) / (S/NP).

Neither of these can be used in describing the Tamil facts since the linear order with respect to the verb does not distinguish subjects from objects in Tamil and the rules that allow the combination of the verb with its object and the subject-predicate rules cannot be distinguished by the forward vs. backward application distinction; furthermore, unlike the English relative pronouns who and whom, the participle marker is invariant between subject relativization and object relativization.

3.3.2 Sheu 1990 discusses the problems with Morrill's suggestions in the face of some facts above Chinese adjectivals (which are similar to Tamil participles), where the word-order does not distinguish subjects from objects, and proposes rules such as the ones in 27a and b that correspond to the ones in 26a and c respectively. 27a describes the combination of the direct object with the verb, whereas 27b is needed for cases where the subject combines with the verb before the direct object does.

27. a. NP + (S\NP) |NP = S\NP (semantics: \lambda v \lambda y [x (y)])
   
   b. NP + (S\NP) |NP = S\NP (semantics: \lambda v \lambda x \lambda y [v (y) (x)])

But as we shall see below, these rules cannot describe some of the facts about Tamil participles. In the following section, I suggest that information about case-marking can be used for languages that have morphological case-marking.
3.3.3 For languages like Tamil and Korean, one could use the case marking on the arguments to allow some variation in the order in which the arguments combine with the functor. This is a viable and not-too-adhoc approach for two reasons: first, languages with relative free word order typically have the relevant information encoded through morphosyntactic endings such as case; secondly, a complete description of morphologically rich languages must ultimately incorporate case marking and hence any further applicability or the utilization of such information in the grammar is only a desirable by-product.

As far as the facts about Tamil participles are concerned, owing to extraction possibilities and word-order variations, there are three situations that warrant some mechanism that would allow less oblique arguments to combine with the functor before more oblique arguments do:

(i) the subject combines with the (transitive) verb before the object does (in the case of object extraction)

(ii) the direct object combines with the (ditransitive) verb before the indirect object (due to word-order variations in subject extractions)

(iii) the subject combines with the (ditransitive) verb before the indirect and direct objects do

Below I sketch an analysis that employs rules similar to the ones in proposed in Morrill 1987 and Sheu 1990. One could distinguish subjects from objects by marking the least oblique of the obligatory arguments (which is usually the subject) as $NP_{nom}$ and the next least oblique of the arguments as $NP_{acc}$, and the indirect object as $NP_{dat}$. Thus, a IV would be of the category $(S|NP_{nom})|NP_{acc}$ and a TV would be of the category $(S|NP_{nom})|NP_{acc}$, and a DTV ((($(S|NP_{nom})|NP_{acc})|NP_{dat}) and the rules that let these functors combine with their arguments are given below all of which are backward application rules since the canonical word-order in Tamil is head-final, even though non-directional slashes are used in the category of the verb to reflect the fact that the word-order is not strictly head-final:

\[
\textbf{b: } B + A \setminus B = A
\]
semantics: $\lambda x \lambda y [ (x) y ]$

The relevant instances of this backward application rule are as follows:

$\mathbf{b}_1$: $\text{NP}_{\text{nom}} + (S|\text{NP}_{\text{nom}}) = S$

semantics: $\lambda y \lambda v [ v (y) ]$

$\mathbf{b}_2$: $\text{NP}_{\text{acc}} + (S|\text{NP}_{\text{nom}})|\text{NP}_{\text{acc}} = S|\text{NP}_{\text{nom}}$

semantics: $\lambda x \lambda y [ v (x) ]$

$\mathbf{b}_3$: $\text{NP}_{\text{dat}} + ((S|\text{NP}_{\text{nom}})|\text{NP}_{\text{acc}})|\text{NP}_{\text{dat}} = (S|\text{NP}_{\text{nom}})|\text{NP}_{\text{acc}}$

semantics: $\lambda w \lambda x \lambda y \lambda v [ v (wxy) ]$

Now I will define two new operators $\mathbf{R}_{1bb}$ and $\mathbf{R}_{2bb}$ as follows:

$\mathbf{R}_{1bb}$: $\lambda v \lambda y \lambda x [ b (bv(x)) (y) ]$

($= \lambda v \lambda y \lambda x [ v (xy) ]$)

$\mathbf{R}_{2bb}$: $\lambda v \lambda y \lambda w \lambda x [ b (bv(w) (x)) (y) ]$

($= \lambda v \lambda y \lambda w \lambda x [ v (wxy) ]$)

$\mathbf{R}_{1bb}$ allows a less oblique argument before one (and only one) more oblique argument. This rule is similar to Morrill's $\mathbf{Rfb}$ that allows subjects to combine with the (transitive) verb before direct objects do. This rule also allows the direct object to combine with the (ditransitive) verb before the indirect object. Thus the following two combinations (among others) are possible via $\mathbf{R}_{1bb}$:

$\text{NP}_{\text{nom}} + ((S|\text{NP}_{\text{nom}})|\text{NP}_{\text{acc}}) = S|\text{NP}_{\text{nom}}$
\[ NP_{\text{acc}} + (((S|NP_{\text{nom}})|NP_{\text{acc}})|NP_{\text{dat}}) = ((S|NP_{\text{nom}})|NP_{\text{dat}}) \]

\( R_{2,bb} \) allows a less oblique argument to combine with the functor before two other more oblique arguments. For instance, it allows the subject NP to combine with a DTV before the verb’s indirect object and direct object do. Thus, we can now get \( NP_{\text{nom}} + (((S|NP_{\text{nom}})|NP_{\text{acc}})|NP_{\text{dat}}) = ((S|NP_{\text{acc}})|NP_{\text{dat}}) \) and the \( NP_{\text{nom}} \) is still interpreted as the subject, due to the semantics of \( R_{2,bb} \).

With these additional combinators, the object extraction cases that were problematic in 21, 23, and 24 above, can be derived as shown below:

28.

\[
\begin{array}{cccccc}
\text{I} & \text{nom} & \text{read} & \text{- PRTP} & \text{book} \\
NP_{\text{nom}} & (S|NP_{\text{nom}})|NP_{\text{acc}} & (N/N)S|NP & N \\
\hline
S|NP_{\text{acc}} & R_{1,bb} & & & & \\
\hline
N/N & FA & & & & \\
\hline
N & FA & & & & \\
\hline
\text{‘the book I read’}
\end{array}
\]

29.

\[
\begin{array}{cccccc}
\text{he-dat} & \text{l-nom} & \text{give} & \text{- PRTP} & \text{book} \\
NP_{\text{dat}} & NP_{\text{nom}} & ((S|NP_{\text{nom}})|NP_{\text{acc}})|NP_{\text{dat}} & (N/N)(S|NP) & NP \\
\hline
(S|NP_{\text{acc}})|NP_{\text{dat}} & R_{2,bb} & & & & \\
\hline
S|NP_{\text{acc}} & FA & & & & \\
\hline
N/N & FA & & & & \\
\hline
N & FA & & & & \\
\hline
\text{‘the book I gave him’}
\end{array}
\]
At this stage, there are two possible ways the expressions could combine: (a) the infinitival verb could combine with the accusative NP to its left by FA (as shown in 31 below); or (b) the infinitival verb could combine with the matrix verb by FC (as shown in 32 below):

Now, in the derivation in 31, the infinitival verb combines with the accusative NP to its left by functional application and thus the NP is semantically the object of the verb. In 32 however, the main verb combines with the infinitival verb by function composition yielding a complex three place predicate. Now, at this stage, this complex predicate category could combine with the accusative NP by functional application and the semantics of 31 and 32 will be identical even though there are two possible derivations possible. This situation can be avoided by
even though there are two possible derivations possible. This situation can be avoided by stipulating (not too haphazardly) where an expression can combine with two adjacent elements by either functional application or by functional composition with no difference in semantics, it combines by functional application alone (see Wittenburg 1987 on eliminating spurious ambiguity and redundant derivations in CG).

Another issue regarding word-order and obliqueness in the sentences of the type given in 32 is predicting an ambiguity that does occur. The accusative NP to the left of the infinitival verb in 31 and 32 can be interpreted as the object of either the infinitival verb or the main verb. A phrase given in 33a could have both the meanings given in 33b and 33c.

33a. naan jaan - e paa - kka conn - a paiyan
l-nom John-acc see -inf tell - prtp boy

33b. the boy I told to see John
33c. the boy I told John to see

In other words, one has to allow for the combination of the accusative NP as an argument, either with the infinitival verb (as in the derivation in 31) or with the main verb. One could attempt to do this by function composing the infinitival and the main verb (as in 32) and somehow combining the more oblique argument of the complex three place predicate. This raises the same question as discussed above about allowing less oblique arguments to combine with a functor before more oblique arguments. Using the combinators $R_1bb$ and $R_2bb$, two different derivations can be given that will reflect the ambiguity.
In the derivation in 34a, the NP John combines by FA with the composed verb 'tell to see' as the outermost argument, i.e. as the argument of see. (Notice that this reading can also be arrived at by applying the infinitival verb see to John by FA. These two derivations are
However, in 34b, this NP John combines with the composed verb tell to see by \( R_{bb} \) as the inner, more oblique argument — as the direct object of ask/tell rather than as the object of see. These two derivations result in two different interpretations, thus accounting for the ambiguity described in 33.

In Korean, the phrases that correspond to the meanings given in 33a and 33b are closely similar to the Tamil facts with some differences in case-marking. The above problem does not arise in describing a subset of the related Korean facts because the case on the NP to the left of the infinitival verb differs based on whether the NP is interpreted as the object of the infinitival verb or the main verb. This set of Korean facts is given below:

35. hay-ka John-il po-ki-il yoku-ha-n sony n
   I-nom John-acc see-nml-acc ask-tns-prtp boy
   'the boy I asked to see John'

36. hay-ka John-eke po-ki-il yoku-ha-n sony n
   I-nom John-dat see-nml-acc ask-prtp boy
   'the boy I asked J. to see'

(Note: In the above glosses, 'nml' stands for 'nominalizer'.)

These Korean facts can be easily described in the following way similar to the cases in 28-30 above. The derivations are given below:

37.
\[
\begin{array}{cccccc}
\text{I-nom John-acc see-nom-acc ask} & \text{PRTP boy} \\
\text{NP}_{nom} & \text{NP}_{acc} & \text{VP}_{inf} & \text{NP}_{acc} & \text{((S|NP)\{(NP)\}(N/N)} & \text{N} \\
\end{array}
\]

\[
\begin{array}{c}
\text{FA} \\
\text{VP}_{inf} \quad \text{FA} \\
\text{((S|NP)\{(NP)\}(N/N)} \\
\end{array}
\]

\[
\text{(S|NP)\{(NP)\}}
\]
The ability to describe within CG the Korean facts which are so similar to the Tamil facts using the casemarking as a way of keeping track of the order of the combination of the arguments with a functor suggests that this approach is in the right direction.

Finally, the Korean facts are similar to the Tamil facts in that the type of ambiguity found in Tamil (as exemplified in 33) arises in Korean too, even though with a different case-marking pattern. The fact that in Korean case marking distinguishes the object of the infinitival verb from the object of the main verb does not mean that in Korean the situation found in Tamil is entirely absent. In fact, there is another casemarking pattern shown in 39, for the type of phrases in 36, whereby the object of the main verb is marked in the nominative, instead of the dative in 36.

Now, with the alternation in case marking, a situation parallel to the one in Tamil arises, where relative clause is ambiguous in the same way as the Tamil relative clause in 33a is ambiguous. The relevant type of relative clause is given in 40a which is ambiguous between the two meanings in 40b and 40c.
40a. John-nom Mary-acc see-nom-acc ask- - prtp boy

40b. the boy who asked J. to see M.

40c. the boy who J. asked to see M.

As the meanings in 40b and 40c show, the nominative NP John can be interpreted as the subject of the verb ask or the object of that verb. In other words, the nominative NP should be allowed to combine with the verb either as the outermost argument or the inner (i.e. the more oblique) argument. These facts can be described in the same way as the Tamil facts in 33 were accounted for in the derivations in 34a and 34b, where an argument which satisfies the case-marking required by two functors can either combine with the composed functors either as the outermost argument by FA or as the inner argument by R₁bb.

The suggestions in the CG literature for letting arguments combine with the functor in a different order from the one imposed by the category of the functor (such as Morrill 1987, Sheu 1990 discussed above) and the suggestion made in this section that uses information about the case marking all fail to describe all the facts about the participial phrases in Tamil and Korean discussed above.

3.3.4 Following the suggestions made in Karttunnen 1984, 1986, Shieber 1986, and other works, the above facts could be described using unification. When a functor of the category (S|NP_{nom})|NP_{nom} which combines with an argument of the category NP_{nom} the argument could unify with either of the arguments of the functor; and similarly, with respect to the Tamil facts in 33, an argument of the category NP_{acc} could unify with either one of the NP_{acc} arguments of the functor ((S|NP_{nom})|NP_{acc})|NP_{acc}, but not with the NP_{nom} argument (cf. the partial derivation in 34).
In addition, unification needs to be incorporated into the CG framework to describe facts about inflectional morphology. For example, to simulate the effects of a mechanism such as the HFC in GPSG, one could say $VP<AGR> = V<AGR>$, which amounts to feature-passing.

3.3.5 All the approaches outlined above allow for the combination of more oblique arguments with a functor do so by stipulating semantic rules that are specific to the syntactic combination thus allowed. There is another recent proposal in the literature that deals with this issue in a very different way. Hepple 1990 attempts to incorporate the treatment of Grammatical Relations within Montague Grammar in Dowty 1982. Hepple notes the proposals in Dowty 1982 are cast within the tradition of classical Montague Grammar, the semantics of all syntactic operations are specified individually for each syntactic rule; a system such as Categorial Grammar in which the semantics is specified for each syntactic rule type, not individual syntactic rules, cannot straightforwardly incorporate the theory of Grammatical Relations as found in Dowty 1982 for the following reason: it is not always the case that the combination of the least oblique argument with the functor can be described as a concatenative operation because of word-order facts such as those seen in the previous sections.

Hepple attempts to incorporate within Lambek Calculus a modified version of Dowty's theory of Grammatical Relations without distinct semantic rules for the combination of the functor with different arguments. He does so by

41. a. factoring out two different kinds of information: first, the order of subcategorization by a head for its complements -- this order corresponding to obliqueness; and secondly, the directionality of each argument (i.e. the direction in which the head seeks each of these)
b. introducing a (lexical) process of head location, which determines the position of the head relative to its complements and
c. enhancing Lambek Calculus with two additional operators and inference rules

3.4. Category change marked by a separate word in CG: As discussed in Chapter II, cross-linguistically, phrase-level category changes are marked not only by inflectional affixes, but also by clitics and function words. Some examples of functional elements other than inflectional endings on the head of the phrase marking the category change from clauses to nominal modifiers are the English relative pronouns such as who, whom, which, that and the Chinese functional element de. Again, as pointed out in Chapter II, CG can account for this type of category change in a way similar to the treatment of category changes marked by inflectional endings. Analogous to the category assignment to the participle marker in Tamil and Korean, the functional element de in Chinese and the relative pronouns in English are also assigned the category (N|N) | (S|NP) (where word order differences between the two languages are represented as differences in the direction of slashes). The Chinese adjectivals have been given a CG analysis in Sheu 1990 and the relative clauses in English in Steedman 1985, Morrill 1987 and the (even though not in the context of the phenomenon that this dissertation focuses on). The issue of distinguishing subject-extraction from object-extraction and the suggestions made in Sheu 1990 and Morrill 1987 for the Chinese and English facts have already been discussed in 3.3. Hence I will not give sample derivations here of the Chinese and English facts; instead, I wish to focus on the most relevant aspects of these analyses: in all of them, the element I call "the marker of category change" is assigned a category of the form (XP|YP) and this element is a function word in the language (without lexical content), not unlike the inflectional endings that mark category change. Thus, the word de in Chinese and the relative pronouns in English are both assigned the category (N|N) | (S|NP), which is the same as that assigned to the participle
marker in Korean and Tamil. The category assignment in CG to all these elements expresses the similarity in the participle / relative clause constructions in these languages. All these elements take as their argument a (gapped) clause and yield a nominal modifier.

3.5. A Phrase Structure analysis of VPs as nominal modifiers

As pointed out in Chapter 2, a phrase structure account of adjectivals with verbal heads can be given following the various proposals within PS grammars. Some possibilities will be sketched in this section and in the following section (3.5) a comparison will be made between the CG and PS analyses.

3.5.1 Rules such as ADJP —> VP [VFORM:PRTP] / NP, which could be used to describe the Tamil facts, are not consistent with the basic assumptions of X-bar syntax, since this violates endocentricity.

A related proposal in Jackendoff 1977 can be extended to the Tamil participles which would allow rules such as ADJP —> -a VP; however, this rule violates not only endocentricity, but also the Lexicalist Hypothesis which is observed in most of the current PS theories of syntax.

3.5.2 One could extend the suggestions made in Pullum 1991 and describe the Tamil facts with the rule in (42)

(42) ADJP —> H [VFORM:PRTP]

It was observed that the notion 'head' is considerably weakened in his analysis of the English gerunds in that the notion is used more like a primitive notion, and has much less substantive content. It is used in as a default notion, even though there is no characterization within GPSG of the situations this default relationship fails and no suggestions as to the correlates of the
situations when this unique identification of head fails, as to whether any other element in the phrase shows head-like properties. But, at least in the case of English gerunds, labeling one of the daughters as the head is not entirely vacuous given the binary branching rule needed to describe English gerunds (owing to the (optional) presence of possessive NPs in English gerunds). In the case of Tamil participles, the facts warrant a unary-branching rule such as the one in (42) given above. In this case, labeling the only daughter as the head does serve the purpose of avoiding an exocentric rule such as ADJP $\rightarrow$ VP[PRTP] but is entirely vacuous use of the notion 'head'. The same point must be made with regard to the adverbial serial verb construction which will be discussed in Chapter V since that construction too, has to be described by a unary-branching rule on this approach.

While Pullum's strategy for describing the English gerunds can be extended to cover Tamil participles (and presumably Korean prenominal modifiers), his claim that the notion 'head' is not without content is considerably harder to maintain.

