SYNTACTIC DEPENDENCIES IN CHINESE AND THEIR THEORETICAL IMPLICATIONS

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ABSTRACT

This dissertation discusses antecedent-gap dependencies, specifically topicalization phenomena in various constructions in Chinese. The discussion reveals the relevance of certain general notions essential to the analysis of antecedent-gap dependencies, such as extraction position and extraction domain, which are stated here with reference to both Government Binding (GB) theory and Generalized Phrase Structure Grammar (GPSG).

The discussion shows that, in the light of these general notions, the distributional facts of empty categories and thus antecedent-gap dependencies in Chinese, which have long been considered problematic for the theories of generative grammar, can be analyzed in the general framework of GPSG. The analysis indicates that proper representation of the relevant phrase structures provides the possibility of accounting in a perspicuous way for a number of central cases by invoking fundamental grammatical principles. For instance, the difference between extraction from relative clauses and from NP complement clauses can be subsumed under the Proper Inclusion Principle, and extraction asymmetries of complex NPs based seemingly on their syntactic location are in fact attributable to the relation of a complex NP to the head of the construction in question.

The result of the analysis suggests that an empty position must be closely connected with the head of the construction containing it, although the notion of

head apparently should not be restricted to that of lexical head cross-linguistically. In contrast, languages may vary more freely in terms of the structural domains from which extraction takes place, and thus island constraints should be considered a less unitary phenomenon than has been traditionally assumed.

The organization of this dissertation is as follows. Chapter 1 and chapter 2 briefly introduce issues, assumptions, and backgroud knowledge necessary for the following discussion. Chapter 3 discusses questions and issues in previous analyses in the framework of GB theory. Chapter 4 discusses relevant theoretical issues in the theory of GPSG. Chapter 5 presents a phrase structure analysis of antecedent-gap dependencies in Chinese. Chapter 6 summarizes the general theoretical implications.

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CONTENTS

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DEDICATION

To my parents, distant from me in China, and to my wife, here with me in Canada, all of whom, with little understanding of my study area, have shared joys and pains throughout my career at the University of Victoria.

ABBREVIATIONS

ADVP	Adverbial Phrase
AGR	Agreement
AM	Adverbial Marker
AP	Adjective Phrase
ASP	Aspect Marker
AUX	Auxiliary
BA	Ba Lexical Item
BAR	Bar Level
CAP	Control Agreement Principle
CED	Condition on Extraction Domain
CL	Classifier
COMP	Complementizer
DET	Determiner
DJR	Disjoint Reference
DUR	Durative Aspect Marker
EC	Empty Category
ECP	Empty Category Principle
ECPO	Exhaustive Constant Partial Ordering
EXP	Experiential Aspect Marker
FCR	Feature Cooccurence Restriction
FFP	Foot Feature Principle
FIN	Finite
FSD	Feature Specification Default
GB	Government Binding Theory
GCR	Generalized Control Rule
GKPS	Gazdar, Klein, Pullum, and Sag (1985)
GPSG	Generalized Phrase Structure Grammar
H	Head
HFC	Head Feature Convention
ID	Immediate Dominance
INF	Infinitive
INFL	Inflectional Component
LF	Logical Form
LP	Linear Precedence
MO	Modifier Marker
NFORM	Noun Form
NORM	Normal
NP	Noun Phrase
PAS	Passive
PER	Perfective Aspect Marker

PF	Phonetic Form
PIP	Proper Inclusion Principle
PLU	Plural
PP	Prepositional Phrase
PS	Phrase Structure
RESUM	Resumptive
STM	Slash Termination Metarule
SUBCAT	Subcategorization
SUBJ	Subject
TG	Transformational Generative Grammar
TYP	Semantic Type
VFORM	Verb Form
VP	Verbal Phrase
W	A Variable over a Multiset of Categories

Chapter I

INTRODUCTION: SYNTACTIC DEPENDENCIES

The study of structural dependencies, in particular long-distance dependencies, has been one of the most interesting topics in generative grammar. Long-distance dependency refers to an overt structural relation of some kind that holds between substructures in a sentence construction. One of the cases of such dependencies concerns antecedent-gap relations and thus the distribution of empty categories. In the last fifteen years, much research has focused on an inquiry of the structural properties of empty categories, the conditions or principles which govern these properties, and in particular how these conditions or principles should be formulated in the theory with respect to cross-linguistic variations.

Chomsky (1981) proposes a "modular" theory of syntax, in which the theory of universal grammar consists of distinct and coherent interacting subsystems, and each of the subsystems is based on principles that allow certain possibilities of "parametric" variations. In other words, the formal properties of languages may differ from one language to another, but they differ only in terms of the choice of parameters in one or another subsystems, not in the small set of universal principles.

A basic assumption has been that the distribution of empty categories in the vast majority of cases is syntactic in nature. In Government Binding (GB) theory,

there are two subsystems of principles which are crucial to the analysis of empty categories, viz., the Subjacency Condition and the Empty Category Principle (Chomsky 1981). It has long been observed that in most languages in the world, certain constructions exhibit "island" effects in the sense that no constituent can be extracted out of such constructions. The case of English complex noun phrases (NPs) is a familiar example:

(1) *Who did you hear the news that John married ____?

This sentence is ungrammatical, because a gap in a complex NP -- an NP containing a clause -- cannot be related to its antecedent outside. Wh-questions and Sentential subjects in English are other typical cases of island constructions. Since Chomsky (1973), the notion of Subjacency has played a central role in attempts to provide a unitary account of island effects, placing locality requirements on possible antecedent-gap dependencies.

The Empty Category Principle, on the other hand, concerns the relation between an empty category and the head of a construction, stating basically that empty categories may occur only in those positions which are governed presumably by the lexical head. This correctly predicts that in languages like English empty categories are in general allowed in object position, not in subject position even though the dependency between the gap in subject position and its antecedent may have not violated Subjacency.

However, it has been observed that the constraints that are applicable to constructions containing antecedent-gap dependencies in languages like English do not similarly apply to the corresponding constructions in several East Asian lan-

guages such as Japanese, Korean and Chinese. For instance, Kuno (1973) notes that Japanese NPs like the following are fully acceptable:

(2) kite-iru yoohuku ga yogorete-iru sinsi
wearing-is suit NOM dirty-is gentleman
'gentleman who the suit (he) is wearing is dirty'

In this structure, an element (i.e., ***sinsi*** 'gentleman') of a complex NP (presumably ***sinsi ga kite-iru yoohuku*** 'suit that the gentleman is wearing') has been relativized, in violation of the Complex NP constraint (Ross 1967), therefore the Subjacency Condition.[1]