3.5.3 Adjectivals not marked by an inflectional ending on the head within PS grammars

As has been noted earlier, not all the elements that can mark category changes are inflectional endings on the head - - consider the facts about the Chinese adjectivals given in 12-17 above (cf. Sheu 1990). The occurrence of predicate phrases as prenominal modifiers is marked by the element de which is considered to be a word (or at least the morphological status of which is closer to that of a word than an affix). Phrase Structure accounts of this kind of category change are necessarily treated in a very different way from how category changes marked by inflectional affixes are treated. Recall the discussions in Chapter 2 on how complement clauses in English are described in PS grammars and how the notion 'head' is questionable in the COMP+S combinations and similar constructions. It was claimed in
Chapter 2 that PS grammars cannot reflect the similarities between two classes of constructions in which the X-bar generalization about the category-identicality between the head and the phrasal projection does not hold; it was also shown that no systematic attempt can be made to express the generalizations about these constructions without significantly modifying the assumptions of X-bar syntax due to the fact that X-bar theories treats these two classes as mere exceptions to the generalizations about phrase construction. In the absence of such a unified characterization of these constructions, the analyses within X-bar of such constructions only serve to bring out the need for such modification because each analysis is characterized by ad hoc assumptions or devices.

For instance, Pullum's account of the English gerunds, while it can be extended to cover other instances of category change which are marked by an inflectional affix on the head, cannot cover Chinese adjectivals (which are syntactically and semantically very similar to Tamil, English, and Korean participles) because in Chinese, this category change is marked not by an inflectional ending on the head, but by a separate word. Consider the facts given in 15 - 18 on Chinese adjectivals: predicative expressions (PP's, VP's, etc.), when they are followed by the function word de occur as prenominal modifiers. If Pullum's analysis were to be successfully extended, the Chinese facts must be characterizable by the rule ADJP -> H[VFORM:PRTP] where [VFORM:PRTP] is an inflectional form of the verb (presumably marked by the suffixation of de). But considering the morphological typology of Chinese, positing inflectional forms for lexical categories is not easily defensible. Secondly, if de is to be treated as an inflectional affix attaching to verbs, it must not occur after words of any category other than verbs. But unlike inflectional affixes, de does not necessarily attach to verbs but can occur after the last word in the phrase and therefore is more like a word than an inflectional affix (cf. 16).
A phrase-structure account of Chinese adjectivals must treat them necessarily differently from the participles in Tamil, Korean and English even though the Chinese adjectivals are also a case of category change from VPs to ADJP's. The PS accounts of Chinese adjectivals will be similar to the accounts COMP+S constructions within PS grammars, since both these are category changes marked by a separate word, and not by an affix. Any PS account of Chinese adjectivals must essentially use some variation of the rule in 43:

43. ADJP ---> VP de

Some of the possible variations on this analysis are sketched below:

Instead of mentioning the function word by its form, the element de can be assigned some (minor) category.

Or, a rule such as VP [ATTR : +] ---> VP de could be posited and rules that expand NPs mention VP [ADJ:+] (and not ADJP) as the modifier, as in 44a:


Or, following the GKPS treatment of complement clauses, one could generate Chinese adjective phrases with the rule in 44b:

44b. X^2 [ATTR: de] ---> H[ATTR: NIL], [SUBCAT: de]

where the difference in the value for the feature [ATTR] between the mother and the daughter is simply stipulated, and equally stipulative is the necessary identicality of the value de for the feature ATTR on the mother and SUBCAT on a non-head daughter.
Or, the rule in 44b could be modified in a way that does not have the same degree of stipulativeness as 44b does. 44c illustrates such modification:

44c. $X^2 [\text{ATTR:+}] \rightarrow H[\text{ATTR: NIL}], [\text{SUBCAT: de}]

In 44c, just as in 44b, the mother and the head daughter have different values for the feature [ATTR], by stipulation. But, in 44c, unlike 44b, the non-head daughter and the mother do not show any similarity in the value for the features [ATTR] on the mother and [SUBCAT] on the non-head daughter. Thus 44c is less ad hoc and stipulative than 44b.

However, it is not always possible to modify rules like 44b into apparently less stipulative versions as in 44c. Consider embedded complement clauses such as I wonder whether fish sleep, I think that fish sleep (see 2.4.1.4 and 4.4.2). In GKPS, the ID rule that describes complement clauses is S[COMP:@, W] $\rightarrow$ [SUBCAT:@], H[COMP:NIL, W], where the mother and the head daughter necessarily differ in the value for the feature COMP and the mother and the non-head daughter necessarily share the value for the features [COMP] and [SUBCAT]. This rule cannot be modified in a way 44b was, as seen in 44c, because it is not sufficient to mark the mother category as [COMP:+] since COMP is not a binary-valued feature in English -- i.e. the range of possible values for COMP in English is not simply {+ , -}, but {that, for, whether, if, NIL}.

Thus, 44b is an example of the format of rules in GPSG which describe category change marked by a separate word. 44c, while it describes the Chinese facts given here, does not illustrate a general strategy of improving rules such as 44b, as the situation with the COMP+S constructions in English shows.

5. In addition, it is possible that the feature ATTR is not binary-valued in Chinese, just as COMP is not, in English. If VPs and clauses in Chinese can be marked by elements other than de and if the choice among these elements is relevant to the distribution of the phrase, then 44b which
Another example of category change from VPs or clauses to nominal modifiers marked by a function word are the English relative clauses. In GKPS, relative clauses are licensed by rules such as the following (GKPS, pp.155)

45. S[+R] --> NP[+R], VP
46. S[+R] --> NP[+R], S/NP
47. S[+R] --> PP[+R], S/PP

The category S[+R] is sister to N^1 and also daughter of N^1 which, in X-bar terms, means that it is a modifier to a N^1. Inspite of this, there is no provision in the theory to relate this nominal modifier category with a verbal head to the other nominal modifiers with a verbal head. In other words, the category label S[+R] does not express the similarities between relative clauses and other nominal modifiers such as adjective phrases or participle phrases. This label also helps to bypass the issue of why a sentential category (which of course has a verbal head) occurs as the sister of a N^1 category as a modifier, since its distribution as a nominal modifier is simply stipulated by the rules. The other question that is not addressed which undermines the basic claims of X-bar theory is the following: of the two daughters of the mother category S[+R], (for example NP[+R] and VP in rule 45 above) which is the head? According to GKPS, the VP is the head in 45, the S/NP in 46 and S/PP in 47, because [R], which is a value for the feature [WHMOR] is a Foot Feature and Foot Features can be passed to the mother category from non-head daughters. It is interesting to note in this connection that the only three Foot Features posited in GKPS are RE (whose values can be REFLEX(ive) or RECP (=reciprocal), WH (whose values are REL(ative), Q(uestion), etc.) and SLASH. The SLASH feature is very different from the other two features in that the information carried by SLASH concerns unbounded dependencies, whereas the other two carry information that is**

generates Chinese adjectivals cannot be modified into 44c. But I have not investigated Chinese facts with respect to this question.
cross-linguistically marked by inflections, function words, clitics these features (e.g. reflexives are often expressed as inflectional endings on the head verb, as in Tamil and Sanskrit, even though in Sanskrit this is not the only means of expressing reflexivization; one of the element that marks coordinations in Sanskrit is a second position clitic (the clitic ca in Sanskrit) and in Tamil edge clitics (um in Tamil). Excepting SLASH, the other features and values carry morphosyntactic information which do not come from the head daughter but are relevant at the level of the mother. First, the three features in GKPS posited as the set of Foot Features do not form a natural class, since SLASH is of a very different nature from the other two. Secondly, there is no proposal, not even a suggestion, as to the substantive definition of Foot Features, as to what kind of information is in the realm of Foot Features. Thus it seems that, excepting SLASH which is irrelevant for morphosyntactic purposes, the notion of Foot Features in GKPS provides a way of gathering grammatical information from different loci in the phrase which are not realized on the head, while at the same time maintaining, at least superficially, the X-bar claim that the head is the locus of all morphosyntactic information relevant at the level of the phrase.

In summary, the generalization that is being missed (or hidden) in GKPS by the invention of Foot Features is that function words, clitics, inflectional endings on the head all carry the same kinds of information cross-linguistically. The reason the participle phrases in English (or Tamil or Korean) and the adjectivals in Chinese cannot be described similarly in GPSG, inspite of the similarities and inspite of the fact that they are problematic to the same claims or assumptions in X-bar theory is as follows: GKPS assumes that they must be different because the grammatical information is realized as an inflectional ending on the head and in the latter, as a function word. Notice however, that the X-bar claim about the category identicality between the mother and the head daughter is falsified in both cases.
3.6. A comparison of CG and PS grammars

In X-bar based PSGs, irrespective of which of the above variations is used to account for the facts, the following still remain true:

a. the assumption about the category of the head and the distribution of the phrase cannot be straightforwardly maintained here;

b. (related to a) the unique identification of the head is not possible here; (cf. Warner 1989 and discussions on Warner and the notion of 'head' in Chapter II)

c. Accounts of category change marked by an affix (such as English gerunds, Tamil or Korean participles), with their own peculiar deviations from the standard X-bar assumptions, differ from accounts of category change marked by a separate word (such as English complement clauses or Chinese adjectivals) which, in turn, violate some assumptions in X-bar syntax.

There is no explanation of why these two types of constructions, which are treated as though they had nothing in common, demand some modification to the same assumptions made by the X-bar view.

d. Finally, X-bar grammars have no means of expressing the similarities between these two subcases of category change.

Contrast this to the Categorial analyses of these two cases: in both types of category change, there is a functor category \((N/N) \ (S|$)\) (i.e. the marker of the category change) and there is an argument category \((S|$)\) (i.e. the input to category change, the clause or VP) which combine by FA.

In PS grammars, which treat the head – dependent relation as the primary one holding between the constituents of a phrase, the situation where the external syntax of a phrase is a direct function of the form-class of their heads (e.g. VP’s with the distribution of predicates) is
the only one that follows the predictions of the theory. Cases such as participles in Tamil and
Korean or the attributives in Chinese and English relative clauses, where the external
distribution of the phrase is not directly predictable from the form-class of the head have to be
treated by some additional assumptions that weaken the theory.

In CG, which takes the functor - argument relationship to be basic, the claim about the
primacy of this relationship can still be maintained in the face of the facts presented in
chapter. Both the types of phrase construbtion – one in which the X-bar notion of category
identicality of the head and the phrase and the notion of a unique head are preserved; and
the other where such notions cannot be maintained (such as English gerunds or Chinese
adjectivals) – follow the general principles of CG: that is, in both, the basic functor-argument
relation holds between the constituents and in both the distribution of the phrase is
determined, not by form-class consideratios, but by specifications of the functor category in
terms of its argument category and the resultant category. In addition, the generalizations that
can only be captured by positing the notion 'head' can be captured in CG by deriving the
notion 'head' as a secondary notion, in terms of the notions functors and arguments. (See the
discussion on Tamil participles where the 'head' notion is used to make the affix -a attach to
the 'head' of a clause, i.e. the form- class of verbs, and note that this notion is defined,not as
a primitive notion, or one based on form-class, but purely in terms of functors and arguments
which are the primitive notions in CG.)

6. Another difference between the CG and X-bar analyses of the facts has to do with the
absence of the notion of empty categories in CG, which are allowed in PS grammars, both
transformational and monostratal. In describing the facts about the extraction in the participle
phrases and relative clauses, PS grammars can locate the site of the extracted NP by positing
empty categories. In CG, on the other hand, the site of the extracted NP is kept track of indirectly
in the way in which the functor combines with the non-extracted arguments, and sometimes by
semantic rules that are specific to the syntactic rules that allow the functor to combine with non-
CHAPTER IV  
NOMINALIZATION

4.0. Introduction

Perhaps the commonest example of phrase-level category change is the occurrence of VPs, clauses, and adjective phrases as verbal and adpositional arguments -- i.e. in typical NP-like slots, as exemplified by English nominalizations such as gerund VPs (e.g. John’s breaking the record was a surprise), complement clauses (e.g. That John broke the record surprised us), Tamil nominalized clauses and complement clauses, the details of which will be discussed below (sections 4.1, 4.2). The various examples of nominalizations differ in several respects as the following observations show: complement clauses in English and Tamil occur as subjects and objects, but not as adpositional objects or oblique objects, whereas the gerund VPs in English and nominalized clauses in Tamil occur as verbal and adpositional arguments; the subject NPs of complement clauses occur in the nominative case in English and Tamil, whereas the subject NP in gerund VPs in English occur in the possessive case.¹ In morphologically rich languages, nominalized VPs, clauses and adjective phrases take on some morphosyntactic properties of NPs such as case-marking. Despite the interesting issues regarding the semantics of nominalizations, due to time and space limitations, I will not be

¹ It has been argued in the literature (Pulum 1991) that the possessive NP in nominalized gerunds is not the subject, but the determiner. It has been argued in Chapter II (section 2.4.1.3) that there are no compelling reasons against treating the possessive NP as the subject, and that it could be argued that they are not determiners in the gerund construction. Irrespective of whether they are determiners or subjects, the observation made here remains -- namely, there are differences among the various instances of category change from VPs or clausal expressions to NP-like expressions.
discussing the semantic aspects of nominalizations here. (For a semantic theory of nominalization, see Chierchia 1988.)

In this chapter, I use the term 'nominalization' to refer to the NP-like distribution of this broad range of non-NP categories (VPs, clauses, adjective phrases, and where particular differences between complement clauses and nominalized clauses are under consideration, the term 'sentence complementation' will be used as distinct from 'nominalization'^2 (especially in the section 4.2.0). Sometimes I will use just 'complementation' instead of 'sentence complementation, while still reserving the use of the term to just the occurrence of clauses, and not NPs, or VPs for instance, as complements. By nominalization, I refer to the distribution of phrases with a non-NP internal syntax in all the typical NP positions -- as subjects, objects, oblique objects and adpositional objects, while complementation is defined in this chapter as the distribution of sentences as subjects and direct objects alone. It should be clear from the context when the term 'nominalization' is used as a general term and when it is used in opposition to the term 'complementation'.

Several instances of nominalization will be discussed in 4.1, particularly from Tamil and English and in 4.2 complementation in English and Tamil will be discussed and the question

^2 Whether or not an embedded clause is termed 'complement clause' in traditional use seems to be determined by two separate, though related, criteria: first, the occurrence of the clause as the complement of some lexical item (e.g. the verb think, the adjective odd) just as NPs, VPs, ADJPs are complements of some lexical head; secondly, the presence of a complementizer. It is not always easy to decide when to treat the 'that/whether/if + S' constructions as complement clauses and when not to: for instance, it was shown in the previous chapter that the so-called 'noun complement clauses' are better treated as adnominal modifiers (cf. 3.2.1); also, if clauses occur as adverbials as conditionals and as complements of verbs like wonder.
of whether complement clauses should be treated as NPs in their external distribution and
whether complementation is a type of nominalization and an instance of category change will
be addressed. In 4.3. and 4.4, a CG and X-bar account of nominalization and
complementation respectively will be outlined and discussed. A comparison of the two
theories will be made in 4.5 with respect to the facts about nominalization.

4.1.0 Nominalizations in Tamil and English

In this section, nominalization will be discussed as distinct from complementation, in the sense
of the terms as defined above. One of the nominalizations (-tu nominalizations) in Tamil will be
discussed in detail, and facts about the English gerunds will be used in the discussion, even
though I do not give an extensive analysis of English gerunds in this chapter due to the fact
that they are very similar to the -tu nominalizations in Tamil and they have been discussed at
length in Chapter II. They have often been discussed in the literature (cf. Chomsky 1970,
Emonds 1976, Jackendoff 1977, Pullum 1991) will be treated here as nominalizations of VPs3
(see 4.1.3). Some examples of the gerund VPs in English are given in 1.

1. a. John’s rejecting the offer surprised everyone.
   b. I find typing on this computer much easier.
   c. Nothing was said about your fixing the copier.
   d. Breaking the record was a surprise.

4.1.1. Nominalization in Tamil

Tamil has at least two different phrase-level processes of nominalization: the first is a

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3. If the possessive NPs in VP gerunds are analyzed as the subject of the gerund VP rather
   than as the determiner, then the gerund constructions could be considered as the nominalization
   of clauses rather than of VPs.
nominalization of VPs marked by the affixation of -tal; the second, of the participle phrases seen in Chapter III marked by -tu. Both these two processes of nominalization are very similar and I assume that they are accounted for in the same way in any theory. Hence I will discuss only the -tu nominalization in detail. The -tal nominalization, which will not be discussed in this chapter, has been discussed in detail in Subramanian 1988, where it is shown that the process of affixing -tal to the verb has the effect of nominalizing, not the verb itself, but the whole phrase headed by the verb, and is hence a phrase-level nominalization and cannot be treated as a word-level process. (There is yet another process in the language which is more appropriately described as complementation, and is marked by the function word enru, which will be discussed in the next section, where the putative distinction between nominalization and complementation will be addressed.)

4.1.2. -tu nominalizations in Tamil

The affix -tu in Tamil marks the nominalization of prenominal adjectives in the language. Recall from the discussions on Tamil participles in the previous chapter that the affix -a marks the category change from (gapped or gapless) clauses to attributive adjectives. Thus, the input to -tu nominalizations are the participle phrases marked by -a. In addition to the participles, -tu also attaches to some deictic particles in the language as will be seen below.

-tu attaches to units of different morphosyntactic and categorial status – first, it attaches to deictic elements whose morphological or syntactic status is not clear. The only property of these deictic elements that seems to be certain is that they are bound, that they are sub-word units.

2.a. atu 'that, that thing'

b. itu 'this, this thing'

c. etu 'which, which thing'
Notice that a-, i-, and e- are analyzable units in 2, a pattern also found in other pronominal paradigms:

3. a. avan 'he (the one over there, non-honorific)'
   b. ivan 'this one (masc. sg. non-hon.)'
   c. evan 'which one (masc. sg. non-hon.)'
4. a. avaL 'she (that one, non-hon.)'
   b. ivaL 'this one (fem. sg. non-hon.)'
   c. evaL 'which one (fem. sg. non-hon.)'
5. a. ange 'there'
   b. inge 'here'
   c. enge 'where'

From 2 - 5, it is clear that a-, i-, and e- are analyzable bound elements in the language. This makes it even more difficult to identify the status of elements like -tu. In addition, -tu also attaches to some of the few adjectival roots in the language – e.g. tii- 'bad', siri- 'small', ari- 'rare, few', koDi- 'deadly' etc. as can be seen from the data in 6. (I call these elements roots because they do not occur alone.)

6. tii 'bad'
   (cf. tilitu 'bad thing')
   siri 'small'
   (cf. siritu 'small thing')
   ari 'rare'
   (cf. aritu 'rarity/ rare thing')
   koDi 'deadly'
   (cf. 'koDitu' 'deadly thing')

All the other facts about -tu involve the participial form of verbs which is marked by the suffix -a; -tu attaches to the small class of adjectival roots + -a sequences (cf. 7); all participial forms of verbs which are the heads of relative clauses (cf. 8 and 9); participial forms of verbs...
participial forms of verbs which are the heads of gapless clauses (cf. 10) just as a subcategory of common nouns do (cf. 11).