As is well known, in Chinese, there is no overt Wh-movement in the sense of transformational theory, but antecedent-gap dependencies of other types do exist, such as those in terms of topicalization. Though there is a number of cases which can be conveniently subsumed under the Subjacency Condition (cf. Huang 1982), there is also a number of cases which are counterexamples to a Subjacency analysis. As Xu and Langendoen (1985) and Xu (1986) note, in Chinese an element may be extracted out of a complex NP. This situation has evoked a long-standing and as-yet unresolved controversy on the relevance of the Complex NP constraint, and thus the Subjacency Condition, to the study of Chinese syntax. To maintain the assumption of Subjacency, several arguments have been put forward purporting to show that in Chinese as in other languages, empty categories involving Subjacency violations are base-generated and that the Subjacency Condition applies only to the cases involving Move-α (cf. Huang 1984, 1987). While this approach does

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[1] The observation of Subjacency violation cases in Japanese has led to much discussion in the literature. See e.g., Farmer (1980), Kitagawa (1982), Saito (1985), and Kameyama (1988) for discussion. As for the relevant cases in Korean, see e.g., Yang (1975), and Na (1990) for discussion.

account for the acceptability of a set of cases such as those involving extraction from complex NPs, it brings about undesirable complications, since other cases are then wrongly predicted or remain unexplained. One of the immediate questions will be: what is the relevant condition governing the possible dependencies between the base-generated empty categories and their antecedents. Furthermore, as Huang (1984) observes, Chinese exhibits a peculiar subject-object asymmetry. It is generally possible to topicalize an element (i.e., a subject or an object) out of a complex NP located in subject position, but it is not possible to topicalize an element out of an complex NP located in object position. This distribution of facts clearly cannot be accounted for directly by the Subjacency Condition, the base-generation strategy, or the Empty Category Principle.

In view of the obvious difficulties for these presumably well-established syntactic principles, the Subjacency Condition and the Empty Category Principle, one would naturally question the hypothesis that the distribution of antecedent-gap dependencies in Chinese is a syntactic fact. To answer this question, it is necessary to consider two related issues: whether the gaps are syntactic and whether the antecedent-gap dependencies can be stated in structural terms. Traditionally, there are two major types of cases which syntactically motivate empty categories in a construction. The first type concerns what are called strong connectivity phenomena (cf. Jacobson 1984). A well-known example of this type is case-marking in the dialect of English which makes the distinction between the nominative form ***who*** and the accusative form ***whom***, as shown by the following contrast:

(3) a. Whom do you think John likes ____?

b. *Who do you think John likes ____?

In the structures above, the case-marking facts indicate that the Wh-word behaves as though it is in the position immediately following the verb *likes*. Similar examples can be found with agreement and other phenomena, as discussed extensively in basic linguistic textbooks. It is generally recognized that there is an (empty) category in the embedded object position, although for sentences like (3) there are several possible ways in which the Wh-phrase may be associated with the position immediately following the verb *likes* in a synactic representation.

The other type of cases syntactically motivating the existence of empty categories concerns subcategorization requirements of verbs. Consider, for instance, the following sentences:

(4) a. Who did John persuade ____ to join the committee?

b. John persuaded Bill to join the committee.

c. *John persuaded to join the committee.

It is generally agreed that an English sentence like (4a) behaves as though there is an NP following the verb *persuade*, since *persuade* does not normally occur without being followed by an NP as shown by the contrast between (4b) and (4c).

As far as strong connectivity is concerned, not much can be said as interesting evidence for empty categories in Chinese since this language employs very little grammatical morphology to convey syntactic information. But the subcategorization property of verbs is an important syntactic argument for the existence of empty categories in Chinese as in other languages, since subcategorization properties seem to be quite uniform across languages. From this point of view, I assume that a sentence like the following contains an empty category in the

object position immediately after the verb ***renshi*** 'know', leaving aside the exact representation a particular theory may provide for such a sentence. since an object NP would normally appear, as required by the verb in question.

(5) Lisi, Zhangsan renshi ____.
Lisi Zhangsan know
'Lisi, Zhangsan knows ____.'

Thus, I adopt the relatively uncontroversial assumption that the distribution of empty categories is determined by the subcategorization properties of the predicates.

Although a variety of factors, not all of which are syntactic, may play a role in determining the acceptability of constructions containing antecedent-gap dependencies, it seems that structural properties of a construction are crucial to the distribution of empty categories, and thus antecedent-gap dependencies, in Chinese.

By the assumption that syntactic factors are crucial, I do not imply by any means that factors other than syntactic ones are irrelevant. For instance, the familiar "aboutness" condition is important to the acceptability of a Chinese topicalization construction (cf. Chafe 1976). However, the requirement that the comment clause (or an element of the comment clause) must be semantically or pragmatically related to the topic is a necessary condition not only for Chinese but also for English and other languages, since a sentence like the following is not acceptable: ****As for the students, the professor likes apples most,*** even though it is generally conceived that the distribution of empty categories in English is largely syntactic in nature. What is more important is that the "aboutness" condition is not sufficient to account for a number of basic facts in Chinese. For instance, both of the

structures in the following involve extraction of the VP ***shuo zhexie hua*** 'say these words', but as Xu and Langendoen (1985) note, (6b) is ill-formed, while (6a) is well-formed:

(6) a. Shuo zhexie hua$_i$, wo bu gan [$_{VP}$ t_i].
say these words I don't dare
'Say these words, I don't dare ____.

b. *Shuo zhexie hua$_i$, wo nande [$_{VP}$ t_i].
say these words I seldom
*'Say these words, I seldom ____.

Obviously, the "aboutness" condition itself can say nothing for the difference between (6a) and (6b) more than simply stating that the empty element in (6a) can be related to the topic but the empty element in (6b) cannot. The reason for this difference is clearly not a matter of semantics or pragmatics.[2]

Thus, it is assumed that the distribution of empty categories in Chinese is basically attributable to structural properties of the constructions in question. As I will show throughout this dissertation, in the vast majority of cases, the acceptability or the unacceptability of constructions containing antecedent-gap dependencies in Chinese can be accounted for in terms of strict syntactic notions, such as the positions in which empty categories may occur and the structural domain which antecedent-gap relations may (or may not) cross. In any event, it is valuable to have explanations for the structural properties governing the possible antecedent-gap dependencies.[3]

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[2] While assuming the "aboutness" condition, Xu and Langendoen (1985) resort to the structural notions of A-position vs. A'-position to distinguish such contrast. According to them, the extraction in (6a) is from an A-position, but the extraction in (6b) is from an A'-position.

[3] See Huang (1987) for more examples and arguments for a structural approach to Chinese antecedent-gap dependencies.

Under the assumption that the distribution of empty categories is statable in terms of syntactic notions, this dissertation discusses antecedent-gap dependencies, specifically topicalization phenomena in Chinese, which typically give rise to antecedent-gap dependencies in various sentence constructions in this language.[4] The dissertation will be concerned largely with the discussion of the properties of Chinese empty categories and the implications of antecedent-gap dependencies in Chinese for the theory of grammar. The discussion will refer to two contemporary syntactic theories, Government Binding theory and Generalized Phrase Structure Grammar (GPSG). While the dissertation is not intended to argue for one theory over the other, the analysis presented in this dissertation indicates that the relevant cases of antecedent-gap dependencies in Chinese can be more conveniently stated in the general framework of GPSG theory.

The remainder of this dissertation is organized largely into four parts. Chapter 2 presents a brief overview of some major characteristics of the Chinese language, particularly those concerning the basic sentence structures and word order. This chapter is meant to provide background knowledge of Chinese syntax necessary for the discussion in the following chapters.

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[4] In the framework of GB theory, it has been traditionally assumed that in Chinese there are two major syntactic processes, i.e., topicalization and relativization, which create antecedent-gap dependencies. Subjacency and the Empty Category Principle are relevant to gaps resulted from both topicalization and relativization since both of the cases are assumed as instances of Move-α. But in the framework of Generalized Phrase Structure Grammar, relative clauses are introduced from phrase structure rules and the relevant structures may contain no gaps. More importantly, as will be discussed in chapter 5, gaps in Chinese relative clauses are introduced through special expansion rules, which are different from the general rule responsible for introducing long-distance dependencies of topicalization. In this dissertation, I will mainly discuss antecedent-gap dependencies with respect to topicalization.

Chapter 3 discusses antecedent-gap dependencies in Government Binding theory. This chapter is intended to recapitulate questions and issues in previous analyses concerning antecedent-gap dependencies in Chinese, since virtually all the analyses proposed so far have been conducted in the GB framework. The discussion reveals the relevance of some notions such as extraction position and extraction domain, which, I believe, are central to the antecedent-gap dependencies, but I will not pursue the question of how these notions may be properly formulated in the general GB framework.

Chapters 4 and 5 discuss antecedent-gap dependencies in the theory of GPSG. Chapter 4 focuses on the discussion of general theoretical issues within this framework. In view of the relevant cases of antecedent-gap dependencies in Chinese and other languages, this chapter will present proposals as to how the theory of GPSG can be modified to implement the notions central to the antecedent-gap dependencies discussed in the preceding chapters, and thus accommodate the relevant cases of antecedent-gap dependencies in Chinese. Based on the discussion in chapter 4, chapter 5 presents a phrase structure analysis of antecedent-gap dependencies in Chinese. Though the theory of GPSG is somewhat technical, I attempt to make the discussion as intuitive as possible.

Chapter 6 is the conclusion, which will not only summarize the theoretical implications with respect to a particular theoretical framework, i.e., the GB theory or the GPSG theory, but also discuss some more fundamental theoretical issues from a general point of view.

Before proceeding to the discussion in the following chapters, I would like to clarify a matter of terminology. In this dissertation, the term "extraction" is used

from time to time. By "extraction", I do not imply that some constituent has been moved (or deleted) and that the construction in question necessarily involves a transformational analysis. In fact, I will often use traditional terminology which may have suggested certain theoretical implications when it was first proposed. The traditional terminology is used in this dissertation simply for its familiarity and constancy with respect to a particular phenomenon discussed in this dissertation.

Chapter II

CONSTITUENT STRUCTURE AND WORD ORDER IN CHINESE

In this chapter, I will briefly review some major characteristics of Chinese. The term "Chinese" is meant to denote the major dialect family most commonly used in China and officially established as the standard language for the nation.[5] The discussion will be focused on the major phrasal categories, i.e., noun phrases (NPs), verb phrases (VPs), adjective phrases (APs), and prepositional phrases (PPs), and their basic internal structures, especially in reference to typological peculiarities of this language. As will be seen, an adequate account of Chinese syntactic structures is best given in terms of hierarchical constituents and properly construed linear order formation. In addition to the information of category types, the information about the status that a relevant category has in a given constituent, such as the notion of "head", is crucial to the determination of the linear precedence among sister categories.

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[5] This major dialect family refers to Mandarin Chinese or, in Chinese, ***putonghua***, meaning literally 'common language'. Since Mandarin Chinese has often simply been called Chinese in the literature, I will follow the tradition in this dissertation.

2.1 Basic Sentence Patterns and Hierarchical Structures

The basic sentence pattern of a Chinese sentence has the form of subject-predicate, though it is controversial whether Chinese is a SVO language or a SOV language in terms of Greenberg's (1966) typological classification scheme. Thus, the subject usually precedes the predicate, while the object sometimes may occur in a position other than the one immediately after the verb, such as sentence initial position in a topicalization construction or preverbal position in the so-called *ba*-construction, which I will discuss below.

Compared with many other languages in the world, Chinese employs very few morphological devices to signal grammatical functions. Grammatical functions are expressed by means of various other devices, among which word order plays a crucial role. In general, the noun phrase which immediately precedes the verb phrase will always be taken as the subject in a sentence as shown by the examples in (1) below.[6]

(1) a. Zhangsan zhaodao le haizi.
Zhangsan find ASP child
'Zhangsan found the child.'

b. Haizi, Zhangsan zhaodao le ____.
child Zhangsan find ASP
'The child, Zhangsan found.'

Chinese has no inflectional forms of subject-predicate agreement to encode such a grammatical relation, in contrast to English, and no nominal particles either to mark subjects and objects, in contrast to Japanese. Usually no confusion will be

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[6] The abbreviation ASP is used to identify aspect markers in general except some specific cases where PER(fective), DUR(ative) and EXP(eriential) aspect markers are discussed and distinguished.

evoked even when the object is topicalized t sentence initial position. As shown by (1), in either of the two sentences, the noun phrase *Zhangsan* will always be understood as the subject. Thus, the sentential structure for Chinese can be encoded in the following phrase structure rule, as has been generally assumed in the literature:

(2) S --> NP VP

Chinese sentences, like their counterparts in other languages, are not just linearly ordered sequences of sounds; rather they are hierarchically structured from successively smaller sets of constituents, with each constituent belonging to a given category. In other words, lexical categories are built into phrasal categories, which in turn are built into sentences. Thus, sentences like that in (3) are built up out of two phrasal categories, i.e., the noun phrase *ta de xuesheng* 'his student' and the verb phrase *zhaodao le neiben shu* 'found that book', which in turn have their own internal structures.[7]

(3) Ta de xuesheng zhaodao le neiben shu.
he MO student find ASP that book
'His student found that book.'

It can be shown that the strings *ta de xuesheng* 'his student' and *zhaodao le neiben shu* 'found that book' are indeed independent constituents, for it is possible for adverbs like *liji* 'immediately' to intrude between them, but not anywhere else, as shown by the grammatical contrast in the following examples.

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[7] The lexical item *de* (glossed as MO in example (2) and henceforth) is a modifier marker. See section 2.2 for further discussion

(4) a. Ta de xuesheng liji zhaodao le neiben shu.
he MO student immediately find ASP that book
'His student immediately found that book.'

b.*Ta de liji xuesheng zhaodao le neiben shu.
he MO immediately student find ASP that book
*'His immediately student found that book.'

c.*Ta de xuesheng zhaodao liji le neiben shu.
he MO student find immediately ASP that book
*'His student found immediately that book.'