7. cinn - a pputagam
   small - a book 'small book'
   cf. cinna - tu 'small one, small thing'

8. kTe - cc - a iTam
   be found -pst - prtp place 'available space' Adj.
   cf. kTecca - tu 'anything available/available thing'

9. naan paTi - cc - a pustagam
   l-NOM read - pst - a book 'the book I read'
   cf. naan paTicca - tu 'that which I read'

10. kuppe laari va -nd-a- t(u) -e ivan - taan paar -tt -aan
    trash lorry come-pst-a- tu -ACC this man-only see-PST-he
    'It is this man who saw the garbage truck coming'

11. nii va - nd -a viSayatt - e ivan -taan ena-kku co-nn-aan
    you come-pst-a matter-ACC he-only l-DAT tell-pst-he
    'It is this man who told me that you've come'
    (lit. it is this man who told me the matter that you've come')

The generalization that the facts in 7 - 11 suggest is that -tu has the distribution of common nouns since it combines with prenominal modifiers in the way common nouns do.

This generalization accounts for all the facts except the combination of -tu with the deictic elements as seen in 2 a - c, since in both in X-bar theories and CG these elements are more likely to be categorized as determiners than as modifiers. The fact that in Tamil, common nouns, unlike -tu, do not combine with the demonstrative elements a-, i- and e-seems to have to do with the historical development of these elements rather than significant differences in the distribution of common nouns and -tu. In High Tamil (which preserves historically prior patterns) common nouns do combine with the demonstrative elements – e.g. appuli 'that tiger', innaaDu 'this country' etc. In Malayalam too, common nouns combine with these
demonstratives – e.g. aa puli 'that tiger', ii naaDu 'this country', etc. However, in modern Tamil, the demonstratives anta, inta and enta combine with common nouns and do not combine with -tu, and a-, i- and e- combine with -tu and do not combine with common nouns.

Given the facts in 7 - 11, and the historically earlier properties of the demonstratives, -tu could be analyzed as having the same distribution as common nouns⁴; as a degenerate common noun, bleached of lexical content, with the meaning (roughly) 'the set of things'; or equally plausibly, as a functional element in the language which has the same distribution as common nouns and which changes attributive adjective phrases into nouns and demonstrative elements into noun phrases⁵. This element -tu in Tamil is at least partly similar to the (phonologically reduced) 'un' in some dialects of English (e.g. the small 'un').

The external syntax of the -tu nominalizations will be discussed now. The examples in 12 show that nominalized clauses occur as the objects of transitive verbs, and are marked accusative as objects typically are:

12a. nii va - nt - a - t - e avan kITTe yaar so - nn - aa
    you come-PST-PRTP-NOM-ACC he to who tell-PST-3PL
    'who told him that you've come?'

b. nii va - nt - a - t - e naa paa - tt - een
    you come-PST-PRTP-NOM-ACC I see-PST-1 SG.
    'I saw that you came/I saw you coming'

⁴. A similar description and analysis can be given of the other nominalizers -van, -val, -var seen in 3 and 4, even though there is one difference between -tu and these affixes which can easily be accommodated: these nominalizers, unlike -tu, do not combine with gapless clauses -- a difference that can be explained by the fact that -tu alone is like nouns such as rumour, claim, etc. that can combine with a proposition level expression (cf. Delacruz 1976, and discussions in Chapter III, 3.2.1).

⁵. The distinction between nouns and noun phrases in Tamil cannot be determined in the same manner it is determined in languages like English, where the category 'Determiner' can be defended.
The data in 13 show that nominalized clauses in Tamil can be postpositional objects (and therefore oblique arguments of verbs in some cases). The case marking on the nominalized clause is determined by the postposition, which governs it.

13.

a. nii va - nt - a - t(u) - e ppatti kaNNan enkiTTe soll-a-le
   you come-PST-PRTP-tu-ACC about Kannan l-DAT say-INF- NEG
   'Kannan told me about your having come'

b. nii eRut-in -a-t - ep poola avan - um eRut -a -laam
   you come-PST-PRTP-NOM-ACC like he - too come-INF-may
   'he can come just as you came'

The occurrence of nominalized clauses in the nominative case are given in 14. (I refrain from calling these nominative cased expressions subjects, for the reasons to be discussed in the next section, which are put forth in detail in Sridhar 1976.)

14. a. en - akku nii va - nt - a - tu piTikk - a - le
   l-DAT you come-PST-PRTP-NOM like - INF-NEG
   'I don't like (the fact) that you came'

b. ellar - ukku - m nii va -nt - a -tu teri -yum
   everyone-DAT-POLAR you come-PST-PRTP-NOM know-3SG.NEUT
   'everyone knows that you came'

To summarize the relevant properties of -tu nominalizations, they have the external distribution of NPs and the internal makeup of VPs, or clauses (whose category has been changed to prenominal modifiers by the affixation of -a).

4.1.3. English gerunds

The gerund VPs in English are an instance of phrase-level category change since they show
the internal syntax of VPs in the following respects (cf. Pullum 1991 for a summary of all the
relevant properties of the English gerunds):

15. The following properties characterize gerund VPs in English (cf. Pullum 1991 for a
summary)

a. the head, in X-bar terms, is of the form-class +V, -N
b. the head is modified by adverbials, not by adjectivals (e.g. Her carefully reading the whole
manuscript saved us a big embarrassment.)
c. the phrase can be negated by not, which marks negation in VPs (e.g. Your not having read
the draft shows your lack of interest)\(^6\)
d. the phrase can be marked for aspect

They show the external syntax of NPs in their distribution as subjects, objects, and
prepositional objects. In addition, it has been argued in Pullum 1991 that gerund VPs have
one of the internal syntactic properties of NPs -- namely the presence of the possessive NPs.
But it could be argued that the possessive NP in gerund constructions is the subject of the VP
and not the determiner of the NPs (see Chapter II, 2.4.1.3). In any case, gerund VPs show the
internal syntax of VPs and the external syntax of NPs.\(^7\)

4.2.0. Sentence complementation in English and Tamil:

As has been noted in the literature, complement clauses in English -- both finite and nonfinite -

\(^6\) not marks negation in NPs too (e.g. Not the men over there, but the women over here, were
the guilty ones), where it occurs before the determiner. In the gerund VPs in English, the not
occurs after the determiner, which shows that the gerund VPs are different from NPs in this
respect.

\(^7\) Arnold Zwicky has pointed out to me that the gerund VPs in English do not have all the
external distribution of NPs since they cannot occur as the possessive determiners of other NPs
as the following ungrammatical example shows: *your disagreeing with me's point is to assert
yourself.
- occur in what are apparently subject and object positions and hence can be said to have some of the typical distributions of NP's (Rosenbaum 1977, Jackendoff 1977), as seen in (16 a - c) below:

16. a. That John came at all surprised me.
   b. That John would come was not expected by everyone.
   c. Everyone believed that John would come.
   d. That John said that to his boss to her face shows that he's an idiot.®

But:

17. *The ancients didn't know about that the earth is flat.

In 16 a and b the complement clause is the subject and in c it is the object. In d, both the arguments of the verb are complement clauses. Unlike gerund phrases, complement clauses cannot be described by a category changing, unary-branching rule, since they do not have all the distributions of NPs. In other words, the rule in 18 makes the wrong prediction that complement clauses occur as prepositional objects (cf. 17).

18. NP --> S^1

One could argue that it is possible to account for the occurrence of complement clauses in object position without positing such a rule, since the verb can be subcategorized for phrases of different categories, not just NPs. Thus rules such as 18 are not needed; a rule such as 19 is sufficient to account for complement clauses as objects:

19. VP --> H[4], S^1

® David Dowty pointed out to me this fourth class of verbs that take complement clauses as arguments -- the class of verbs that take propositions as their subjects and objects (e.g. implies, proves, shows, etc.)
While the occurrence of complement clauses in object positions can be described purely in terms of subcategorization (and not as category change), the subject position is generally assumed to be not subcategorized by the verb. (In HPSG, they are assumed to be subcategorized.) One could hypothesize that all the NP-like occurrences of complement clauses -- complement clauses in subject position included -- can be treated as being subcategorized. In other words, the occurrence of complement clauses in subject positions is restricted to a subcategory of verbs that subcategorize for subjects, just as other verbs ordinarily subcategorize for objects. Below I will discuss the properties of the types of predicates that take a complement clause as subject, and suggest that the complement clause in subject positions is more like an object rather than subject.

The occurrence of complement clauses in subject positions seems to be restricted by the kind of predicates in the higher clause. In English, the four types of predicates that allow a COMP+S subject are as follows:

20. (i) psych predicates (e.g. *That John walks surprises Mary*)

(ii) passive VP's (e.g. *That the she'd resign was not expected*)

(iii) some copular predicates (e.g. *That it's going to rain is obvious*)

(iv) verbs that take propositions as subjects and objects (e.g. *That John said that to his boss to her face shows that he's an idiot*)

Now, psych predicates in English are often viewed as involving a "flip" of its arguments, by which it is meant that the subject argument of the verb is interpreted as the object and the
object as the subject. In addition, the subject-like properties of objects and object-like properties of subjects in these constructions has some overt reflexes in psych constructions in languages like Tamil as will be seen below. Thus this suggestion is also tenable for the Tamil facts to be discussed below (as indeed, Sridhar 1976 argues, the nominative NP in the dative subject constructions in Kannada and other Dravidian languages are in fact the objects, and the dative NP's, the subject). In many other languages, the psych predicates involve some atypical characteristics such as quirky case-marking (such as the double nominative construction in Korean, which also involves psych predicates and other closely related kinds of predicates such as copular predicates with stative adjectival phrases (cf. Jo 1989). In Quechua too, the 'experiencer' NP in these constructions is marked in the nominative, and the 'experiencer' in the accusative and agreement fails, the verb carrying a default third, singular, neuter marker (cf. Cole 1981). (Compare the possibility of extraposition in English with a dummy it as in 'It surprised me that you came; it is a pity that you couldn't come', etc. in psych constructions.)

The distribution of COMP + S construction in Tamil are closely parallel to the English facts. In Tamil, complement clauses, marked by the function word enru (reduced to nnu in colloquial Tamil, which is probably more like a clitic than a separate word), occur as direct objects of verbs such as ninai 'think', sol 'say'; and apparently as the subjects in the so-called 'disative-subject construction', a construction found in most Indic languages where the 'experiencer' is in the dative subject (cf. M.K. Verma 1976). In addition to the complement clauses, the occurrence of -tu nominalizations as subjects of transitive verbs is also restricted to the dative-subject construction. Some examples of the dative subject construction are given below:

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9. I use this term "flip of the arguments" only as a pretheoretical metaphor. I do not assume a transformational analysis of any sort that actually moves phrases from subject position to object position or vice versa.
Now some examples of complement clauses in (putative) subject position are given below in 22 a and b, 22 c and d have -tu nominalizations. Notice the similarities between the examples given below and the examples of dative subject construction given in 21 above:

22.

a. kaTai muuDiDuttu -nnu enakkut teri- yaatu
   shop has closed- COMP I -DAT know-3 SG NEUT-NEG
   'I didn't know that the shop has been closed'

b. puune marattla irukkum-nnu avalukkut tooNi-ttu
   cat tree-LOC will be-COMP she-DAT occured-3SGNEUT
   'It occurred to her that the cat might be on the tree'

c. en - akku nii va - nt - a - tu pITikk - a - !$e
   I-DAT you come-PST-PRTP-NOM like - INF-NEG
   'I don't like (the fact) that you came'

d. ellar - ukku - m nii va - nt - a - tu teri -yum.
   everyone-DAT-POl you come-PST-PRTP-NOM know-3SG.NEUT
   'everyone knows that you came'

Observe that the clauses nominalized by -tu in 22 c and d and the non-dative NP's in 21 a and b are in the base form without any overt case-markers, which in Tamil is taken to be the nominative, since the nominative case in Tamil coincides with the base form of the noun. The complement clauses marked by enru/nnu are not marked for case.

The dative-subject construction is characterized by the following features:

23. a. among the arguments of the verbs are a nominal expression in the nominative case
(either an NP with a N head or nominalized clauses) and an NP in the dative case;

b. the verbs in these constructions have the same semantic range as the 'psych' verbs in languages like English;

c. (related to b) the argument in the dative case is understood as the 'theme', 'patient', the entity affected by the action;

d. even though in other constructions in the language the expression in the nominative case satisfies the criteria for 'subjecthood', in this construction, the expression in the nominative case has none of the properties of the prototypical subject NP – it does not trigger agreement on the verb, in terms of the canonical word-order it has the position of objects, etc. (see Sridhar 1976 for various arguments that the dative NP in this construction is the subject, and the nominative expression is the object, despite the atypical case marking in this construction).

e. the verb is marked for third person, singular neuter in this construction. (This in conjunction with the fact that the nominative expressions in this construction are usually third, singular, neuter (e.g. the fact, that he came, chocolate, etc.) has led several Dravidian linguists to assume that the nominative NP is the subject in this construction, because it is marked as subjects in Tamil are, and it seems to trigger agreement on the verb). However, the third singular neuter seems to be the most preferred default 'agreement' marker on verbs when agreement fails. In Quechua, in very similar constructions, agreement with the 'logical' subject fails and the verb carries a third, singular, neuter marker.

In Korean, psych verbs and similar predicates are involved in what is sometimes called
*double-subject* constructions, because in these cases both the arguments are marked in the nominative leading some linguists to think that this construction has two subjects (cf. Jo 1989).

Based on the cluster of properties that psych verbs trigger in the constructions that they participate in, in various languages, it might be a plausible analysis that the complement clauses in English, and the nominalized clauses in Tamil do not have the general distribution as subject when there is an 'experiencer' NP in the sentence, but occur as subjects only in those constructions where the theme is interpreted as the subject -- i.e. psych constructions, passives, etc. and in copular predicates, where the two arguments of the copular verb are not necessarily analyzed as the object and the subject.

Thus it could be argued that the fact that the occurrence of COMP+S constructions in the subject position is restricted to the above three types of predicates is not syntactic in nature, but semantic. Expressions that are clearly NPs in their internal syntax, such as abstract NPs, pattern with complement clauses and nominalized clauses in their occurrence in subject positions and they still have to be analyzed as NPs (e.g. Your honesty is frightening). The restrictions on the occurrence of complement clauses in subject position alone does not argue for distinguishing complement clauses from NPs and nominalizations. However, the impossibility of complement clauses in adpositional object slots makes it necessary to distinguish them from NPs and nominalizations.

### 4.2.1 Nominalizations Vs. Complement clauses:

Thus, an analysis of complement clauses that does not posit a category changing rule has to explain only complement clauses in object position and subject position. The former is not unusual since verbs are standardly assumed to be subcategorized for the number and
category of their arguments. The latter, namely complement clauses in subject position, however, is not as easily explained since verbs are not assumed to be subcategorized for their subject argument. But it has been shown in the above section that complement clauses occur as subjects in those constructions where the subjects are more object-like than subject-like and hence can be assumed to be subcategorized for.

On the other hand, if complement clauses are treated as a case of category change, then they cannot be category changed into NPs without being overgenerated as prepositional objects in English and Tamil. One possibility is to change their category, not into NPs, but into a special category that verbs and VPs alone can take as arguments. The standard label $S^1$ will serve the present purposes. Complement clauses in object positions are allowed by verbs of the category VP/$S^1$ and in subject positions they are allowed by verbs of the category ($S/S^1)/$ $S$ (where $S$ stands for the non-subject argument(s)).

Now, it has been noticed by several linguists working on embedded clauses of various types that gerund VP’s and complement clauses have differences in their distribution since the former, but not the latter, can occur as prepositional objects in English (Rosenbaum 1976). In Tamil, clauses nominalized with -tu can be the objects of postpositional objects, as seen in 13; but clauses with the complementizer -enru cannot. Thus, the gerund VP’s in English, and the nominalized clauses in Tamil are more like NP’s in their distribution than are complement clauses in either language (cf. 24 a and b).

24. a. I was not informed of the dangers of leaving my dissertation in the freezer.

   b. * I was not informed of that he is in town. (cf. I was informed of his being in town)

   c. I was not informed of his being in town.

Barring this difference, the facts about the occurrence of both gerunds and complement
Clauses in the subject position in English are the same as discussed above - i.e. both gerund VP's and complement clauses occur as subjects only with psych predicates or passive VP's. This might argue for a syntactic differentiation between these two types of embedded clauses and not a semantic one.

In addition, there are other facts in English that suggest that claims about the non-occurrence of complement clauses as prepositional objects are questionable. Consider the following example that shows connectivity between the position of a prepositional object and a complement clause:

24c. That he is an alcoholic, no one is willing to talk about.

Moreover, whether clauses are in fact acceptable as prepositional objects in some cases such as the following:

24d. I am not sure about whether or not I should go.

The committee debated about whether or not to take down the bird pictures on the library door.

For these reasons, I will assume that the complement clauses are not qualitatively different from nominalizations, that they are as much an instance of category change as any other process I have discussed in this dissertation.

4. 3 A CG analysis of Tamil nominalizations

In this section, I will outline the CG analysis of the Tamil facts described above. The basic strategy used in CG in describing category changes is to assign the marker of category
change a category of the type XP/YP. In addition, a distinction needs to be made between cases such as the English gerunds, -\textit{tu} nominalizations in Tamil where the input category gains all the external distributions of another major categorial phrase (in this case NP) and cases such as the \textit{that}+\textit{S} clauses in English which can occur in subject and object positions but not as prepositional arguments, and hence positing a general, unrestricted category-change into NPs in the case of complement clauses will only overgeneralize.

To distinguish between these two cases of category change, the marker of category change in English gerunds and Tamil -\textit{tu} nominalizations is categorized as NP/(N/N) and the complementizers that mark the category change in complement clauses as S'/S. A more detailed discussion of complement clauses will follow the discussion on gerunds and nominalizations. -\textit{tu}, which marks nominalizations, attaches only to the head verb, whereas \textit{enru/nnu}, the complementizer, does not attach to any specific word in the sentence that it combines with -- it attaches to the last word of the sentence that it complementizes, irrespective of the category of the word that it phonologically leans on. Hence the categorization of \textit{enru/nnu} is simply (S'/S), without reference to any particular word inside the sentence, such as the lexical head.