Thus, the structure for the VP of (4a) can be represented as an adjunction of an adverbial phrase to the VP, as encoded in the following rule:

(5) VP --> ADVP VP

Here I am not going to dwell upon the discussion of the arguments for the claim that Chinese sentences are hierarchically structured, since arguments for hierarchical structures of sentences in other languages have been extensively discussed in the literature and parallel evidence for hierarchical structures for Chinese sentences can be readily observed in terms of distribution, coordination, omissibility, structural ambiguity, and so forth.

Though Chinese sentences are largely hierachically structured, there are phenomena which show certain complications. In Chinese, modifiers occur generally before the constituent they modify. More specifically, adnominal modifiers occur before the head noun and adverbial modifiers occur before the verb phrase. What is interesting is that adnominal modifiers (i.e., adjective, noun and other types of phrases) in general may occur in free word order among themselves if there is more than one adnominal modifier occurring before the head. The same is true of adverbial modifiers.[8] These facts may be considered an indication that there is no

internal structure within a noun phrase (or an adverbial phrase) other than a flat structure in which the head follows all its modifiers. Such a structure can be generated by the operation of a rule like the one in (6), exhibiting certain free word order properties of non-configurational languages like Japanese and Warlpiri.

(6) N' --> XP* N

Though a flat-structure approach has advantages in the analysis of free word order phenomena with respect to certain constituency in languages like Japanese and Warlpiri,[9] relevant cases in Chinese seem to favor a hierarchical approach. Huang (1982) presents a set of examples concerning the interpretation of sentences involving multiple adnominal modifiers. Though modifiers may occur freely in order without causing any difference in grammaticality, each order almost always entails a difference in meaning. Given two modifiers M_1 and M_2 preceding the head noun in that order, in general M_1 includes M_2 in its scope of modification, but the reverse is not true. As Huang (1982) notes, this asymmetry in the directionality of modification can be accounted for by a rule of interpretation like the one in (7). Assuming a flat structure for each noun phrase, this rule specifies the scope relation of modification, successively from left to right.

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[8] See section 2.4. for further discussion of adverbial modifiers.

[9] In Japanese, for example, it is difficult to assume VP constituency since the word strings which can possibly constitute a VP may not be adjacent to each other. In contrast, a flat-structure generated by a rule like S --> XP* V allows an appropriate number of arguments to be associated with the node(s) XP* in the relevant tree. Assuming that there is no restriction on sequential order of the association and nodes may not be associated with any argument, the free word order fact becomes simply an entailment of the lack of VP constituency. The assumption that Japanese does not have VP constituency is also consistent with the observation that there appears to be no VP extraction in this language. See Farmer (1980) and Hale (1981, 1983) for discussion of properties of non-configurational languages and a more general form of the rule in (6).

(7) Given a linear sequence P_1, P_2, ... P_n for all i and j, $1 \leq i \leq j \leq n$, interpret P_j as in the scope (of modification) of P_i, but not conversely (cf. Huang 1982, p. 66).

Alternatively, Chinese noun phases can be assumed to have uniformly a right-branching representation instead of a flat one. Given such a hierachical assumption, the facts concerning scope may follow from the definition of scope given in Reinhart (1976), without invoking the linear interpretation rule in (7).[10]

Though there is no significant difference theoretically and empirically in terms of tne facts concerned so far, other cases provide strong arguments favoring a hierarchical analysis. Specifically, with respect to simple sentence structures, the relationship between scope order and surface word order in Chinese can be accounted for either in linear terms or in hierarchical terms; however, the same is not true concerning complex sentence structures. One type of example presented in Huang (1982) involves sentences with a sentential subject or a relative clause embedded in a preverbal NP:

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[10] The definition of scope is stated as follows (cf. Reinhart 1976):

α has a scope over β if and only if α c-commands β.

Given uniformly a right branching structure, a modifier will almost always c-command the modifiers it precedes and therefore has them in its scope.

(8) [$_S$ You wu liu ge ren xuan zhemen ke] dui dajia dou hao
have 5-or-6 CL man take this course to everyone all good
'It is good for everyone that there are five or six people taking this course.'

(9) [$_{NP}$[$_S$ Mai-le henduo shu] de neige ren] dui meige ren
buy ASP many book MO that man to every man
dou hen keqi.
all very polite
'The man who bought many books was very polite to everybody.'

Each of the two sentences involves two quantificational expressions. The one on the left is a constituent in a subordinate clause, and the one on the right is a constituent of a matrix clause. In neither of the two sentences does the quantificational expression on the left have a wide scope over the one on the right. Apparently, a hierarchial hypothesis is superior to a linear hypothesis in accounting for such cases since given a hierarchical representation, the scope relations between the two quantificatcnal expressions in (8) and (9) are simply a result of the fact that the one on the left does not c-command the one on the right though the former does linearly precede the latter.

Although the argument above is largely theory-internal, the correlation between scope interpretation and structural properties should be captured by any theory. Reasons for such a position are quite clear. In order to treat scope relations uniformly across categories, it is clearly necessary and essential to assume hierarchical structures for all the categories in Chinese. It is hard to imagine what the situation would be if linear structures are assumed for noun phrases, while hierarchical structures are assumed for phrases of other category types. As is generally agreed, one kind of relationship which it is necessary for an adequate grammar to express is cross-categorial generalization. Constituent structure provides a

natural means of characterizing logical relations expressed in a sentence, such as scope phenomena, ambiguities, and so forth. Moreover, since constituent structure is required for independent reasons in syntax as extensively discussed in the literature, there is no reason not to represent scope relations among elements of a sentence in syntactic terms if syntactic representations are available.

A hierarchical representation of Chinese sentences captures generalizations and facilitates linguistic analysis of this languages in a number of ways in which a linear representation does not. The *ba*-construction is an interesting example. In Chinese, there is a common alternation in transitive sentences. The object of the verb can occur either immediately after the verb or immediately before the verb. When the object occurs before the verb, there must be a preposition *ba* preceding the object. Consider the examples in (10) below, where the relevant parts are underlined.[11]

(10) a. Zhangsan zhaodao le neiben shu.
Zhangsan find ASP that book
'Zhangsan found that book.'

b. Zhangsan ba neiben shu zhaodao le.
Zhangsan BA that book find ASP
'Zhangsan found that book.'