As mentioned above, the central aspect of the CG analysis is to assign the category-changing marker a category of the type XP/YP and in the case of the -\textit{tu} nominalizations, the element -\textit{tu} is assigned the category NP/(N/N) and the element -\textit{tal} is assigned the category NP/VP. The major part of the analysis of -\textit{tu} nominalizations is included in the analysis of the participles in Tamil (discussed in Chapter 3) since the input to -\textit{tu} nominalizations is the output of participle-formation, since in Tamil, gapped and gapless clauses are first category-changed to prenominal modifiers by the affixation of -\textit{a} and then category-changed to NPs by -\textit{tu}.
The -tal nominalizations, on the other hand, are a case of category change from VPs directly into NPs. Perhaps due to the fact that this particular nominalization is not a synchronically active construction in Tamil (even though it is still found in highly formal varieties of High Tamil as mentioned above), this construction has a restricted use as VP nominalization without subject NPs and sentential modifiers.

To return to the case of complement clauses, the class of verbs that can take complement clauses as objects is restricted to the lexical and/or semantic class of verbs of propositional attitudes and those that can take complement clauses as subjects are restricted to the class of psych predicates and/or stative predicates, thus the category assignment to such verbs should reflect this lexical or semantic restriction. Verbs that can take a complement clause as a subject such as annoy, bother, surprise, worry, etc. are assigned the category (S\$)/$ (where $ stands for the non-subject argument(s) that the verb might take) and those that can take complement clauses as objects such as think, suspect, believe, etc. are assigned the category (S|NP)/S'.

Incidentally, this strategy is used in GKPS, where verbs such as annoy, bother, surprise, etc. are introduced by the following rules:

25. VP[AGR:S] --&gt; H[20], NP
26. H[20] --&gt; bother, annoy, surprise ...

The analysis of complement clauses in object positions is even more standard since it involves simple subcategorization and is often described by assigning the category (S|NP)/S' to verbs such as believe, think, suspect, etc.

In addition to the categorization of these verbs, the complementizer is assigned the category
S'/S and finer distinctions are made within the class of complementizers: whether is assigned the category S'[WH:+]/S and that the category S'[WH:]/S and so on, and corresponding distinctions are made within the class of the verbs that take sentential complements -- for instance, wonder is categorized as VP/S'[WH:+] while think is categorized as VP/S'[WH:-].

Regarding the semantics of the nominalization of clauses, I follow the suggestions in Chierchia 1984, 1985 where the nominalized clause is represented as
\[ (\delta^n (\kappa_1) \ldots (\kappa_n)). \]

Some sample derivations are given below. To see how participle phrases are derived in CG (and GPSG), see Chapter 3. A few matters need to be explained about the following derivations:

First, in Tamil, there is no category DET though there are numeral quantifiers and a few deictic determiner-like words; in general, the distinction between the levels N' and NP as is posited for English NPs is only vacuously found in most Tamil NPs. The -tu nominalizations cannot combine with the deictic determiner-like elements (cf. 22 above). So in the following derivations, sometimes the category N combines with functors which require an NP argument, and this discrepancy is not a serious one, since the categories marked N in the derivations could be marked NPs. Alternatively, -tu could be categorized as NP\(\backslash(N/N)\).

Second, copular predicate phrases in Tamil do not have an overt copula and in sentences such as 34, an implicit assumption is made about the analysis of copular predicates which allows NPs and PPs to be categorized as \((S|NP)\).

And finally, in the place of -tu, a few other elements (which correspond to pronouns and
pronominal agreement markers on verbs, cf. 3 and 4 above) can mark the change from (N/N) category to N. These elements are -van, -va(L), -var which correspond to 3SGMASC, 3SGFEM, 3SGHON, respectively. On the present analysis, these will be categorized just as -tu is, as N\(N/N\). In addition, I will be using the R1bb combinator defined in Chapter III in some of the derivations below which allows for the word-order variations in Tamil.

**-tu nominalizations**

27. naa l-nom nii you vand -a - ptprpt -tu -acc paakka- IE see-NEG
   NP NP (S|NP) S\(N/N\) NP\(N/N\) (S|NP)\|NP

   S

   N/N

   FA

   FA

   FA

   FA

   FA

   S|NP

   S

   S

'I didn't see you coming' (I didn't see that you came)
Complement clauses in English and Tamil$^{10}$

$^{10}$ Mc Gee Wood argues that embedded clauses (even before they combine with the complementizer) should be assigned an atomic category S', and not S. The reason is that assigning S to embedded clauses will generate ungrammatical strings such as *Kittens and I believe that cats enjoy rolling in catnip, *Kittens like catnip and I believe that dogs -- bones, etc. If embedded sentences are assigned S', then complementizers will have to be S'/S' which makes complementizers similar to endocentric modifiers, but complementizers do not behave like modifiers -- for instance, they are not repeatable. Hence, Mc Gee Wood proposes another atomic category S''/S'. Having put forth this proposal, she admits that it is rather stipulative -- it posits two
new atomic categories $S''$ and $S'$, and three different sentential atomic categories, $S$, $S'$, and $S''$. For the purposes of the present discussion, I would like to note that the treatment of complement clauses provided here can be easily modified to make it compatible with the suggestions Mc Gee Wood makes.
'it occurred to me that the cat might be on the tree'

4.3.2 A CG analysis of English gerunds

As seen in Chapter 2, the English gerund VPs, which have a complete NP-like distribution in that they can occur as verbal and prepositional arguments, can be given a simple account in CG as a case of category change. The affix -ing is assigned the category N/VP, which combines with a VP; or conversely, if the possessive NPs in English gerunds is analyzed as the subject of the gerund VP rather than as the determiner of the NP, then the category change involved here is from VP to NP (where the possessive NP is not present) and from S to NP (where the possessive NP is present). The CG account can be easily modified to suit any of these various analyses of the possessive NP in the gerund construction without changing CG's ability to express the view of category change that is offered here. The affix -ing combines with its argument (S or VP), not by simple concatenation, but by some special operation such as Head Adjunction (cf. 2.4.1.2, Hoeksema 1985), since English VPs are not head-final. I refer the reader to the previous chapter for a discussion of the CG analysis of
gerund phrases in English and some sample derivations (cf. 2.4.2).

4.4 A PS account of nominalizations and complementations

In this chapter, as elsewhere in this dissertation, I will mainly deal with GPSG as the X-bar based syntactic theory to be contrasted with CG due to the compatibility between the two theories in other respects.

4.4.1 Nominalizations in X-bar grammars

Linguists working within X-bar theory have resorted to exocentric rules such as the following to describe the English gerunds (cf. Jackendoff 1977):

33. NP → -ing VP

An extensive critique of Pullum 1991 was given in Chapter 2, where it was shown that Pullum's account of English gerunds cannot be successfully extended to all the cases of category change; that even for English gerunds within GPSG, it is ad hoc and leaves several questions unanswered (cf. 2.4.1.3). I will briefly summarize the discussion of Pullum's account below.

Pullum claims that the English gerunds are not a counterexample to the basic claims of X-bar theory -- in particular, the claim that every phrase in human languages is endocentric; the claim that is modified in his analysis is the one that requires the head to be of the same form-class category as the mother. Pullum claims that there is a prediction implicit in the way in which the Head Feature Convention and Feature Cooccurrence Restrictions interact in GKPS. The former is a default feature-passing mechanism which can be overridden by more specific conditions such as the FCRs. The rule he uses to generate gerund VPs, given in 34, makes use of this interaction between the HFC and FCRs.
34. \([N:+, V:-, BAR:2] \rightarrow (NP[+POSS]), H[VFORM:PRP]\)

Because the feature \([VFORM:PRP]\) can only be instantiated on verbs and the application of the HFC would assign the head the category noun which would conflict with the FCR; hence the HFC is blocked and thus the head of an NP mother has the category verb.

Notice that endocentricity is preserved in 34 since one of the daughter is labeled H, and that the optional possessive NPs in this construction are analyzed as determiners. The reasons why this analysis is ad hoc and stipulative are as follows:

first, the feature \([VFORM:PRP]\) in the rule indirectly specifies that the head of the NP is a verb which makes it merely a notational variant of the rule \([N:+, V:-, BAR:2] \rightarrow (NP[+POSS]), H[+V, N:-]\)

second, Pullum claims that the notion head is not weakened despite the fact that the HFC is blocked here and the head is not of the same category as the mother because the head shares other features with the mother such as \([SUBJ:-]\), \([BAR:2]\) and \([SLASH]\). The assumption that the gerund VP and the mother NP are both negatively marked for the feature \([SUBJ]\) is based on Pullum's analysis of the possessive NPs in the gerund construction as the determiner rather than the subject. I have argued in the Chapter II (2.4.1.3) that there are no compelling reasons why the possessive NP cannot be analyzed as the subject and I have also put forth some arguments in favor of treating it as the subject. The sameness of values for the feature BAR does not provide strong evidence that the gerund VP daughter is the head since in GKPS the bar level value is the same unless the rule specifies otherwise; in addition, given the low number of values for the feature BAR, the sameness of value for this feature is rarely

\[11\]. Since in English, gerunds and present participles are identical phonologically, Pullum uses \([PRP]\) in the place of \([GER]\), noting that some morphological shape condition is needed to link the two.
significant. In fact, the non-head daughter in 34 also has the same value for this feature as the mother. In sum, it is questionable whether the VP daughter is as head-like as heads in truly endocentric constructions are.

To return to the issue of category change in X-bar theories, the English gerunds and other such examples of nominalizations falsify the X-bar claim that the category of the mother is determined by the category of the daughter. Pullum's account serves to preserve endocentricity in only English gerunds where there are two daughters (due to the optional presence of the possessive NPs). It cannot be successfully extended to two other types of category change: first, where there is only one daughter and a unary branching rule must be used which makes labeling the only daughter (which differs in categorial features from the mother) as the head vacuous; second, where the category change is marked, not by an inflectional affix, but by a separate word, as in the case of complement clauses in English and Tamil, which will be discussed next.

4.4.2 Complementation in X-bar theory

Both the examples of complementation seen in this chapter (those in Tamil and English) are examples of category change into nominals marked by a function word. In describing the complement clauses in Tamil and English, the problems X-bar theories face are similar to those discussed in the context of Chinese adjectivals and English relative clauses both of which are marked by function words (cf. Chapter 3, 3.3.2). The English complement clauses is marked by the function word that and those in Tamil by the word enru (reduced to nru in colloquial Tamil).

Complement clauses are treated in an ad hoc fashion in GKPS, as noted by Warner 1990. In GKPS, English complement clauses are described by the following rule (GKPS, pp. 113):
35. S [COMP : @] → [SUBCAT:@], H[COMP:NIL]

By stipulation, the head daughter carries a different value for the feature COMP from the mother, and the non-head daughter, again by stipulation, carries the same value for the feature SUBCAT as the value for COMP on the mother. The former is to prevent strings like *that that that ... Mary resigned and the latter to differentiate Ss from complementized Ss (whose external distributions are different).

I assume that the Tamil complement clauses can be given an account analogous to that of their English counterparts, the difference being mainly in the word-order aspects. In addition, in Tamil complement clauses, whether or not the embedded clause is [WH:+] or [WH:-] is not determined by a choice among the complementizers -- in English, whether, how, if are [WH:+] whereas that is [WH:-]. In Tamil, the S daughter, and not the COMP daughter, has the distinction marked for ±WH, and enru is the only complementizer in the language. Neither the word-order nor the locus of the ±WH distinction would make the GPSG account different from that of the English complement clauses. The rule in 35 thus describes Tamil complement clauses too.

4.5 A comparison of X-bar and CG

The main concern of this dissertation has been the nature of the relationship between the internal make-up of a phrase -- especially the form-class membership of the "head" -- and its external distribution, and if the former can entirely exclusively determine the latter, as the X-bar view asserts. The examples of nominalization and complementation seen in this chapter, as examples of all the other category changes discussed in Chapters 3 and 5, show that the head of phrase alone does not automatically determine its external distribution. The failure of
category identicality between head and the whole phrase covaries with the presence of a grammatical element – an inflectional ending in the case of the nominalizations in Tamil and English and a function word in the complement clauses in the two languages.

In GPSG, which has been chosen as the example of X-bar based theories, this situation, which does not follow from the strictest interpretations of the X-bar view, has to be allowed without renouncing the basic claims of X-bar theory. A review of the mechanisms used in describing such internal and external syntax mismatches shows that espousing the X-bar view of the connection between the head and the phrase only makes the descriptions ad hoc and conceals the generalization that could otherwise be expressed by a theory.

Consider the rule in 35 from GKPS which generates complement clauses in English: first, COMP is neither a FOOT feature, nor a HEAD feature, which makes its status mysterious in the context of the rigorously formulated theory of features in GKPS. secondly, in this rule, there are two things which have no explanation in GPSG -- first, why the non-head daughter and the mother in this rule must necessarily have the same value for the feature SUBCAT and COMP respectively; and secondly, why the head daughter must necessarily differ from the mother in the value for this feature, which is not to be expected. The reason is that according to X-bar theory, all the morphosyntactic information on the mother must come from the head daughter and from no other source. But, as has been repeatedly shown by the data in this dissertation, function words that mark category change carry morphosyntactic information that must be passed up to the level of the mother category, which is precisely what we find in the case of the complementizers in English. With no systematic means to express feature-sharing between mothers and non-head daughters, GKPS simply stipulate such a situation in 35. The Foot Feature Principle, as pointed out in Chapter 3, is also devised to gather morphosyntactic information from non-head sources (except the feature SLASH, which does not carry
Thus, it can be seen that GKPS does not have a principled account of feature-sharing between mother and non-head daughters because such a situation is not predicted by the X-bar theory and where it is empirically necessary to allow such feature-sharing, GKPS devises ad hoc mechanisms piecemeal, rather than question the basis of the X-bar view. In the case of relative clauses, the feature [WHMOR] is treated as a FOOT feature (see 3.3.2) and in 35 the mother has the same value for a feature as a non-head daughter does. On the view that I put forth in this dissertation, both these are instances of category change.

Pullum’s account of the English gerunds seen in the previous section resorts to an induced failure of the HFC with respect to category features. In X-bar theories which cannot recognize category change as a phenomenon without giving up some of the basic claims, the similarity between these two constructions and other examples of category change surfaces in the unusual, unexplained mechanisms that are posited to describe such cases.

In CG, the nominalizer -tu in Tamil is assigned the category N\(N/N) and the -ing in English gerunds is assigned the category NP/VP (or NP/S depending on the analysis of the possessive NPs) and these functor elements combine with their arguments by FA. The operation by which they combine is not always concatenation. The gerund marker in English combines by Head Adjunction, which affixes the affix to the head rather than the whole phrase. Similarly, the complementizers are given the category NP|S (or S\(^1|S depending on how the distributional difference between NPs and complement clauses is treated).

In CG, as has been pointed out in the previous chapters, the notion ‘head’ is not a primitive notion, and the category of a phrase is not inseparably linked to the form-class of the head. The category assignment to expressions in CG is a reflection of their external syntax, rather
than their internal syntax. And, the functor-argument relationship is the primary one that holds between the parts of a phrase. These assumptions in CG allow a natural account of both category changes which are problematic to the X-bar view and X-bar-preserving phrase constructions where the X-bar predictions hold.
CHAPTER V
ADVERBIALS WITH NON-ADVERBIAL HEADS

5.0 Introduction  The treatment of the so-called "Adverbial Phrases" within most syntactic theories, even X-bar based theories, brings out the dichotomy between the two notions of phrasal categories -- one based on form-class and the other based on the external distribution. In strict accordance with the form-class definition of phrasal categories, only expressions with the lexical class of adverbs as a head can be categorized as AdvPs. The external distribution of AdvPs is as modifiers of VPs, Ss or ADJPs. Due to the fact that PPs, complement clauses, some NPs, and AdvPs can be VP, S modifiers, even in X-bar based syntactic theories, this particular phrasal category is often described in terms of the external distribution or the combinatory properties and PS rules such as AdvP --&gt; PP or AdvP --&gt; S' are commonly used.

In this chapter, several instances of phrasal expressions with a non-adverbial head having the same distribution as those with an adverbial head will be discussed. Some examples are: the (adverbial) serial verb constructions in Tamil\(^1\) (given in 1 below, discussed in section 5.1), PPs (English data given in 2), the so-called "bare-NP adverbials" in English (see 3), and absolutive constructions in English (cf. Stump 1984, see 4 below).

1. maRe penc-u uur-ellaam veLLam
   rain rain-SER city-all flood
   'the city is all flooded due to the rain' (the rain having rained, the city is all flooded)

\(^1\) My discussion with Don Winford on the details of the differences between the SVCs in Tamil and Caribbean creoles has been very useful to me in analyzing the Tamil data.

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2. I will try and finish it on Monday

3. John meets Mary every Tuesday/the first Tuesday/etc.

4. a. With John in prison, we don't get nuisance calls anymore.
   b. The children having left, there was nothing left to do.
   c. Thoroughly exhausted and yet very nervous, she tried to finish the work.

In this chapter, the only construction that I discuss at length is the (adverbial) serial verb construction in Tamil (cf. 5.1). I present a CG analysis of this construction in 5.2, a GPSG analysis in 5.3 and compare the two approaches in 5.4. A fundamental difference between CG and PSG that becomes evident in the analysis of the facts within each approach is the connection between syntax and semantics assumed within these approaches. One of the basic premises of CG is that the syntax and semantics are homomorphic in that the meaning of a complex expression is a function of the meaning of the parts and the syntactic structure. On this *top-down* approach, the basic strategy in giving a syntactic analysis of a complex expression is to see how the expression can be divided so that the meaning of the expression can be derived from the meaning of the parts. Thus semantic considerations force certain choices on the syntactic analysis(es) since syntax and semantics are inextricably connected in CG.

In most PS grammars, however, this syntax-semantics connection is not an intrinsic aspect of the syntactic framework. Since I will be using GPSG as an example of PS grammars to contrast with CG in this chapter, I will now restrict my discussion to GPSG. Even though GKPS try to incorporate into GPSG the *Rule-to-Rule Hypothesis* to ensure compositional semantics and an intimate connection between syntax and semantics, it still remains an extraneous stipulation imposed on the syntax rather than an intrinsic aspect of the syntactic approach. This becomes clear in the discussions on the possible analyses of Tamil serial verb constructions within GPSG (section 5.3) where it will be shown that the phrase-structure, *bottom-up*, X-bar based nature of
GPSG syntax forces some syntactic analyses which are not desirable considering the semantics of the construction.