As mentioned above, relative to other languages, Chinese employs little grammatical morphology to signal grammatical functions of a particular word or phrase in a sentence. Word order plays a crucial role in encoding grammatical functions among words or phrases in a sentence. Now the question is how one knows that

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[11] In general, the noun phrases which can follow the preposition *ba* must be semantically specific. See Li and Thompson (1981) for detailed discussion. Following Li and Thompson, I will henceforth call the object noun phrase of *ba* the *ba* noun phrase.

in a structure like (10b), it is the noun phrase ***Zhangsan*** that is the subject, but not the noun phrase ***neiben shu*** 'that book' since the latter immediately precedes the verb. The relevant intuition is that relative to the verb, the noun phrase immediately preceding the verb in a ***ba***-construction does not act as an independent sister constituent to the verb; rather the noun phrase is introduced by the preposition ***ba*** and combines with ***ba***, forming a prepositional phrase, which precedes the verb. This intuition can be proved by the fact that it is possible for an adverbial phrase like ***henhen de*** 'cruelly' to intrude either before the ***ba***-phrase or before the verb and after the ***ba***-phrase, but not into the ***ba***-phrase, as shown by the contrast in grammaticality in the examples below:[12]

(11) a. Zhangsan henhen de ba Lisi piping le yi dun
Zhangsan cruelly AM BA Lisi criticize one time
'Zhangsan gave Lisi a cruel criticism.'

b. Zhangsan ba Lisi henhen de piping le yi dun
Zhangsan BA Lisi cruelly AM criticize one time
'Zhangsan gave Lisi a cruel criticism.'

c. *Zhangsan ba henhen de Lisi piping le yi dun
Zhangsan BA cruelly AM Lisi criticize one time
'Zhangsan gave Lisi a cruel criticism.

The generalization that ***ba*** and its object constitute a prepositional phrase which as a whole combines with the following verb can be expressed in terms of a hierarchical structure. Consider the following structure, in which I tentatively assume that the ***ba***-phrase is the sister of a verb phrase:

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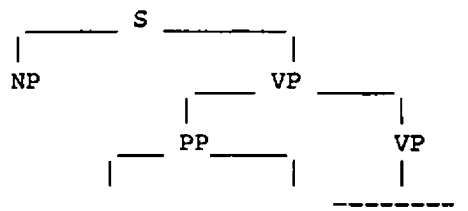
12 The lexical item ***de*** in the example (11) is a morpheme independent of the modifier marker ***de*** used in the example (3) above. They are different both in functions and forms though they are homophones. The ***de*** in (11) is a particle usually combining with adverbs to form an adverbial modifier. I use AM to gloss the adverbial ***de*** in this dissertation.

(12)



Zhangsan ba neiben shu zhaodao le
Zhangsan BA that book find ASP
'Zhangsan found that book.'

Though here I will not further discuss the relevant arguments, the fact that an adverb may occur between the PP and the verb can certainly be considered as evidence for assuming a structure like (12), where the PP has a VP as its sister.[13] Given a structure like (12), the noun phrase ***neiben shu*** 'that book' is not locally adjacent to the verb phrase. Assuming that the notion of linear precedence is relevant only to sister constituents, this structure is consistent with the claim that the noun phrase which immediately precedes the verb phrase is in general the subject.[14]

To sum up, the basic structural pattern of a Chinese sentence is subject-predicate. A hierarchical representation of sentences in Chinese is not only independently motivated by the relevant facts as in other languages, it is also required in order to capture cross-categorial generalizations and facilitate linguistic analysis

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13 I leave it for further research whether the head of the category containing the ***ba***-PP should be a VP or V'. The point is that it is a phrasal category, since an adverb may occur between the PP and the verb, as noted above. See also footnote 96 for related discussion.

14 In typological studies, there has been a long-standing debate whether Chinese is basically a SVO or SOV language. Greenberg (1966) proposes a set of criteria to classify languages. The ***ba***-construction has been considered as one of the important features of SOV language. Since Chinese has SOV as well as SVO features in Greenberg's terms, it is difficult to determine which type of language Chinese should belong to in his system.

of this language.

2.2 Noun Phrases

Like their counterparts in other languages, noun phrases in Chinese can consist of a head noun plus other modifying elements. However, as briefly mentioned above, these modifying elements always occur in front of the head noun. In addition, the modifying elements are usually followed by a particle *de*, which denotes various modifying relations of the modifying elements to the head noun. Phrases of almost all category types may be used as adnominal modifiers, such as noun phrases, adjective phrases, prepositional phrases, and verb phrases as shown in (13), where the modifying elements are underlined.

(13) a. Zhangsan de haizi
Zhangsan MO child
'Zhangsan's child'

b. piaoliang de haizi
beautiful MO child
'a beautiful child'

c. dui zuguo de re'ai
to country MO love
'the love for the country'

d. hui tiaowu de xuesheng
can dance MO student
'the student who can dance'

In (13a) two noun phrases are linked by the particle *de*. Though other types of associative relations are also possible, one very important function of a noun

phrase followed by ***de*** is the possessive relation. Thus, a noun phrase followed by ***de*** usually functions as a possessive phrase. Adjective phrases followed by ***de*** denote a typical function of modification, specifying the attributes of the head noun expression, while prepositional phrases and verb phrases followed by ***de*** perform the function of clarifying or restricting the reference of the head noun expression modified. When a verb phrase is used to modify a noun phrase, the verb phrase is usually predicated of the head noun. In this sense, verb phrases which modify noun phrases may be regarded as a type of relative clause, as shown by the example in (13d). I will come to a detailed discussion of relative clauses in section 2.3. The structures in (13) can be collectively represented roughly in terms of the following phrase structure rule.

(14) NP --> XP NP

See section 2.3 for discussion of the motivation for assuming the head category as being phrasal.

Before the discussion proceeds further, one more thing should be mentioned. Related to the distribution of noun phrases in Chinese, there is one important notion, namely, "specificity". It means loosely that the reference of the noun phrase is known presumably at least to the speaker. In English, nouns are usually marked by definite or indefinite articles. In Chinese, nouns do not have to be marked at all, though expressions like demonstratives may be used to denote specificity and expressions like numerals may be used to denote non-specificity. A noun phrase being specific or non-specific is generally correlated with its distribution. A non-specific NP does not occur in a position where only a specific noun phrase is sup-

posed to occur. One well discussed case of specificity of NPs concerns the *ba*-construction. The *ba*-noun-phrase usually must be specific in meaning. This property can be shown by the grammatical contrast between (15a) and (15b) below.

(15) a. Zhangsan ba neiben shu gei le Lisi.
Zhangsan BA that book give ASP Lisi
'Zhangsan gave Lisi that book.'

b.*Zhangsan ba sanben shu gei le Lisi.
Zhangsan BA three book give ASP Lisi
'Zhangsan gave Lisi three books.'

As has also been long observed, non-specific NPs may not occur in subject position unless the NP is introduced by the existential expression you 'there be'. The difference in terms of specificity can be shown by the following structures (cf. Huang 1982, pp. 63-64).

(16) a. Zhangsan de sanben shu zai zher.
Zhangsan MO three book be-here
'Zhangsan's three books are here.'

b.*Sanben Zhangsan de shu zai zher.
three Zhangsan MO book be-here
'There are three books here belonging to Zhangsan.'

c. You sanben Zhangsan de shu zai zher.
there-be three Zhangsan MO book be-here
'There are three books here belonging to Zhangsan.'

Although both the NP with the possessive phrase *Zhangsan de* preceding the numeral expression *sanben* 'three' and the one with *sanben* 'three' preceding *Zhangsan de* are well-formed, the former (i.e., (16a)) tends to have a specific interpretation, while the latter (i.e., (16b) or (16c)) is entirely non-specific. This contrast in specificity of subject noun phrases results in a grammatical contrast shown in (16).