5.1. The Serial Verb Construction in Tamil

First, I will consider the adverbial constructions in Tamil which I will classify as the serial verb construction (SVC henceforth). The reasons for identifying this construction as (one kind of) SVC will presently be discussed (but see Steever 1988\(^1\)). In order to keep the comparison between PS grammars and CG as straightforward as possible, in discussing the possible accounts of SVCs (or adverbials in general), I will only focus on monostratal PS grammars, mainly GPSG, since theories such as GB make very different assumptions on most fundamental issues in syntax. Moreover, the term SVC is probably a collection of several related constructions since SVCs are too broadly defined to account for the various differences that are sometimes language-specific and at other times, even within the same language, particular to a sub-type of SVC; in this chapter, I will confine my discussions to Tamil SVCs and in particular, the adverbial SVCs. But, the distinction between adverbial SVCs, and complement SVCs and coordinating SVCs is not always clear. To a large extent, the treatment of SVCs in this chapter is necessarily overly simplistic, since it is not possible to do justice to the details of this construction without digressing from the main issues of this dissertation. So I will mainly focus on one aspect of SVCs – namely the distribution of serial verb phrases which is different from that of ordinary finite VPs.

\(^1\) Steever 1988 calls a construction in Tamil and other Dravidian languages the SVC which does not show any of the properties of the SVC except the characteristic of having two finite verbs with no overt markers of subordination or coordination. This construction is found in Old High Tamil and does not exist in Modern Tamil; furthermore, even in Old Tamil it is not productive, but is restricted to a few combinations of specific pairs of verbs (e.g. aadinoom paaDinom 'we sang, we danced'). In any case, I consider the construction that will be discussed in this chapter as one subtype of the SVC (namely the adverbial SVC) which has little to do with the construction that Steever 1988 calls the SVC.
The criteria for the identification of the serial verb construction in a given language have been laid out in Sebba (1987) which are listed in 5 below:

5.
   a. they have only one overtly expressed (syntactic) subject;
   b. they contain two or more verbs without overt markers of coordination or subordination;
   c. the actions expressed by the verbs are either simultaneous or consecutive, and all verbs are interpreted as having the same tense;
   d. negation, whether marked once or more than once, applies to the whole string;
   e. tense, aspect, mood and polarity (or whichever of these a language has) are either marked only once in the string, or else each verb in the string is marked as having the same tense, aspect, mood and polarity as V1;
   f. either: the semantic subject of $V_i$ is the subject of $V_{i+1}$, or: the object of $V_i$ is the semantic subject of $V_{i+1}$.

The construction I will discuss in this section shows all the properties listed above in 5 except 5b, since not all the verbs have the same form in SVCs -- all the verbs except the main verb take what I shall call the "serial form" and the main verb is the only one that can be finite and take subject agreement markers. If the serial form that all the verbs in this construction occur in except the main verb is interpreted as a device of subordination, then the criterion in 5b is not met in this construction in Tamil. But as it has been pointed out in subsequent literature on serial verbs, constructions in different languages that could be considered the SVC based on the other criteria lack this property suggesting that this property is perhaps characteristic of the SVCs in the languages that Sebba examines, but is not a cross-linguistic characteristic of SVCs.²

². It is presumably because the languages that Sebba 1987 is concerned with are Caribbean creoles which do not show much morphology.
In addition, the features given in 6 characterize one of the serial verb constructions that Sebba calls "subordinate serial verb constructions", and this is the variety of SVCs in Tamil that I will treat as category change from VP or S to ADVP.

6. In a sequence of the form V1 .... V2,
   a. both V1 and V2 must be lexical verbs, i.e. must be capable of appearing as the only verb in a single sentence.
   b. If it is possible to conceive of V1 and V2 as denoting separate actions at all, then both V1 and V2 must be interpreted as having the same tense and aspect. Thus, for example, V1 may not be interpretable as "past" if V2 is interpreted as "future".
   c. There must not be an ascertainable clause boundary between V1 and V2, i.e. they must be within the same clause.
   d. No conjunction should separate the verbs in sequence.

Before we consider the facts particular to the SVC, I would like to point out some general facts about Tamil syntax which will be relevant to the present discussion. Tamil is one of the so-called "pro-drop" languages in that the subcategorized complements of a verb need not be overtly provided -- they could be retrieved from previous context, or could be pragmatically determined. The canonical word-order in matrix clauses is SOV, even though the major constituents of a matrix clause can appear in any order. Embedded clauses are strictly verb-final and the constituents of embedded clauses cannot be interspersed with those of main clauses.

Some of the characteristics of this construction in Tamil are listed below in 7:

7. a. There is more than one verb in a clause and all but one of these verbs are in a non-finite form that I will call the serial verb form; the actual realization of this grammatical category that I
call the serial form of a verb depends on the morpholexical class that the verb belongs to.
b. The serial verb can take any or all of its arguments separately or it can share them with the
main verb;
c. If the serial verb shares any argument(s) with the main verb, then that argument must occur
before the serial verb;
d. When the adicity of the serial verb(s) and that of the main verb are different, one of the two
positions -- the serial verb slot or the main verb slot -- is lexically restricted;

Concerning 7b, I will show that the gaps in the serial verb phrase are not contextually interpreted,
that they are bound by the arguments of the main verb. Consider the following sentence:

7e. naa enta muyal-E- yum aTi-ccu kkolla -le
I any rabbit-ACC- NEGPOL hit-SER kill -PST.NEG
'I didn't hit and kill any rabbit' (=for each rabbit, it is not the case that I hit (it) and killed it)

Here, the serial verb does not have an overt object NP that it combines with, separate from the
object of the main verb. But this gap in the serial verb phrase cannot be contextually interpreted
to be different from the object of the main verb, and this gap is bound by the argument of the
main verb, as the interpretation of 7e shows.

5.1.1 Some patterns found in Tamil Serial Verb Constructions

The patterns given below from 8 - 14 describe the various possibilities in SVCs.

If the verb in the serial form is TV, then it must take its object to its left -- this follows from the
strictly verb-final word-order in embedded clauses in Tamil. If the main verb is also TV, then there
are two possibilities: the main verb shares the NP object with the serial verb if the pattern is as
given in 8 and 9; or the two verbs can take their NP objects separately, as shown in 10. Some
possible pragmatic implicatures are given in paranthesis at the end of the gloss, to show that these are interpreted as a 'single action'.

8. naan pustagatt - e vaang -i ppaDi -cc - een
   I nom book -acc buy-SER read-PST-1sg
   'I bought the book and read it' (=I didn't borrow the book, I bought it and read it)

9. naan pustagatt - e ppaDiccu ppaa-tt -een
   I book -acc read-ser see-pst-1
   'I tried and read the book' (= I read the book to see how it was)

10. naan pustagatt - e ppaDicc - u kkaTTurai eRut -in - een
    I-nom book -ACC read-SER composition write-PST-1
    'I read (the) book and wrote (the) paper'
    (I read the book to prepare for writing the paper and wrote the paper)

In clauses where the main verb is intransitive, and when there is no accusative NP before the serial verb that can be construed as its direct object (see 11) or indirect object (see 12) the subject of the main verb is interpreted to be the object of the (transitive) serial verb.

In 13, the serial verb and the main verb share the indirect object, but not the subject or the direct object. In 14, the serial verb is TV and the main verb is DTV and they share the subject and the direct object.

11. naan taLL - i avan viRu - nt -aann
    I push-SER he fall - PST-he
    'My having pushed (him), he fell (down)' (=I pushed him down)

12. naan paNam kuDuttu avan kaTan - e aTecc-aan
    I money give he loan -acc pay - he
    'I gave (him) money and he paid off the loan' (that's how he was able to pay off the loan')

13. avanukku naa maattrE kuTuttu ava uusi pooTTaa
    he-DAT l-NOM pill give-SER she-NOM injection gave- 3.SG.F
    'I gave him the pill and she gave (him) an injection' (=between the two of us, we treated him')

14. naan oru pustagam vaang-i avan-ukku kkuDutteen
    I one book buy-ser he-dat give-pst-1
    'I bought a book and gave (it) to him' (I wanted to get him a gift and this is what I did)
The (pretheoretical) generalization about the serializing affix is that it attaches to any verb to form the serial form; the serial form of the verb can then combine with any or all of its arguments and then combine with the main verb as its modifier. According to this statement, the case where the serial verb shares all its arguments with the main verb, the serial verb combines with the main verb and this sequence of serial verb and the main verb combine with the main verb's arguments, a subset of which are interpreted as the serial verb's arguments; where the serial verb and the main verb do not share all the arguments, the serial verb first combines with the unshared arguments and then combines with the main verb which combines with its own arguments, some of which can be shared with the serial verb; and finally, the serial verb combines with all its arguments before it combines with the main verb in those cases where there is no argument sharing between the main verb and the serial verb.

5.2 A CG account of adverbial SVCs in Tamil

All the examples seen above can be viewed as instances of one type of category-change - from VPs or clauses to modifiers of VPs or clauses, which can be given an account within CG similar to the description of the facts in the previous chapters. The serializing affix can be treated as the marker of category change and can be assigned a schematic category (S|$)/(S|$)\(\backslash(S|$)\) (where $ stands for the arguments of the verbs) to express the fact that expressions with a verbal head have adverbial distribution also have the head verb in the serial form. This part of the analysis is parallel to the treatment of the category changing elements seen in the previous chapters. But this category assignment is too simplistic to account for the facts on argument-sharing discussed above and cannot express the generalization about the affix -- namely that it combines with all verbs, and the serial verb can share all or any or none of its arguments with the main verb. So this basic strategy of describing category changes will need to be slightly refined so as to allow for argument sharing. Before giving the category schema for the serializing affix, I describe all the relevant aspects of the category assignment below.
The input category of the serializing affix is a verb, i.e. a basic expression of the category 
(S\X_1\ldots\X_m) where X_1 to X_m stand for the arguments that the verb takes, X_1 being the least 
oblique and X_m the most oblique of the arguments. The output category of the serializing affix is 
an adverb that first combines with some or all of the arguments of the source verb — i.e. 
(S\X_j\ldots\X_k) where j \geq 0 and k \leq m; then it combines with the main verb as a modifier.

Now, I use the operator "RESULT-IN" to represent the range of meanings the serial verb 
(phrase) has in relation to the main verb (phrase) (e.g. temporal sequence, temporal 
simultaneity, cause-result, means-end, adverb of manner, etc.). Of these various relationships 
between the serial verb (phrase) and the main verb (phrase), the particular relationship that 
obtains between them in the interpretation of a given sentence is determined by several factors 
including pragmatic, discourse and cultural context.

In addition, for expository convenience, I will represent the NP arguments of the serial verb and 
the main verb as individuals rather than as the properties of properties of individuals — i.e. the 
type of quantified NPs. This is because the derivations below are meant to illustrate how the 
category schema of the serializing affix applies to individual verbs, how argument sharing is dealt 
with and how the serial verb combines with the main verb as a modifier. In order to highlight these 
crucial aspects of the present analysis of Tamil SVCs, I have represented the NP arguments as 
the lower type denoting individuals.

Having explained these various aspects of this category assignment, I now give the category 
schema for the serializing affix in (15):

15a. The serializing affix is of the category

\[ ( ( (S(X_1\ldots X_n)) / (S(X_1\ldots X_n)) ) \setminus (X_j\ldots X_k) ) \setminus (S(X_1\ldots X_m)) ) \]
(where \( j \geq 0 \) and \( k \leq m \))

15b. Semantically it translates as

\[
\lambda V_{s|x_1 \ldots x_m} \lambda x_k \ldots \lambda x_j \lambda V_{s|x_1 \ldots x_n} \lambda y_n \ldots \lambda y_1 \ [ V_{s|x_1 \ldots x_m} \{(y_n)^{x_k} \ldots (y_j)^{x_j}\}] \text{RESULT-IN} \ V_{s|x_1 \ldots x_n} \ (y_n)^{(y_1)}
\]

The schema above can be described as follows: \((S\ (X_1 \ldots X_m))\) represents the input verb, i.e. the verb that appears in the serial form; \((X_j \ldots X_y)\) represents the unshared arguments, i.e. those that the serial verb combines with before it combines with the main verb. \((S\ (X_1 \ldots X_n))\) \((S\ (X_1 \ldots X_n))\) \((S\ (X_1 \ldots X_n))\) represents the main verb, and \((S\ (X_1 \ldots X_n)) \slash ((S\ (X_1 \ldots X_n))\) represents the modifier of the main verb -- i.e. the verb in the serial form. The serial verb combines with a total of \(m\) arguments. In the semantic schema, the fact that the arguments of the serial verb can consist of both \(x\)'s and \(y\)'s shows that the serial verb can share its arguments with the main verb -- if it shares all its arguments with the main verb, then its arguments are all \(y\)'s and if it shares none of its arguments with the main verb, then its arguments are all \(x\)'s. However, the grammatical relation between a shared argument and the main verb need not be the same as the one between that argument and the serial verb. For example, the subject of the main verb can be interpreted to be the object of the serial verb (see 11); the indirect object of the serial verb can be interpreted to be the subject of the main verb (see 12) and so on.

The category of the serial verb (i.e. a verb + the serializing affix), according to 15, is:

16. \((S\ (X_1 \ldots X_m) \slash (S\ (X_1 \ldots X_n)) \ \slash (X_j \ldots X_y)\)

where \((X_1 \ldots X_m)\) stands for the arguments that the serial verb does not share with the main verb.
(which might be null when the serial verb shares all its arguments with the main verb).

In the rest of this section, an illustration will be given of the CG analysis of the Tamil facts seen above. The categories to which the serializing affix attaches to, and how the argument structure of the serial verb and that of the main verb interact will be seen in the sample derivations given below.

### 5.2.1 All arguments shared

In this case, none of the arguments of the serial verb is overtly provided and all the arguments of the main verb or a proper subset of the main verb's arguments are interpreted as those of the serial verb.

According to the schema given in 15, all serial verbs which share all their arguments with the main verb will be assigned the category $(S|X_{1}...X_{n}) / (S|X_{1}...X_{n})$ since they first combine with the main verb as a modifier and do not combine with any complement on their own. For example, a serial verb that shares all its arguments with a TV main verb is assigned the category $(S|NP|NP) / (S|NP|NP)$ (which is one of the instantiations of the schema in 15); a syntactic derivation of an example of all-argument-sharing and the corresponding semantic derivation are given in 17.

17. naan pustagatt - eDuttu ppaDi-cc-een
   NP_{nom} NP_{acc} ((S|NP)|NP|NP) / ((S|NP)|NP|NP) / ((S|NP)|NP) FA
   ______________ (S|NP) FA
   ______________ (S|NP) FA
   S
a. category schema of the serializing affix:
\[ \lambda V_{s|x_1...x_m} \lambda x_1 \ldots \lambda x_j \lambda V_{s|x_1...x_m} \lambda y_1 \ldots \lambda y_1 \ [ V_{s|x_1...x_m} \{ y_n \} \ldots \{ y_j \} \] \text{RESULT-IN} \]
\[ V_{s|x_1...x_m} \{ y_n \} \ldots \{ y_j \} \]

b. an instance of the above schema:
\[ \lambda V_{s|x_1|\ldots|x_2} \lambda x_1 \ldots \lambda x_j \lambda V_{s|x_1...x_m} \lambda y_1 \ldots \lambda y_1 \ [ V_{s|x_1|\ldots|x_2} \{ y_n \} \ldots \{ y_j \} \] \text{RESULT-IN} \]
\[ V_{s|x_1...x_m} \{ y_n \} \ldots \{ y_j \} \]

(c) the schema in b applied to the verb 'take' (i.e. the serial form of 'take')
\[ \lambda x_k \ldots \lambda x_j \lambda V_{s|x_1...x_m} \lambda y_1 \ldots \lambda y_1 \ [ \text{take'} (\{ y_n \} \ldots \{ y_j \}) \] \text{RESULT-IN} \]
\[ V_{s|x_1...x_m} \{ y_n \} \ldots \{ y_j \} \]

d. where there are no unshared arguments (i.e. \( x_j \ldots x_k = 0 \))
\[ V_{s|x_1...x_m} \lambda y_1 \ldots \lambda y_1 \ [ \text{take'} (\{ y_j \} \ldots \{ y_j \}) \] \text{RESULT-IN} \]
\[ V_{s|x_1...x_m} \{ y_n \} \ldots \{ y_j \} \]

e. an instance of the schema in d
\[ V_{s|x_1|\ldots|x_2} \lambda y_2 \lambda y_1 \ [ \text{take'} (\{ y_2 \} \ldots \{ y_1 \}) \] \text{RESULT-IN} \]
\[ V_{s|x_1|\ldots|x_2} \{ y_2 \} \{ y_1 \} \]

f. e applied to the verb 'read'
\[ \lambda y_2 \lambda y_1 \ [ \text{take'} (\{ y_2 \} \ldots \{ y_1 \}) \] \text{RESULT-IN} \]
\[ \text{read'} (y_2) (y_1) \] (the book)

g. \[ \lambda y_1 \ [ \text{take'} (\text{the book}) (y_1) \] \text{RESULT-IN} \]
\[ \text{read'} (\text{the book}) (y_1) ] (l)

h. \[ [ \text{take'} (\text{the book}) (l) \] \text{RESULT-IN} \]
\[ \text{read'} (\text{the book}) (l) ] (l)

A derivation for another example of all-argument-sharing is given in 18 where a TV serial verb shares all its arguments with DTV main verb. In the following derivation, where required, I am using the operation \( R_{\text{tibb}} \) as defined in Chapter III (section 3.3), which allows a less oblique argument to combine with a functor before a more oblique argument combines with it. The word-order facts in languages like Tamil warrant some mechanism that allows the obliqueness hierarchy to be preserved in the semantics while syntactically allowing the arguments to combine with the functor in an order different from the obliqueness hierarchy.
18.
naan jaan-ukku pustagatt-e vaangi kkuDu-tt-een

NPnom Npdat NPacc (S|NP|NP) (S|NP|NP) (S|NP|NP) (S|NP|NP) FA

(S|NP|NP|NP)

____________________ r_tbb

(S|NP)|NP

____________________ FA

(S|NP)

____________________ FA

S

'I bought the book and gave (it) to John'

a. category schema of the serializing affix:
\[
\lambda V_{s|x_1 \ldots x_m} \lambda x_k \lambda x_j \lambda V_{s|x_1 \ldots x_n} \lambda y_n \ldots \lambda y_1 [ V_{s|x_1 \ldots x_m} \{ \gamma^n \} \ldots \{ \gamma^1 \} ] \text{ RESULT-IN } x_k \lambda y_{1} [ V_{s|x_1 \ldots x_n} \{ \gamma^n \} \ldots \{ \gamma^1 \} ] \text{ RESULT-IN } x_j
\]

b. an instance of the above schema:
\[
\lambda V_{s|x_1 \ldots x_m} \lambda x_k \lambda x_j \lambda V_{s|x_1 \ldots x_n} \lambda y_n \ldots \lambda y_1 [ V_{s|x_1 \ldots x_m} \{ \gamma^n \} \ldots \{ \gamma^1 \} ] \text{ RESULT-IN } V_{s|x_1 \ldots x_n} (y_n) \ldots (y_1)
\]

c. the schema in b applied to the verb 'buy' (i.e. the serial form of 'buy')
\[
\lambda x_k \ldots \lambda x_j \lambda V_{s|x_1 \ldots x_m} \lambda y_n \ldots \lambda y_1 [ \text{buy} ] \{ \gamma^n \} \ldots \{ \gamma^1 \} \text{ RESULT-IN } V_{s|x_1 \ldots x_n} (y_n) \ldots (y_1)
\]
d. where there are no unshared arguments (i.e. \( x_j \ldots x_k = 0 \))
\[
\lambda V_{s|x_1 \ldots x_m} \lambda y_n \ldots \lambda y_1 [ \text{buy} ] \{ \gamma^n \} \ldots \{ \gamma^1 \} \text{ RESULT-IN } V_{s|x_1 \ldots x_n} (y_n) \ldots (y_1)
\]
e. an instance of the schema in d
\[
\lambda V_{(s|x_1 \ldots x_m) x_3} \lambda y_3 \lambda y_2 \lambda y_1 [ \text{buy} ] \{ \gamma^n \} \ldots \{ \gamma^1 \} \text{ RESULT-IN } V_{(s|x_1 \ldots x_m) x_3} (y_3) (y_2) (y_1)
\]
5.2.2 One or more unshared argument(s)

Several possibilities exist when the serial verb does not share all its arguments with the main verb, which will be discussed below.

In those cases where the serial verb does not share all of its arguments with the main verb, it combines with the main verb after it has combined with the unshared arguments. Thus the category assigned to a TV serial verb that shares the subject with the main verb -- but not the object -- would be

\[
\text{(S|NP}_{\text{nom}}|NP_{\text{acc}}) / \text{S|NP}_{\text{nom}}|NP_{\text{acc}}) \setminus \text{NP}_{\text{acc}}
\]

an example of which is given in 19.
19.

naan paiy - E ttirantu pustagatt -e eTu -tt-een
l-nom bag -acc open-ser book-acc take-pst-l
NPnom NPacc ((S|NP|NP)| (S|NP|NP)) NPacc (S|NP|NP)
______________________________ FA
(S|NP|NP)/ (S|NP|NP) (cannot be combined)

'I opened the bag and took the book'

At this point, it is necessary to be concerned with the linear order of the constituents since, given
the category of the serial verb, it cannot combine with the main verb by simple concatenation.
One could assume that the main verb combines with the accusative NP to its left first to form
(S|NPnom) and treat the serial verb as having the category (S|NPnom) | (S|NPnom), and modifying
the S|NPnom category to its right which consists of the main verb+ NPacc object (as shown in the
derivation in 19). But this analysis of the facts does not help us maintain the generalization that
the schema in 15 expresses.

The sentences in 21 and 22 also pose the same problem:

21. naa pustagatt-e vaang-i avan-ukku kkuTu-tt-een
l-nom book-ACC huy-SER he -DAT give-PST-l
'I bought the book and gave (it) to him'

22. nii it-e muTiccu naa aTuttapakkatt-e aarambikkaNum
you this-acc finish-ser I next side-acc start-must
NP NPacc (S|NP|NP) | (S|NP|NP) NPnom NPacc (A=S|NPnom|NPacc)
'I must start the next side after you finish this(side)'

One could use the wrapping operation (see Bach 1982) to describe this situation, which is not
unlike other cases of discontinuous constituency. To see how the wrapping operation helps in
maintaining the generalization that the schema in 15 expresses, it is necessary to consider the
constituency of sentences such as 19 and 22 predicted by the schema in 15.

23. (constituency of 19 according to the schema in 15)

naa paiye tirantu pustagatte eTuteen
I-nom bag-acc open-ser book-acc take-pst-l

24. (constituency of 22 according to the schema in 15)

nii it-e muTiccuccu naa aTutta pakkatt-e aarambikka-Num
you this-acc finish-ser I next side-acc start-must

The wrapping operation here will have to be head wrapping since the argument(s) of the main verb is/are placed before the main verb which is the head. The wrapping operation could be
stated as follows:

25. If \( \alpha \in A/B \) and \( \beta \in B \), and \( wxy = \alpha \), then \( \text{Wrap} < \beta, \alpha > = \text{wp}xy \) where \( x \) is the head of \( A/B \).

In order to maintain the generalization about the serializing affix in terms of its input and output categories, it is therefore necessary to use the wrap operation. Furthermore, as the facts from the previous chapter on participles in Tamil and Korean show, wrapping or some operation that simulates the effects of wrapping is needed to describe the facts in Tamil.

Below I will give the semantic derivation of 19 as an example of the serial verb taking some arguments separately from the main verb:
a. category schema of the serializing affix:

$$\lambda V_{s[x1...xn} \lambda x_k ... \lambda x_j \lambda V_{s[x1...xn} \lambda y_n ... \lambda y_1 [ V_{s[x1...xn} \{ y_n \} ... \{ y_1 \}] \text{RESULT-IN V}_{s[x1...xn}(y_n) ... (y_1)]$$

b. an instance of the above schema:

$$\lambda V_{(s|x1)x2} \lambda x_k ... \lambda x_j \lambda V_{s[x1...xn} \lambda y_n ... \lambda y_1 [ V_{(s|x1)x2} \{ y_n \} ... \{ y_1 \}] \text{RESULT-IN V}_{s[x1...xn}(y_n) ... (y_1)]$$

c. the schema in b applied to the verb 'open' (i.e. the serial form of 'open')

$$\lambda x_k ... \lambda x_j \lambda V_{s[x1...xn} \lambda y_n ... \lambda y_1 [ open' \{ y_n \} ... \{ y_1 \}] \text{RESULT-IN V}_{s[x1...xn}(y_n) ... (y_1)]$$

d. where there is one unshared argument (i.e. $x_j ... x_k = 1$)

$$\lambda x \lambda V_{s[x1...xn} \lambda y_n ... \lambda y_1 [ open' \{ y_n \} ... \{ y_1 \}] \text{RESULT-IN V}_{s[x1...xn}(y_n) ... (y_1)](the\ bag)$$

e. $\lambda V_{s[x1...xn} \lambda y_n ... \lambda y_1 [ open' (the\ bag) \{ y_1 \}] \text{RESULT-IN V}_{s[x1...xn}(y_n) ... (y_1)]$

f. an instance of the schema in e

$$\lambda V_{(s|x1)x2} \lambda y_2 \lambda y_1 [ open' (the\ bag) \{ y_1 \}] \text{RESULT-IN V}_{(s|x1)x2}(y_2) (y_1)]$$

g. e applied to the verb 'take'

$$\lambda y_2 \lambda y_1 [ open' (the\ bag) \{ y_1 \}] \text{RESULT-IN take' (y_2) (y_1)] (the\ book)$$

h. $\lambda y_1 [ open' (the\ bag) \{ y_1 \}] \text{RESULT-IN take' (the\ book) (y_1)] (I)$

i. $[open' (the\ book) (I)] \text{RESULT-IN take' (the\ book) (I)]}$

'I bought a book and gave (it) to him'

5.2.3 A summary of the CG analysis

To summarize the main points of the CG analysis of the adverbial serial verb constructions in Tamil, this construction is treated on a par with the others in previous chapters as an instance of category change. The serializing affix is treated as the marker of this category change and is
given the category \(((S|X_1|...|X_n)/(S|X_1|...|X_m)) \setminus (S|X_1|...X_m)\). This schematic category assignment is meant to generalize over the possible variations regarding the subcategory of the main verb, the subcategory of the serial verb, the extent of argument-sharing, etc., but should be interpreted as a schema ranging over a finite set of categories; since the maximum number of arguments for verbs is perhaps three, the different instantiations of this schematic category change can in fact be listed; such a list is given in 26; the subcategory of the serial verb and the main verb and the details of argument sharing, if there is argument sharing, are explained for each instantiation of the schema.

26.

a. schematic category of the serializing affix

\(((S|X_1|...|X_n)/(S|X_1|...|X_m)) \setminus (X_j|...|X_k)) \setminus (S |X_1|...|X_m)\)

where \(i \geq 0, k \leq n, \text{ and } n \leq 3\)

This schema assigns the serializing affix a category that takes a verb (i.e. \((S|X_1|...|X_m)\)) to its left and turns it into a modifier of a verb (i.e. \(((S|X_1|...|X_n)/(S|X_1|...|X_m))\) ); but before it combines with the verb it modifies, it combines with any argument that it doesn’t share with the main verb (i.e. the set of arguments \((X_j|...|X_k)\) where \(j = 0 \text{ and } k = m\)). In the semantic interpretation, the arguments that the main verb shares with the serial verb are provided as arguments of both verbs, as shown in the semantic schema.

In the following list of various possibilities in the serial verb + main verb combinations, the serial verb (i.e. a verb + the serializing affix) is treated as a single unit and the category assignment to this serial verb unit is an instantiation of the resultant category of the serial verb given in the

---

3. Perhaps the highest number of NP arguments for a verb is four in consideration of verbs like *trade*. 
b. all arguments shared: \((S|X_1|...|X_n) / (S|X_1|...|X_n)\)

If the serial verb is intransitive and if the serial verb does not have a separate subject NP, then the subject of the main verb is interpreted to be the subject of the serial verb, and the subject of the serial verb cannot be any other argument of the main verb. For instance, the object of the main verb cannot be the subject of the serial verb, even though the grammatical relations of the shared arguments to the main verb and the serial verb generally need not be the same, as was shown above.

(i) the category of the serial verb \(\alpha\) when both the serial verb and the main verb are IV and when there are no unshared arguments: \((S|NP_{nom}) / (S|NP_{nom})\)

semantics: \(\lambda V_\text{IV} \lambda y_1 [\alpha'(y_1) \text{RESULT-IN} V_\text{IV}(y_1)]\)  (e.g. I tripped and fell (=That's how I fell.))

(ii) the category of the serial verb \(\alpha\) when the serial verb is IV and the main verb is TV and the subject is shared:

\((S|NP|NP) / (S|NP|NP)\)

semantics: \(\lambda V_\text{TV} \lambda y_2 \lambda y_1 [\alpha'(y_1) \text{RESULT-IN} V_\text{TV}(y_2)(y_1)]\)

(e.g. 'I got up and switched the light on' (=I got up to switch the light on))

c. shared subject, separate object

(i) category of the serial verb \(\alpha\) when both the serial verb and the main verb are TV:

\(((S|NP_{nom}|NP_{acc}) / (S|NP_{nom}|NP_{acc})) \setminus \text{NP}_{\text{acc}}\)

semantics: \(\lambda x \lambda V_\text{TV} \lambda y_2 \lambda y_1 [\alpha'(x)(y_1) \text{RESULT-IN} V_\text{TV}(y_2)(y_1)]\)
(e.g. (example 19 above 'I opened the bag and took the book' (=that's how I took the book))

(ii) category of the serial verb $\alpha$ when both the serial verb and the main verb are DTV, and both the direct object and the indirect are not shared:

$$(S|NP_{nom}|NP_{acc}|NP_{dat}) \setminus (S|NP_{nom}|NP_{acc}|NP_{dat}) \setminus NP_{dat}$$

semantics: $\lambda x_2 \lambda x_1 \lambda y_2 \lambda y_1 [\alpha'(x_2)(x_1)(y_1) \ \text{RESULT-IN} \ V_{DTV} (y_2)(y_1)]$  
(e.g. I gave the children coloring books and the parents magazines' (that way, I didn't have to take care of them))

d. separate subject

(i) category of the serial verb $\alpha$ when the serial verb and the main verb are both DTV, and the subject and direct object are not shared, but the indirect object is:

$$((S|NP)|NP) \setminus (S|NP)|NP$$

semantics:

$\lambda x_2 \lambda x_1 \lambda y_2 \lambda y_1 [\alpha'(y_2)(y_1) \ \text{RESULT-IN} \ V_{DTV} (y_2)(y_1)]$

(e.g. (example 13 above) 'I gave him a pill and she gave (him) an injection (=between the two of us, we treated him)'

(ii) category of the serial verb $\alpha$ when the serial verb is TV and the main verb is IV and the object of the serial verb is interpreted as the subject of the main verb:

$$((S|NP)|(S|NP)) \setminus NP$$

semantics: $\lambda x \lambda y [\alpha'(y) \ (x) \ \text{RESULT-IN} \ V_{IV} (y)]$

(e.g. (example 11 above) 'I pushed (him) and he fell down (=I pushed him down)'


It is to be hoped that the examples above serve to adequately illustrate that a precise account of the adverbial serial verb constructions can be given in a way that the generalization about the serializing verb can be captured; notice that the account sketched above also treats this construction in a parallel fashion to the other cases of category change.

But the most important aspect of the CG analysis is the way in which semantic considerations force certain choices on the syntactic analysis. It is this fundamental assumption about the homomorphic relationship between syntax and semantics that leads to the analysis of the serial verb constructions presented here -- the category assignment to the serializing affix, the serial verb, and the relationship between the serial verb and the main verb and how the argument structure of the two verbs interact.

5.3 A Phrase Structure account of Serial Verb Constructions

In laying out the possible accounts of SVCs within PS grammars, as mentioned above, I only consider the Tamil facts discussed in this chapter although, where necessary, facts from other languages or analysis of such facts in the SVC literature will be mentioned.

In Sebba 1987, the coordinating serial verb constructions are described with rules such as

27. VP --> VP VP

to reflect the equal rank of the VPs. In Winford 1991, the subordinate SVC is given a structure where the second VP is treated as a subcategorized argument of the first verb. This structure is motivated by the fact that in some subordinate SVCs one of the verb slots (V1 or V2) is lexically restricted. Rules such as

28. a. VP --> H[34], NP, IVP [DIR]

b. H[34] --> kyari, poro

are used that show that only certain lexical items can occur as V1 and that there are restrictions
on V2 also (namely that they are directional VPs). This analysis treats this type of SVCs as a case of VP complementation (see Zwicky 1990 for a discussion of the various syntactic relationships that obtain between the verbs in verb ... verb sequences as found in SVCs -- complementation, conjunction by concatenation, modification, etc.).

In Tamil SVCs, as described earlier, there are some cases where the first verb (i.e. the serial verb) slot is lexically restricted and some where the main verb slot is. The former type of SVC can be described with the use of some feature as shown below:

29. a. VP -> VP [MOTION][VFORM:SER] H [FIN]
   b. VP[MOTION] -> (PP) H [38]
   c. H[38] -> poo, vaa, eRu

The second type where the main verb slot is lexically restricted is accounted for with the rules in 30:

   b. H[39] -> paar, muDi

Now we come to those cases where there are no lexical restrictions on either the serial verb slot or the main verb slot and where the main verb and the serial verb can share their arguments or take their arguments separately. These cases have to be described by the following rule in 31:

31. VP -> VP[VFORM:SER] VP[FIN]

5.3.1 Modifiers and Conjuncts

At this point it ought to be mentioned that the above structure is the one that has been proposed for what have been called "coordinate SVCs" which can be shown to differ from "subordinate SVCs" by several tests. One of the characteristics that have attributed to coordinate SVCs in the
literature on SVCs is the ungrammaticality of the extraction of one of the NP objects (either that of the serial verb or the main verb) (cf. Sebba 1987, Seuren 1990, Winford 1990 for the criteria that distinguish these two types of SVCs).

However, the syntactic relationship between the two VPs in this SVC in Tamil can be shown to be one where the first VP is a modifier of the second VP, and not a conjunct. First, the object NP of either verb can be questioned. Consider the data in 32 - 34:

32. naa paiy - e ttirantu pustagatt - e eTutt-een
   I bag-acc open-ser book -ser took-l
   'I opened the bag and took the book' (How I took the book was by opening the bag)

33. nii paiy - e ttirantu ennatt- e eTutt -e
    you bag -acc open-ser what-acc took-you
    'what did you open the bag and take?'

34. nii et -e ttirantu pustagatt- e eTutt - e
    you what-acc open-ser book- acc took-you
    'what did you open and take the book?'

This standard test that distinguishes subordinate SVCs from coordinate SVCs shows that the above SVCs in Tamil have to be analyzed as subordinate SVCs, and not as coordinate SVCs. There is a different SVC in Tamil that is more appropriately analyzed as the coordinate SVC, which differs from the above type in one respect: the serial verb (i.e. V1) is marked for aspect separately from the main verb (i.e. V2). An example is given below in 35:

35. naa pustagatt- e ppaDiccu - TTu peeppar eRut-in-een
   I book-acc read -PERF paper write-pst-l
   'I read the book and (then, later) wrote the paper'

Compare the meaning of 35 with that of 8 and 20; in 35, the meaning of the two VPs are not interpreted as referring to *the same action* unlike 9 and 21 where the serial VP has the force of a modifier and hence subordinate to the finite VP.
It is not clear how PS grammars could assign different structures to VP - VP combinations where there are no lexical restrictions on either verb slot that would distinguish the subordinate from the coordinate SVCs. In other words, the issue here is the ability of PS grammars to reflect the distinction between modifiers and conjuncts (with no overt marker of coordination) structurally, since these two relationships among coconstituents are deemed to be different in PS grammars and the identification of head is different in the two constructions.

The construction exemplified in 35, even though there is no overt conjunction, could be treated simply as a coordinate structure -- i.e. as multiply headed -- to reflect the syntactic and semantic differences between the subordinate and coordinate SVCs. The rule given in 36 illustrates this approach:


A language-specific stipulation seems to be necessary since in Tamil the only phrasal categories that can be conjoined are NP, PP, and ADVP. The subordinate SVCs, as suggested in the rules in 29 and 30 are not multiply-headed since only the main VP is labeled H.

5.3.2 Argument sharing in PS grammars

The general property of the cases in which the serial verb and the main verb share one or more argument is the overt presence of fewer arguments than the individual valencies of the two verbs would require. There are three basically different approaches that could be taken within PS grammars, which I will briefly sketch below and a discussion of each of the approaches will follow.

5.3.3 Empty Categories

4. Hukari and Levine 1989 argue for empty categories within GPSG.
The first approach is to posit empty categories in one of the VPs in the place of all the shared arguments. For instance, two ditransitive verbs in an SVC which share the subject and the direct object will be given the structure given in 37. The tree structure given in 37 is mainly to illustrate the constituency and the presence of the empty category and the details of the category labels, etc. do not strictly follow the GPSG conventions, even though the deviations from the GPSG conventions are merely notational and not of consequence. (Recall that in Tamil the sequence of the constituents in such a case is \( \text{NP}_{\text{nom}} \text{NP}_{\text{acc}} \text{TV}_{\text{ser}} \text{TV}_{\text{fin}} \).) I have labeled the VP nodes in order to identify them with some ease in the following discussion.