The notion of specificity is related to some other phenomena such as the topic construction. As Li and Thompson (1981) point out, NPs in topic positions must be specific. I will have a more detailed discussion of topic constructions in section 2.6. Thus, the property of specificity of an NP to some extent determines the distribution of the NP. When an NP is non-specific, it will not have a chance of occurring in the object position of the preposition *bǎ*, nor in a topic position in a sentence.

2.3 Complex Noun Phrases

The notion of a complex noun phrase probably was first introduced by Ross (1967). According to Ross, if an NP contains a clause (e.g., a relative clause or a complement clause), it is a complex NP. As has been mentioned, an NP in Chinese may be modified by a verb phrase, which can be regarded as a relative clause. Accordingly, an NP may also be modified by a clause with the modifier marker *de* occurring immediately after the clause and before the head noun. Furthermore, a clause followed by *de* can be a relative clause or a NP complement clause. Thus, the NPs containing verb phrases or clauses are complex NPs.

As in English, in Chinese there are two common patterns of relative clauses in terms of the relation between the relative clause and the head noun being modified. These two patterns are: the head noun can refer either to the subject participant or the object participant of the verb of the relative clause, as shown by the examples in (17).

(17) a. xuesheng xihuan ____ de neiben shu
student like MO that book
'the book that students like'

b. ____ xihuan neiben shu de xuesheng
like that book MO student
'the student who likes the book'

In (17) the verb ***xihuan*** 'like' is a transitive verb. In (17a) the object of the verb in the relative clause is missing and the head NP ***neiben shu*** 'that book' is understood as referring to the missing object. In (17b), the subject of the relative clause is missing and the head NP ***xuesheng*** 'the student' is understood as referring to the missing subject. Thus, verb phrases which modify NPs are actually subjectless relative clauses.[15]

As mentioned above, a clause followed by ***de*** can be an NP complement clause as well as a relative clause. Compared with relative clause constructions, there are, as noted in Li and Thompson (1981), two important characteristics of NP complement clause constructions. One is that the head noun is generally abstract in meaning, as shown by the following examples, with the head noun underlined.

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[15] There is another type of NP construction in which the head noun is modified by a verb phrase but both the subject and the object of the verb are missing, as shown by the following example.

(i) Jintian mai de yu hen xinxian
today buy MO fish very fresh
'The fish (we) bought today is very fresh.'

The verb phrase involved in the case above bears resemblance to the infinitival verb phrases in English. I leave open the proper analysis of such constructions.

(18) women hezuo de wenti
we cooperate MO question
'the question concerning our cooperation'

(19) zongtong cizhi de xinwen
president resign MO news
'the news that the president has resigned '

(20) renmin xunqiu heping de fang'an
people seek peace MO plan
'the plan that people seek peace'

The other important characteristic of NP complement clauses is that the head noun does not refer to any particular entity in the complement clause; rather, a NP complement clause specifies the content of the head noun, as shown by the examples above. Accordingly, nothing (i.e. neither the subject nor the object) is missing in an NP complement clause.

Thus, in Chinese as in English, relative clauses can be used to modify any head noun, whereas only a restricted set of head nouns combine with NP complement clauses. In other words, nouns have to be subcategorized for whether they can combine with an NP complement clause or not. This seems to suggest that the structural difference between relative clauses and NP complement clauses looks rather similar to that between relative clauses and NP complement clauses in English. However, Chinese complex NPs, particularly those containing NP complement clauses are different from their English counterparts in some important structural aspects. Notice that in (17a) above, the relative clause precedes the head NP "that book". In Chinese, the head of a complex NP containing a complement clause is also a phrasal category rather than a lexical category, since the complement clause may always precede a full NP (a noun together with a determiner) as shown by the following examples.

(21) women hezuo de nei-ge wenti
we cooperate MO that CL question
'that question concerning our cooperation'

(22) zongtong cizhi de nei-tiao xinwen
president resign MO that CL news
'the news that the president has resigned'

(23) renmin xunqiu heping de nei-yi fang'an
people seek peace MO that CL plan
'that plan that people seek peace'

Furthermore, NP complement clauses in English are always introduced by the complementizer ***that***, in contrast to relative clauses, which can be introduced either by the complementizer ***that*** or a Wh-word (e.g., which), whereas in Chinese the particle ***de*** is used to mark both relative clauses and NP complement clauses. In fact, there is a type of complex NP construction in which nothing is obviously missing with respect to the modifying clause and the head noun refers to some other participant related to the situation described by the modifying clause rather than directly referring to some missing participant in the modifying clause as in relative clauses. The following are some examples (cf. Li and Thompson 1981. pp. 582-583):

(24) Zhangsan qu xuexiao de luxian
Zhangsan go school MO path
'The path by which Zhangsan goes to school'

(25) women xiuli qiche de gongju
we repair car MO tools
'the tools with which we repair cars'

(26) Lisi xue yuyanxue de yuanyin
Lisi study linguistics MO reason
'the reason why Lisi studies linguistics'

In terms of semantic properties, the modifying clause in each of the examples above is more like a relative clause modifying the head noun. In terms of structural properties, however, the modifying clause is more like a complement clause to the head noun since no subconstituent in the clause is clearly missing.

These properties of complex NPs as discussed above indicate that there is a closer relation between relative clauses and NP complement clauses in Chinese than that between relative clauses and complement clauses in English. In Chinese, the NP complement clause acts more like a modifier than a complement. Given this, an NP containing a relative clause or an NP complement clause may be encoded in a rule like (27).

(27) NP --> S NP

2.4 Predicates

The types of verb phrases in Chinese are largely the same as those found in other languages. Basically, there are two types of verb phrases, intransitive and transitive. Unlike some other languages, however, Chinese intransitive verb phrases include those which have been called "adjectival verb phrases", in addition to the copula and other intransitive verbs commonly found in other languages, such as *live, fall* and so on in English. In Chinese, the vast majority of adjectives which denote qualities or properties of individuals may serve independently as predicates in sentences, without being accompanied by the copula *shi* 'be' or any other verbs. Such sentences are usually descriptive. Consider the two sentences in (28a) and (29a), as compared to (28b) and (29b).

(28) a. Neige haize hen congming.
that child very clever
'That child is very clever.'

b. congming de haizi
clever MO child
'a clever child'

(29) a. Jintian tian se cang bai.
today sky color pale white
'Today, the sky is pale white.'

b. cangbai de tian se
pale-white MO sky color
'a pale white sky'

As the term "adjectival verb" suggests, the adjective phrases like those underlined in (28a) and (29a) have properties of verbs. Not only may they function independently as VPs, but also they may take aspectual particles as shown in (30).

(30) Zhangsan de toufa quan bai le.
Zhangsan MO hair all grey ASP
'Zhangsan's hair is grey all over.'