37.

```
NP_{\text{nom}} \quad \text{VP}_1 \\
\quad \text{VP}_j \quad \text{VP}_k/\text{NP}_{\text{acc}} \\
\quad \quad \text{NP}_{\text{acc}} \quad \text{TV} \quad \text{NP}_{\text{acc}}/\text{NP}_{\text{acc}} \quad \text{TV} \\
I \quad \text{book} \quad \text{buy-SER} \quad e \quad \text{read-PST-I}
```

Here the gap in the second VP (i.e. \( \text{VP}_k \)) is not just contextually interpreted, but can be bound by the object NP pf the first VP -- i.e. \( \text{VP}_j \) with the serial verb -- which is shown by the interpretation of quantified NPs in this construction (cf. footnote). Now it is interesting to note

\[6\] Recall the data previously given (7e, pp.164):

\[\text{naa enta muyal-E- yum aTi-ccu kkolla -le}\]
I any rabbit-ACC-NEG.POL hit-SER kill-PST.NEG
'I didn’t hit and kill any rabbit' (= 'for each rabbit, it is not the case that I hit it and killed (it)')
here that the only way the desired semantic interpretation can be arrived at is by storing the interpretation of the first NP up to the level of VP\_j, then up to the level of VP\_i, then down to VP\_k and down to the gapped NP node dominating the empty category in order to bind the NP gap or the NP gap to be interpreted as being bound by the first NP. This is a highly ad hoc and implausible situation which seriously affects the syntax-semantics connection that GKPS attempt to capture.

38 is the structure for two ditransitive verbs that share the subject and the indirect object, but not the direct object on this approach.

\[\text{S} \rightarrow \text{NP\textsubscript{nom}} \rightarrow \text{VP} \rightarrow \text{VP\textsubscript{ser}} \rightarrow \text{VN} \rightarrow \text{NP\textsubscript{dat}} \rightarrow \text{NP\textsubscript{acc}} \rightarrow \text{DTV} \]

5.3.4 Metarules Another possible strategy to generate the object-sharing subtypes of SVCs is to posit metarules that take VP-expansion rules with a (di)transitive head verb as the input rules and yield rules without NP objects in the expansion of the VPs. (see Sebba 1987 and Winford 1990 where this strategy is employed). The basic metarule will look like the one in 39.

This shows that the gap is actually a bound gap, not one that can be contextually interpreted.
39. VP $\rightarrow$ W NP Y
   \[ \Downarrow \]
   VP $\rightarrow$ W Y

But this metarule will overgenerate since it ungrammatically allows the head verb to take one less object even independent of SVCs and where the absence of the object is not motivated by discourse factors.

5.3.5 An analogue of the CG analysis

And finally, a PS analogue of the CG analysis discussed in the previous section could be attempted, in order to express the generalization regarding the input and the output to the verb serializing affix that the CG analysis could schematize. To illustrate, if one takes this approach within PS grammars, in the case of two transitive verbs sharing both the subject and the direct object, the PS analogue of the CG analysis would let the two verbs combine first to form a complex transitive verb, as illustrated in the tree structure in 40 below.

40. \[
    \begin{array}{c}
    S \\
    \quad \downarrow \\
    NP_{\text{nom}} \quad \text{VP} \\
    \quad \downarrow \\
    NP_{\text{acc}} \quad \text{TV} \\
    \quad \downarrow \\
    TV_{\text{ser}} \quad TV_{\text{fin}}
    \end{array}
\]

To illustrate with one more example, the case of two ditransitive verbs sharing the subject and the indirect object but not the direct object will be given the structure in 41 below:
Thus, with regard to the argument sharing aspect of SVCs, it is seen that PS grammars have to resort to very different mechanisms from those used in CGs. It was seen in the previous section that this fact about SVCs can be accounted for in CG by a schematic category assignment to the serial verb which allows the serial verb to modify the main verb before the main verb combines with the shared argument(s) and it is specified in the semantics that those arguments are to be interpreted as the arguments of both the serial verb and the main verb. Regarding the three possibilities sketched above, there are several aspects of each approach that remain unclear or do not follow from the assumptions standardly made in GPSG. Below I will discuss and evaluate each of the above approaches.

In PS grammars, there are three distinct possibilities:

First, since PS grammars allow empty categories, the argument of one of the verbs could be an empty category, and which of the verbs combines with the overtly present argument is an issue that has to be decided on both empirical and theoretical grounds.
Or conversely, a metarule could be posited to allow a VP without an NP object where the input rule has an NP object as part of the expansion of a VP (see Winford 1990 which employs such a metarule).

Thirdly, the serial verb and the main verb could form a constituent (analogous to the CG analysis outlined in the previous section) which then combines with the object NP; this analysis obviates the need to posit empty objects or metarules to allow VPs without objects. While comparing the CG and PS analyses of the facts in section -- below, I will argue that where the NP is shared, the constituency tests show that the serial verb + main verb can be shown to be a constituent, while the NP object + serial verb is not a constituent in the language. Thus, this analysis is empirically motivated, while the above two are not; in addition, this analysis is a simpler one than the other two outlined above. Positing empty categories in the position of the shared objects in one of the VPs is problematic since in GPSG, empty categories (via SLASH) are introduced only in the case of Unbounded Dependencies and SVCs are not one of the known examples of UDCs. Secondly, when more than one argument is shared, multiple gaps have to be introduced and SVCs do not have any of the properties of multiple-gap constructions. The problems with the metarule analysis first proposed in Sebba 1987, the most significant of which is overgeneration, are discussed in Winford 1990; Winford introduces some modifications to Sebba's analysis and Winford's own analysis does not have the problems that Sebba 1987 has, but the data that Winford analyses is very different from the facts under consideration here since the SVCs he describes with metarules are lexically restricted and therefore can be described with the use of features such as [MOTION], [DIRECTION], etc. The object sharing cases in Tamil that we have discussed above are not lexically restricted and therefore cannot be described with such features.

To elaborate on the third possible analysis then, a rule that allows a complex verb consisting of a serial verb and the main verb is needed. The bar-level of this verb must be 0 since any other
bar-level assignment to a verb that has not combined with its complements would be inconsistent with the assumptions in X-bar syntax. The serial verb and the main verb must both be transitive verbs since they have to combine with at least one NP object. Taking these factors into consideration, the rule that allows a complex transitive verb has to be of the following form:

42. H[2][SUBCAT] --> V [VFORM:SER], H

Though such a rule accurately reflects several aspects of this subtype of SVCs (such as constituency, semantics) and is simpler since no metarule or empty categories need be posited, there are several issues that remain unclear about this analysis.

First, the fact that the serial verb slot and the main verb slot are both lexically unrestricted makes this serial verb + main verb combination a productive pattern; in X-bar syntax, an expression of bar-0 level is a lexical item and the syntactic combination of two verbs into a bar-0 V in the above rule is highly unusual and does not follow from the assumptions in X-bar syntax, though it is allowed in GKPS. (Compare this X-bar assumption with the absence of such a restriction in CG where both basic and phrasal expressions can belong to the same category and there is no analogue of bar-levels in most versions of CG (see Bouma 1988 where bar-level features are used in CG.)

Secondly, in GPSG, the subcategory of the verb cannot be referred to except when the verb is the head combining with its complements. In the above rule, it has to be guaranteed that both the verbs are transitive verbs by some means which is not otherwise employed in the theory.

Thirdly, when two ditransitive verbs share their indirect object and subject, but not their direct object, the approach outlined above cannot be extended to cover the ditransitive verb cases. Recall that the sequence
corresponds to the case where the main verb and the serial verb share the subject and the indirect object but have different direct objects. To extend the above approach to object sharing, the \((\text{NP}_{\text{acc}} + \text{DTV}_{\text{ser}})\) combination must combine with the \((\text{NP}_{\text{acc}} + \text{DTV}_{\text{fin}})\) to make a complex transitive verb described by a rule such as the following one:

\[
\text{43. VP} \rightarrow \text{NP}_{\text{det}} \text{H}[3]
\]

where \(\text{H}[3]\) is the complex verb. Now, to my knowledge, there is no standard way of referring to the internal constituency of the complex verb for two reasons: first, this complex verb has two VPs inside it; and the VPs consist of the verb and the direct object alone. Since in GPSG and many other PS grammars, the manner in which the head combines with its complements is described not by binary rules where only one argument combines with the head at one time, it is not possible to refer to the combination of the verb and the direct object alone.

\[
\text{44. V[BAR:1]} \rightarrow \text{V[BAR:1, VFORM:SER]}, \text{V[BAR:1, VFORM:FIN]}
\]

5.4 A comparison of the CG and the PS analyses of the Tamil SVC constructions

The most significant difference between the CG analysis and the GPSG analysis is that, in CG, two generalizations about the adverbial SVCs in Tamil can be expressed straightforwardly: the first concerns the general issue of category change addressed in this dissertation, namely that expressions of various sizes with a verbal head (verb, verb+object, verb+object+subject, etc.) can have atypical external distribution as adverb phrases when the head verb is in the serial form; the second concerns the specific properties of the serial verb construction, especially argument-sharing. This is due to the fact that the syntactic analysis in CG is forced by the principles of compositionality.
The various types of category change seen in Chapters 3, 4 and 5 are given a unified account in CG thus reflecting the similarities across these cases of internal and external syntax mismatches. In all these analyses, there is a functional element of the category XP/YP which combines with an expression of category YP (whose lexical head is of the category Y) to yield an expression of the category YP -- the participle marker -a in Tamil is (N/N)/(S|$), the nominalizer -tu is N/(N/N) and the serializing affix is (S|$)(S|$) \ (X...X)$\(S|$).

The argument-sharing property specific to SVCs is accounted for by the fact that the serial verb can combine with some or all of its arguments before combining with the main verb.

Though I have not given a particular GPSG account, from the discussion of the various possibilities outlined here, the following issues remain problematic in GPSG:

The difficulties faced in accounting for the facts about argument-sharing have already been discussed after each of the possible analyses within GPSG was outlined.

More importantly for the issue of sameness of category between the lexical head and its phrasal projection: in the case of Tamil serial verbs, the category of the lexical head of these phrases is +V, -N. But the distribution of the whole phrase is that of adverb phrases (which, incidentally, do not fall into the traditional ± N, ± V classification in X-bar theory in any obvious way). Positing a rule such as ADVP -> VP violates endocentricity, whereas avoiding such a rule with another rule such as VP -> VP VP raises the issue of how to distinguish between conjunction by concatenation and modification, (since, of the two VPs in the rule, one could be a modifier and the other, the head, or they both could be heads).

Finally, even though GKPS try to incorporate Bach's *rule-to-rule* hypothesis to ensure compositional semantics, the X-bar foundations of an essentially phrase-structure approach to
natural language syntax dictate the possible syntactic analyses of SVCs within GPSG, whereas in CG, the semantic consideration of how to derive the meaning of a complex expression from that of subexpressions determines the range of syntactic analyses available to the grammar. The particular difficulties GPSG faces are the following: due to the X-bar assumptions and a PS approach, GPSG cannot construct partial phrases (i.e. complex expressions which are not maximal projections) and allow such partial phrases to combine with each other (e.g. indirect object + DTV as a unit which combines with another indirect object + DTV unit (cf. 5.3))\(^6\); where there are syntactic gaps in the main VP which are bound by an NP in the serial VP, given the syntactic analysis that is consistent with the bases of GPSG, the semantic interpretation cannot be arrived at without implausible, ad hoc devices (see 5.3.3).

The problem that CG faces is the following: in order to preserve compositionality, CG has to resort to some mechanism such as Bach's 'wrap' operation that allows for word-order variations without altering the semantic interpretation. But operations such as wrap have been shown to be warranted by many other phenomena in natural language syntax (such as Right Node Raising, extraposition, etc.) and even PS grammars such as GPSG need to be augmented with such devices, as has been pointed out in the literature.

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\(^6\) The problems that GPSG (or PS grammars in general) face are similar to those that non-constituent coordination raise, since in both cases, units which are not maximal projections (in X-bar terms) need to be treated as constituents.
CHAPTER VI

CONCLUSION

6.0 Introduction In view of the critical discussions in Chapter 2, and the various constructions seen in chapters 3-5 all of which exhibit the dichotomy between form-class based categorization and distribution based categorization, some conclusions about internal and external syntax mismatch in natural language syntax can be drawn. In this chapter, a few fundamental issues, both theoretical and empirical, will be addressed, which the facts discussed in this dissertation raise. These issues relate to

1. The differences between CG and PSG in the way expressions are categorized and in the predictions (section 6.1);
2. the differences and similarities between the two types of category changes: one marked by inflectional endings on the head (such as English gerunds and Tamil participles) and the other marked by a separate word (such as the complement clauses in English and the adjectivals in Chinese) (section 6.2);
3. (related to 2) the putative distinction between affixes and words (section 6.3);
4. the putative distinction between syntax and the lexicon as separate components of the grammar (section 6.4)

6.1 A comparison of CG and PSG
As seen in Chapter 2, Categorial grammars and X-bar based PS grammars take fundamentally different approaches to the issue of how to categorize phrases, the basic relationship among its constituents and the connection between the internal and the external syntax. Due to these differences in the basic assumptions, the two classes of grammars make very different predictions about the syntax of human languages with respect to these issues.

6.1.1 Predictions of X-bar grammars

First, the classical X-bar theory, in its most fundamental form, predicts that the situations that constitute the phenomenon of category change (as defined in this dissertation) do not arise. The assumption that leads to this conclusion are that every phrase has a head which is of the same category as the whole phrase. Any attempt to take account of these facts within this version of X-bar theory is inconsistent with these assumptions basic to the strongest version of the X-bar view. Of course, no syntactic theory adopts this stark version of the X-bar view, since constructions such as the English gerunds are very well known and the various syntactic theories have tried to account for a few such well-documented instances of this phenomenon even though they have been treated as exceptions. The descriptions of these few instances have (i) tried to explain away the facts and essentially treat them as chance exceptions, or (ii) make ad hoc assumptions to generate these constructions; or (iii) adopt a modified view of X-bar syntax where the fundamental claims are weakened, or is inconsistent with them.

6.1.1.1 Given the X-bar prediction that category changes are not to be expected in natural language syntax, let us consider how the claims of the theory are weakened by the empirical generalizations as evidenced by the problems with the various analyses of a few instances of category change within X-bar theories of syntax:

6.1.1.2 Exocentric analyses
X-bar theory disallows rules such as XP --> YP (where X ≠ Y) or XP --> W YP (where W ≠ X). However, rules of this type are commonly resorted to in the treatments of the various instances of internal and external syntax mismatches, as the review of the various proposals in X-bar syntax in Chapter 2 shows. For instance, the rule for the English gerunds in Jackendoff’s original discussions on X-bar is

N" --> -ing V" (Jackendoff 1977, pp. 52-53)

which is of the form XP --> W YP, and to Jackendoff’s credit, it should be mentioned that he entertains the possibility that this might be a general phenomenon and generalizes the above rule to a schema X' --> at Y'. Other examples of such rules found in X-bar analyses are given below:

NP --> S'
ADVP --> S'

The list will be much longer but for the fact that not all the instances of category change have been studied or accounted for.

6.1.1.3 Specifier + X^1 combinations

Also, recall the facts about the Specifier + Head combinations (such as DET + N^1, COMP + S discussed in Chapter 2, 2.3.0 - 2.3.4); it was shown that, contrary to the claims of X-bar theory, these constructions are not uniquely headed since in these constructions each of the sister constituents show some head-like property and the features of the phrase cannot be determined based on the features of the (so-called) head alone. It was also pointed out that in the literature on these constructions, sometimes the (so-called) Specifier element is analyzed as the head and sometimes the X^1 (see Zwicky 1985, Hudson 1987, Warner 1989). In all these cases, the most important predictions of the theory -- namely that every phrase is uniquely headed and that the category (and the external distribution) of a phrase can be predicted from the form-class of its head -- can be shown to be falsified because of the tension over...
headhood between the two constituents of such phrases.

There are some recent X-bar proposals (mainly within the Government and Binding framework e.g. Abney 1987) of the Specifier + Head combinations seem to be motivated by the need to state that these constructions are different; these analyses treat NPs as D(eterminer) P(hrase) and S' as C(OMP)P. Note that it is the Specifier's property of being the semantic functor, which is taken to be one of the characteristics of the head, that is reflected in these analyses even though, to my knowledge, these analyses do not concern themselves with functor-argument relationships. These analyses (which differ from the traditional form-class based analyses) can be taken to indicate an interesting shift, even within X-bar theories, from the traditional X-bar approach to something akin to a Categorial approach in that it is not the form-class criterion, but the property of being a functor, that corresponds to the determination of headhood in these analyses.

6.1.1.4 Multiple Heads

Allowing for multi-headed constructions (except in coordinate structures) as in Warner 1989 weakens the X-bar assumption that every phrase has a unique head, even though it may be empirically more accurate (see the discussion on complement clauses in Chapter 2, 2.4.1.4, Chapter 3, and on Chinese adjectivals in Chapter 4.)

6.1.1.5 Endocentric analyses

Pullum 1991 tries to argue that, far from disallowing phrases whose categories are not identical to that of their heads, (the GKPS version of) X-bar theory in fact predicts such a situation; and that cases such as the English gerunds do not violate the principles of the X-bar theory. (For a critique of the details of this analysis, see Chapter 2, 2.4.1.3 and Chapter 4, 4.3.) To restate the main point, Pullum's analysis makes the notion 'head' even more of a primitive
notion than in GKPS, in that the head, given this modification he introduces, is not even expected to share major-categorial features with the phrase; the property of endocentricity, which Pullum tries to preserve and argue for, can now be trivially satisfied by marking one of the daughters as H. Pullum argues that the head still shares other (head) features with the mother and it was shown in 2.4.1.3 that his arguments for claiming that the head shares some features with the mother are very tenuous and it is as plausible to argue that the head and the mother differ with respect to some of these features as it is to argue that they share them.

In addition, it was shown in Chapter 3 (see 3.3.2, 3.3.3, 3.4) this analysis cannot be extended to all cases of internal and external syntax mismatches: for instance, it cannot describe Tamil nominalizations (which are so similar to English gerunds in many ways) and Tamil participles because these two constructions would require a unary rule (such as NP --> H [VFORM: GER]) which would render Pullum’s analysis vacuous; it cannot describe Chinese adjectivals which are VP+de combinations since these do not involve an inflectional ending on the head.

In sum, the facts discussed in the previous chapters are systematically in conflict with the central assumption in X-bar theory – namely that the primary relationship between the co-constituents in every phrase is the head-nonhead relationship, where headhood is decided based on form-class criteria. While this assumption is empirically valid for all combinations within constituents of the X^1 level (as seen in Chapter 2), beyond the X^1 level, this assumption about the primacy of the head-nonhead relationship only has disadvantages, and cannot be maintained as a fundamental principle of phrase construction, of the way in which constituents are formed from smaller units.

6.1.2 Predictions of CG

In CG, the primary relationship that holds between the parts of a phrase is the functor-
argument relationship, not the head-nonhead relationship; there have been proposals to
derive the X-bar notion of head in terms of the functor-argument relationship (Hoeksema 1985,
Bouma 1988), which have been outlined in 2.2.2; the CG definition of head is in fact applied in
identifying the head verb in a clause (or a VP) in the CG analysis of Tamil participle phrases
(Chapter 3) and Tamil SVCs (Chapter 5).

The significance of the facts relating to category change discussed in the previous chapters to
CG is not exactly of the same nature as their significance to X-bar theories since the functor-
argument relationship does hold in the endocentric cases (predicted by X-bar theories) as well
as the cases that are problematic to X-bar theories (such as the Specifier+ Head cases and
the category change cases). Since CG does not rule out the exocentric cases, problems for
this theory in describing the facts discussed in this dissertation are of a different kind.

6.1.2.1 Operations not overtly marked

In CG, category changes that are not marked by an overt element are problematic since these
phrases cannot be factored into a XP/YP functor (i.e. the marker of category change) and an
argument of category YP (i.e. the input phrase to category change). Of the various instances
of category change considered here, the only example of category change without an overt
marker is the English bare-NP Adverbials (discussed in Chapter 2 and Chapter 5).

6.1.2.1.1 Phonologically null functors

It might be possible to posit a phonologically null functor which avoids the problem mentioned
above at the cost of proposing a more abstract analysis (similar to analyses involving zero-
affixes in morphology).

6.1.2.1.2 One-place operations

Another possibility is to analyse these cases as the result of one-place operations. (This
would be a CG analogue of unary-branching rules in PS grammars such as ADVP → NP.)

This is a very important line of investigation which I have not even begun to explore. I cannot
here consider this possibility further though they are of great interest and merit further
research. I would like to add that the issue of one-place operations is not limited to the
phenomenon of category change alone, but is relevant to any operation on phrases that is not
overtly realized. For a discussion of the range of phrasal operations that are often not overtly
realized, see Carlson 1985; cross-linguistically most inflectional processes (which are
semantically operations on phrases) are candidates for zero-realization, especially in
languages with little or no morphology.

6.1.2.2 The distinction between category change and other Function
Applications in CG

Yet another question that needs to be addressed in CG is the following: if category change is
to be accounted for simply as a case of Function Application
(e.g. ADJP|VP  VP → ADJP  where ADJP|VP is the marker of category change and VP is
the input to the category change process),
then how is category change distinguished from other rules of FA such as  VP|NP  NP →
VP, because both rules are of the form YP|XP  XP → YP? The prediction that the latter is
an instance of category change is not a desirable one.

Intuitively, these should be distinguished by the differences between the functor expressions in
the two cases. In true instances of category change, the functor is a grammatical element –
an affix or function word with no lexical content, whereas in the VP example the functor is a
lexical item, a member of an open class. It is possible to treat the combination of the functor
and the argument in the case of category change (and in the case of other grammatical
functors) syncategorically and in some cases very natural to treat them thus, whereas in
the case of lexical functors it is not so. For instance, in a syncategorematic account, the presence of a function word or inflectional affix is the result of an operation that is part of the specifications of a syntactic rule (which in turn is paired with a semantic rule). An example of this would be

\[
\text{INFINITIVE (VP) = to VP}
\]

where the function word \textit{to} is not a categorized element, but is introduced as the realization of the function from VPs to the infinitives of VPs; another example would be \text{PAST (walk) = walked}. Syncategorematic analyses intrinsically follow Item-and-Process models, not Item-and-Arrangement models. The view embodied in syncategorematic analyses is that there are elements that are manifestations of purely grammatical information without lexical content, and these overtly mark some semantic function.

To return to the issue of how to distinguish FA rules such as \text{VP|NP + NP => VP} from FA rules that describe category change such as \text{NP|VP + VP => NP}, the former involves the combination of content words, members of the open-class of verbs combining with their NP objects and the functor in that rule cannot be introduced syncategorematically, as the realization of some grammatical function.

Beyond stating this pretheoretical generalization, I have no further suggestions on how to formally distinguish these two types of FA at this point.

\textbf{6.1.2.3 Predictions about the Internal syntax of phrases in CG: simulating form-class classifications in CG}
It could be argued that while CG does allow category change, it is at the cost of making fewer predictions about the connection between the internal and external syntax of phrases. X-bar theory is restrictive in its predictions about the relationship between the external and the internal syntax, in that the external syntax is claimed to be predictable from the internal syntax, but it cannot account for the clear cases of category change presented in this dissertation.

However, it is possible to show that CG can impose a restrictive link between the internal and external syntax of phrases. The following account of such a restriction within CG was suggested to me by David Dowty (p.c.)

First, the notion crucial to the internal syntax of phrases in X-bar theories is the notion of form-class, as shown in Chapter 2. The X-bar classification of (content) words into the four major lexical categories N, V, ADJ and PREP (which are [N:+, V:-], [N:-, V:+], [N:+, V:+], and [N:-, V:-] respectively,) can be simulated in CG:

a. Nouns: [N:+, V:-] = (N|$) and (NP|$) (i.e. the lexical class of nouns consists of all functions into NP or N)

b. Verbs: [V:+, N:-] = (S|$) (i.e. the lexical class of verbs consists of all functions into S)

c. Adjectives: [N:+, V:+] = ((N|$) | (N|$)) or ((NP|$) | (NP|$)) (i.e. adjectives are (modifier) functions into NP or N)

d. Prepositions: [V:-, N:-] = ((S|$) | (S|$))/NP and ((N|$) | (N|$))/NP (prepositions are functions from NPs into (modifier) functions into Ns, NPs or Ss)

In addition, a lexical class that is not defined in the X-bar schema, namely adverbs can perhaps be defined as (modifier) functions into Ss, the definition of which is stated below:

e. adverbs:(not defined in X-bar syntax in terms of ±N, ±V)
In sum, it has been shown that the predictions of CG are more compatible with both the endocentric cases and the category change cases discussed in this dissertation. While it is true that some details of the Categorial analysis are not fully worked out, it is clear that the facts presented here cannot be accounted for in X-bar theory without either giving up some fundamental assumptions of the theory or resorting to ad hoc devices which fail to capture the important similarities between these cases.

6.2. The two sub-types of category change

As the data in the previous chapters illustrate, the internal-external syntax mismatches can be signaled either morphologically as an inflection on the head (e.g. -ing in the English nominal gerunds and the -a in Tamil participles) or syntactically as a functional word concatenated with the input to category change (e.g. that in complement clauses in English and de in Chinese adjectivals). I have treated both these types of constructions as instances of the same phenomenon that I call category change.

However it is not uncontroversial to claim that they constitute the same phenomenon. The bases for my claim are as follows:

a. First, in both types of constructions, a phrase of one syntactic category gains the distribution of expressions of another syntactic category;

b. cross-linguistically, the functions marked by inflection are the same as the functions marked by non-lexical, functional words; sometimes it is the case that even within the same language, the same function is marked by inflection in some cases and by function words in others (e.g. the comparatives and superlatives in English) (more on this below in 6.3);

c. (related to b) the markers of category change in both cases are grammatical elements; if
they are separate words, they are a closed-class (in some cases, they are the only members of the category they are assigned to)

d. cross-linguistically, internal and external syntax mismatches with the same input and output categories are marked by inflections in some languages and by function words in others (e.g. prenominal modifiers in Tamil and Chinese, which are VPs serving as ADJPs, are marked inflectionally in Tamil and with the function word de in Chinese.)

Even in X-bar theory, which crucially does not permit an expression of the similarities between these two subtypes, these two class of constructions constitute exceptions to the same claims of X-bar theory. In both cases, the external syntax of a phrase cannot be determined based on the categorial features (i.e. form-class) of the head. The two class of situations can be schematized as follows : (i). category change marked by inflection:

```
a.  XP
    |   
    | YP [+F]
    |      
    | (b) ADJP
    |      
    | VP [+PRTP]
```

In a, F is the inflectional feature on the head which is the determinant of the external syntax of YP. (b) illustrates the Tamil or Korean participles where the head verb of the VP takes a participle ending and as can be seen in the diagram above, does not share the set of categorial features with the mother. Examples of this type of category change are: English gerunds (see Chapter 2, 4), Tamil and Korean participles (see Chapter 3), English participles (see Chapter 3).
(ii) category change marked by function words

a. \[ \text{XP[+F]} \]
   \hspace{1cm} \text{Function word} \hspace{1cm} \text{YP (where Y can be X)}

b. \[ \text{ADJP} \]
   \hspace{1cm} \text{VP} \hspace{1cm} \text{de}

In the schema in a, the distribution of XP[+F] cannot be predicted by the categorial features of the head daughter alone, but can only be predicted when the feature provided by the function word is taken into consideration. b represents the Chinese prenominal modifiers which consist of VP concatenated with the function word de, and the distribution of this combination cannot be predicted by the categorial features of the head (i.e. the VP) alone. Other examples of this type of category change are English complement clauses with that and if and Tamil complement clauses with enru (see Chapter 4).

The fact that the X-bar accounts of these two subtypes of category change (e.g. Jackendoff 1977, Abney 1987, Pullum 1991, Warner 1989, GKPS discussed in Chapters 2 - 5) are so different that they seem to be descriptions of two entirely different phenomena. But the basic similarities between these two cases surface in X-bar theories in ways that cannot be otherwise explained, and both are problematic to X-bar theories in similar ways: for instance, within GPSG, both these situations warrant blocking the HFC or modifying it (see review of Pullum 1991 and Warner 1989 in Chapter 2); in X-bar theories such as GB which are not monostratal and which allow fairly abstract analyses, both the inflections and 'minor categories' are often identified as the head due to the need to take into account the head-like
property of these elements in determining the distribution of the phrase. Thus, by forcing the head-nonhead relationship between constituents at all levels in all combinations, and determining headhood based on form-class criteria, the X-bar view makes it difficult for a syntactic theory to (i) account for category changes in a principled way and (ii) express the similarities across different manifestations of this phenomenon. This leads us to the next issue under consideration here, namely the alleged distinction between words and affixes.

6.3 The Lexicalist Hypothesis and missed generalizations

The position that syntax cannot access the internal structure of words is not an intrinsic property to either X-bar grammars or CG grammars. It is possible to conceive of X-bar grammars that do not adopt the Lexicalist Hypothesis (and in fact the X-bar versions before 1970 were of this kind) and those that do; and the same holds true of Categorial grammars. Historically, however, most post-Nominalizations versions of X-bar have, in response to the statement of the Lexicalist Hypothesis, developed very different ways of handling grammatical information based on whether the information is realized as an affix or as a function word. In most X-bar frameworks, the function words are treated more like words than affixes, and are distinguished from the content words by the following assumptions: the closed-class, function words fall outside of the traditional X-bar classification of lexical items into \( \pm N, \pm V \) GKPS notion of 'minor categories'; in GKPS, (unlike GB) they cannot be specified for the feature \([\text{BAR}]\). Inflectional affixes on the other hand, which are acknowledged to be relevant to syntax, are not manipulated directly by syntactic specifications, but are values of morphosyntactic features of syntactic categories; and on some morphosyntactic proposals, cannot be assigned a category (cf. Anderson, Zwicky). To a large extent, the inability of X-bar grammars to express the similarities between the two subtypes of category change (as mentioned in the previous section) is due to this theoretical decision to treat words and affixes differently.
The function words, because they are words, are given a category, even if the category is a singleton set (based on the claim/slogan 'No acategorial words' (cf. Pullum 1982)). The arguments in favor of a Item-and-Process model of morphology (see Matthews, Anderson, Zwicky), as opposed to a Item-and-Arrangement model, can be extended to syntax, in the face of syntactic facts that require a processual analysis (see Sheu 1990, Bach 1984), and it is perhaps because PS grammars are IAP models of syntax that a syncategorematic treatment of function words is inconsistent with PS or X-bar theories.

In CG, on the other hand, both affixes and function words are treated quite similarly, due to the basic assumptions of CG. First, they are typically functors. (See Carlson 1985 for a discussion of which type of elements are likely to be functors and which ones, arguments.) In some versions of CG, (influenced by the trends in Montague Grammar), both affixes and function words can be (and often are) treated syncategorematically.

As Carlson 1985 convincingly argues with cross-linguistic data, inflectional affixes and function words share many properties:

a. the most fundamental aspect of their similarities is that they both are pure embodiment of grammatical information;
b. semantically, they both are functions on phrases (which is why inflectional morphology is relevant to syntax, as opposed to derivational morphology); even though inflectional endings are realized on a lexical item (the head), semantically they have to be interpreted as applying to the whole phrase (e.g. tense on verbs, number on nouns);
c. cross linguistically semantic operations that can be realized by inflectional affixes and function words can also be realized by zero-marking (number markings, complementizers);
d. they both are typical functors (and cannot be treated as arguments in any natural way)
To return to the question of category change, in CG, the two subtypes within XB represented above are the same -- both are cases where the (grammatical, functional) functor combines with phrasal argument; what differentiates the two cases is the operation associated with it -- for example, in the CG analysis of English gerunds discussed in Chapter 2, (see 2.4.2), the functor element -ing combines with the VP argument, not by concatenation, but by the Head Adjunction operation (adopted from Hoeksema 1985); in the case of English complement clauses with that, the functor that combines with the S argument by concatenation (same holds for Chinese adjectival); in the case of Tamil participles, the functor -a combines with the head of the VP argument by concatenation; note that the result of Head Adjunction will be the same as concatenation with the head in this case because the head is phrase-final in Tamil.

Thus, the surfacial differences between the two types of category change are treated as just that -- surfacial differences, in CG. It is the operation by which the category change marker combines with the input phrase in these cases that results in these differences, unlike in PS grammars where affixes and words are treated as entirely different linguistic units.

6.4 Lexical rules vs. Syntactic rules

And finally, it is claimed that the lexicon and the syntax are separate components and the same rules cannot apply in both these components. The facts about various instances of category change discussed in this dissertation suggest that the same process applies to syntactic, phrasal units as well as clearly lexical, sub-word units.

Recall the facts about the -tu nominalizations in Tamil (Chapter 4); -tu nominalizes all participles (which are adjectival forms of verbs, VPs, and clauses (both gapped and gapless)); but it also nominalizes (with the same semantics) some stems or roots in the language which are deictic elements which are not free morphemes. Recall also that this situation cannot be
dismissed as accidental homophony by hypothesizing that the two -tu are not the same affix, since the same is true of the other nominalizing affixes such as -van, -val, -var, etc.

The facts about the other examples of category change -- participles, SVCs suggest a very similar situation. The participle marker -a in Tamil marks the adjectival distribution of verbs, VPs, clauses; and it attaches to several acategorial roots in the language which cannot surface as words without -a (see Chapter 3). The Korean participle marker -n (or the prenominal ending, as it is sometimes called in Korean linguistics) and the nominalizing suffix in Korean also have this property of attaching to both clearly syntactic and clearly sub-word units.

Hence presumably the rule that combines these sub-word units and the affix is a lexical rule, while the one that combines the phrasal units (i.e. the VPs or clauses in most of these cases) with the category changing affix is a syntactic rule, in a theory of grammar where the same rules cannot apply both in the lexicon and syntax.

But given the similarities in the syntactic and semantic specifications in the lexical and syntactic counterparts of the various processes mentioned above, it is an artificial, theory-internal decision to postulate that it is not the same rule because in one case the input is phrasal and therefore it must be a syntactic rule and in the other case the input is sub-word unit and hence it must be a lexical rule.

There have been proposals in the literature that allow the same syntactic/semantic rule to apply both in the lexicon and in syntax (see Dowty 1979). Outside of category change, there are several other cases where there are similarities between lexical and syntactic rules such as passivization, causativization, intransitivization, etc.
6.5 Concluding remarks

The theoretical conclusions I would like to draw, based on empirical evidence I have provided from various languages, is that endocentricity is a valid cross-linguistic principle, but only so far as the combination of a lexical head (of a major category) with its complements and modifiers. Claims about endocentricity cannot be straightforwardly maintained when dealing with a sub-type of higher-level combinations of this phrase and a grammatical, non-lexical functor. Many examples were seen, of a grammatical element -- be it an inflectional affix, clitic, or a function word -- combining with a phrasal unit consisting of a lexical, major-category head and its complements and modifiers resulting in constructions that were characterized by the 'head' and the phrasal projection differing in their syntactic category. The English gerunds, Tamil, English and Korean participles, English relative clauses, Tamil SVCs, all exemplify this phenomenon that I call category change, or internal and external syntax mismatches.

Theoretically, the import of these facts suggest that cross-linguistically, phrase-construction includes both endocentric and non-endocentric types of phrases. Nevertheless, this phenomenon of internal and external syntax mismatches -- i.e. the conditions under which strict endocentricity fails -- is clearly definable, since it involves the combination of a grammatical element with a phrasal expression.

It has been argued in this dissertation that Categorial Grammars accommodate category change in a rather straightforward way, since the primacy of the functor-argument relation, which forms the basis of the CG approach to phrase-construction, remains unaffected in both the endocentric cases and in the cases of category change. X-bar-based PS grammars, I have argued, become substantively less interesting in that the fundamental insight that guides the formalism of X-bar grammars is canceled, revoked in these cases.
In addition, maintaining a strict distinction between words and affixes, I argue, hinders a unified account of this phenomenon. Categorial Grammars (as well as some PS grammars such as recent versions of GB) allow a typology of heads and grammatical elements that is necessary in giving a unified account of this phenomenon. This property of CG makes it possible to give a (partially) similar description of various instances of the same type of category change: e.g. the participle phrases in Tamil, English and Korean, the adjectival phrases in Chinese and relative clauses.

1. However, the assumptions that accompany the analysis of a grammatical element such as that in English complement clauses or de in Chinese adjectivals, result in a less 'surfacy', sometimes unnecessarily baroque, analysis in GB. For example, the assumption that elements such as Neg(ative), T(ense), etc. have a full set of bar-level projections has no straightforward analogue in CG.
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