Transitive verbs in general require objects. The object mostly occurs immediately after the verb; it can, however, occur in other positions as well. There are two common cases in which the direct object occurs in some position other than the position immediately after the verb. As mentioned above, the object of a verb may occur in the preverbal position in the *ba*-construction as shown by the example in (10b), repeated in (31) below.[16]

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16 As discussed in Wang (1947), and Li and Thompson (1981), not every transitive verb allows the use of the *ba*-construction. The set of the verbs which may allow the use of the *ba*-construction is generally those which describe how the object is handled, manipulated, conducted, or disposed of. Thus, stative verbs, psychological verbs, etc. cannot occur in the *ba*-construction.

(31) Zhangsan ba neiben shu zhaodao le.
Zhangsan BA that book find ASP
'Zhangsan found that book.'

The other position in which the direct object may commonly occur is sentence initial position. This position is generally referred to as the topic position. I will give a more detailed discussion of the notion of topic and topic construction in section 2.6.

Both intransitive and transitive VPs may be modified by adverbial phrases (or prepositional phrases), which in general occur before the head verb or adjectival verb, as shown in (32) and (33).

(32) Zhangsan zixi yuedu le neiben shu.
Zhangsan carefully read ASP that book
'Zhangsan read that book carefully.'

(33) Zhangsan dui Lisi hen keqi.
Zhangsan to Lisi very polite
'Zhangsan was very polite to Lisi.'

Like prenominal modifiers discussed above, preverbal modifiers may also occur in free word order among themselves if there is more than one modifier. Again, an adverbial modifier has the scope of modification over the modifiers it precedes as long as they all precede the head verb. Thus, I assume that verbal phrases have a hierarchical internal structure, which may be represented by a recursive rule like the following:

(34) VP --> PP (or ADVP) VP

As for VP constituency, there are some facts concerning Chinese which may be taken as arguments. First, there is some empirical evidence supporting the assumption of VP constituency in Chinese. One common test for VP constituency is based on the expectation that the verbal string may coordinate with another string or may be extracted. Consider the following examples:

(35) a. Zhangsan bu hui [$_{VP}$ shuo zhexie hua].
Zhangsan not will say these words
'Zhangsan will not say these words.'

b. Zhangsan bu hui [$_{VP}$ shuo zhexie hua] bingqie [$_{VP}$ zuo zhexie shi].
Zhangsan not will say these words and do these things
'Zhangsan will not say these words and do these things.'

c. [$_{VP}$ Shuo zhexie hua], Zhangsan bu hui.
say these words Zhangsan not will
'Say these words, Zhangsan won't .'

d. [$_{VP}$ Shuo zhexie hua], Zhangsan bu hui danshi Lisi hui.
say these words Zhangsan not will but Lisi will
'Say these words, Zhangsan won't, but Lisi will.'

As shown by the structures above, the string ***shuo zhexie hua*** 'say these words' can coordinate with another string of the same type and can be moved to sentence initial position. In short, it can occur as an independent structural unit in various sentence positions. Furthermore, though preverbal modifiers may occur in free word order with respect to each other, they are always adjacent to each other or to the verb head, forming a continuous constituent, in contrast to the situation in non-configurational languages like Japanese, where the elements which can possibly constitute a VP may not be adjacent to each other, as noted above. These facts suggest that the string headed by a verb in sentences like the above is a constituent and there is VP constituency in Chinese.

2.5 Prepositional Phrases and Complementizers

As in many other languages, prepositions in Chinese introduce NPs, forming prepositional phrases. There are three major functions of PPs in Chinese. They may be used to modify NPs or VPs, and to serve as verb complements. As mentioned in section 2.2, when PPs serve as nominal modifiers, they occur before the head NP. Mostly, PPs are used as adverbials, modifying VPs. In such cases, PPs generally occur before the VP as shown by the examples in (36), (37) and (38).

(36) Qiche cong dong bian kai lai.
car from east side drive come
'The car is coming from the east.'

(37) Nei-wei jiaoshou xiang xuesheng jieshao le
that CL professor to student introduce ASP
ta de yanjiu fangfa.
he MO research method
'The professor introduced his research method to his students.'

(38) Zhangsan zai xuexiao gongzuo.
Zhangsan at school work
'Zhangsan works at the school.'

The majority of PPs can be used as nominal modifiers and adverbial modifiers. But there is only a limited set of prepositions which may be used to introduce complements of verbs. The following are two examples.

(39) Zhangsan song le yiben shu gei Lisi.
Zhangsan give ASP one book to Lisi
'Zhangsan gave a book to Lisi.'

(40) Zhangsan zuixian pao dao zhongdian.
Zhangsan first run to terminal-point
'Zhangsan was the first to reach the terminal point
in the running.'

As shown by the examples above, when a PP is used as the complement of the verb, it occurs after the verb instead of preceding the verb, in contrast to the situation where a PP is used adverbially. The internal structures for relevant VPs for sentences like (39) and (40) may be represented in the two phrase structure rules as the following respectively:

(41) a. VP --> V NP PP
     b. VP --> V PP

Thus, there are three major positions in which prepositional phrases may occur: the position before the NP, the position before the VP and the position after the verb.

Chinese in general does not use an (overt) complementizer to introduce sentential complements to verbs. There is only a limited set of constructions in which complement clauses are introduced by lexical items. The lexical items which function as complementizers are largely prepositions (or deverbalized verbs), which in general can take sentences as their objects. The following are examples:[17]

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[17] The element ***de*** in the example (42) (glossed as COMP throughout this dissertation) has been considered as one of the few complementizers in Chinese and thus different from either the modifier marker ***de*** or the adverbial ***de*** in the examples in (11) above, though they are homophones. (43) and (44) are taken from Huang (1982). See Hashimoto (1971) and Huang (1982) for related discussion and more examples.

(42) Zhangsan xiao de dajia momingqimiao.
Zhangsan laugh COMP everybody not-knowing-why
'Zhangsan laughed so much that everybody was puzzled.'

(43) Ta mai shu gei wo kan.
he buy book to I read
'He bought a book for me to read.'

(44) Zhe gen Lisi bu xihuan Zhangsan wuguan.
this with Lisi not like Zhangsan no relation
'This has nothing to do with Lisi's not liking Zhangsan.'

(45) Renmin dou xiang wei zuguo zaori fanrong
people all want for country earlier prosperous
duo zuo gongxian.
more do contribution
'The people all want to contribute more for the country
to be prosperous earlier.'

Huang (1982) suggests that sentence-connectives, which are usually used to introduce subordinate clauses, are other lexical items which may be regarded as complementizers (or prepositions). But not everybody agrees with this point of view. See Chao (1968), Li and Thompson (1981), Liu et al. (1983), and Xu and Langendoen (1985) for related discussion.

2.6 Topic Constructions

As has long been observed, one of the most important features of Chinese is the notion of topic-prominence (cf. Chao 1968, Li and Thompson 1976). The topic-comment sentence structure is a favorite sentence type in Chinese and has been considered as a feature which distinguishes Chinese typologically from many other

languages. A topic is usually a noun phrase (or more generally a phrasal category) occuring in sentence initial position.[18] Consider the following examples, where the topic is underlined:

(46) Nei-ke shu, yezi hen da.
that-CL tree leaf very big
'As for that tree, the leaves are very big.'

(47) Shuiguo, wo zui xihuan xiangjiao.
fruit I most like banana
'As for fruit, I like banana most.'

Each of the sentences in (46) and (47) consists of two parts: the topic, which occurs in sentence initial position, and the comment, a clause which follows the topic. The phrase in sentence initial position is termed topic because it always specifies a frame of reference for the following clause, particularly for some constituent (possibly empty) in the comment clause. Furthermore, since the speaker usually assumes that the person listening to the utterance has some knowledge about the topic, the phrase which may occur in the topic position must be specific in meaning, as mentioned above in section 2.2. Sentences like (46) and (47) are typical examples of Chinese topic constructions. In earlier analyses (e.g., Chao 1968, Teng 1974), topic constructions are treated as double-subject constructions. In Chao, the topic is considered as the "main subject" and the subject of the comment-clause is considered as the "minor subject". The relevant structure could be depicted as follows (cf. Li and Thompson 1981, p. 93).

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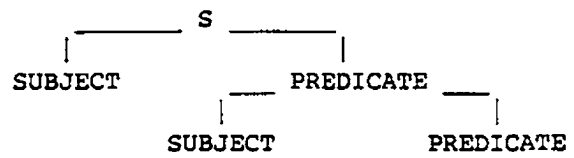
[18] The term "topic" is used here as a semantic term, not as a grammatical term.

(48)



Besides NPs, there are other types of phrases which may occur in sentence initial position, as shown in the following:

(49) Zai Beijing, renren xihuan zuo zaocao.
in Beijing everybody like do morning-exercises
'In Beijing everybody likes to do morning exercises.'

(50) Dao guowai xuexi, ni bixu shengqing qianzheng
to abroad study, you must apply visa
'For studying abroad, you must apply for a visa.'

The PPs in the sentence initial position in sentences like (49) and (50) have also been considered as topics. See Li and Thompson (1981) and Xu and Langendoen (1985) for more examples and discussion of other types of phrases occurring in the topic position.

The cases of topic constructions discussed thus far contain no structural gaps. Traditionally, topicalization constructions are also considered as an important type of topic construction, where overt gaps are involved. The following are some examples.

(51) Zhangsan, Lisi renshi ____.
Zhangsan Lisi know
'Zhangsan, Lisi knows ____.'

(52) Shuo zhexie hua, Zhangsan bu zancheng ____.
say these words Zhangsan not approve-of
'Saying these words, Zhangsan does not approve of ____.'

In the examples above, the phrase in sentence initial position will be understood unambiguously as referring to the object (or the complement) of the verb in the comment clause since the verb in each of the sentences requires an object (or a complement). As shown by the examples in (51) and (52), either NP or VP may occur in topic position. It has been assumed that a phrase of any major category type may occur in topic position. Thus, it is widely assumed that the relevant structure for the topic construction can be stated by the following phrase structure rule:[19]

(53) S --> XP S

2.7 Word Order

Thus far, I have discussed basic Chinese sentence constructions and the basic structural patterns of these constructions. In this section, I will summarize word order phenomena. It has been shown that Chinese sentences are not just linearly ordered sequences of sounds but rather they are hierarchically structured from successively smaller sets of categories. Lexical categories are built into phrasal categories, which in turn are built into sentences. If a hierarchical structure is assumed, a sentence in general is composed of an NP and a VP, with the former preceding the latter. Topic constructions belong to a special case. Given the struc-

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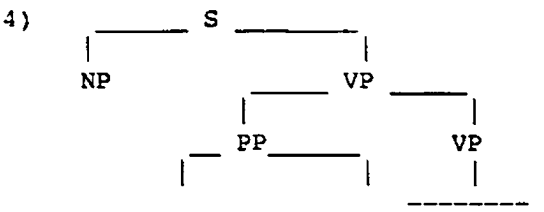
[19] It is not quite clear that PPs (or APs) in sentences like (49) and (50) should be treated as syntactically identical to NPs and VPs occurring in sentence initial position. See section 3, chapter 5 for further discussion of the relevant rules for topic constructions.

ture adopted in Xu and Langendoen (1985) and Jiang (1989), a topic construction is a sentence composed of a phrase followed by a sentence. Thus in a topic construction, an NP (or VP) may precede an S, as the examples in (50) and (51) show above.

In comparison with their English counterpart, the internal structure of Chinese NPs is peculiar. As discussed in section 2.2, all adnominal modifiers in an NP precede the head and the head is a phrasal category rather than a lexical category. Thus, in terms of the word order with respect to the immediate constituent structure of an NP, the head NP may be preceded by an NP, AP, PP or VP (leaving aside the order among the modifiers if there is more than one modifier). In cases of complex NPs, an S (i.e relative clause or a NP complement clause) precedes the head NP. At the lexical level, the determiner (e.g., the demonstrative) also precedes the head. Thus, the relevant descriptive generalization of word order in NP constituency is that it is head-final at both the phrasal level and the lexical level.

The word order in VP constituency is different between the phrasal level and the lexical level. As mentioned in section 2.4, adverbial modifiers in a VP most generally occur before the head verb (or adjectival verb). Adverbial modifiers may be PPs or ADVPs of manner, degree, etc. (e.g., ***liji*** 'immediately' and ***quan*** 'all'). The ***ba***-construction falls into this pattern, that is , the ***ba***-PP precedes the VP, assuming the structure in (12), repeated below:

(54)



Zhangsan ba neiben shu zhaodao le
Zhangsan BA that book find ASP
'Zhangsan found that book.'

At the lexical level, the situation is the opposite. As has been mentioned before, the object or the complement of the verb generally occurs after the verb. A phrase of almost any major category type (i.e., NP, VP, AP, and PP) and a clause may be the object or the complement of the verb. The following are some examples:

(55) Lisi [$_{VP}$ mai-le [$_{NP}$ yiben shu]]
Lisi buy ASP one book
'Lisi bought a book.'

(56) Lisi [$_{VP}$ xihuan [$_{VP}$ du shu]]
Lisi like read book
'Lisi like to read books.'

(57) Lisi [$_{VP}$ shi [$_{AP}$ nayang zhencheng]]
Lisi be so sincere
'Lisi is so sincere.'

(58) Lisi [$_{VP}$ lai [$_{PP}$ zi nanfang]]
Lisi come from south
'Lisi came from the south.'

(59) Lisi [$_{VP}$ renwei [$_{S}$ Zhangsan bu hui lai]]
Lisi think Zhangsan not will come
'Lisi thinks that Zhangsan won't come.'

(60) Lisi [$_{VP}$ gaosu [$_{NP}$ ta][$_{S}$ Zhangsan bu hui lai]]
Lisi tell he Zhangsan not will come
'Lisi told him that Zhangsan wouldn't come.'

Thus, in terms of VP constituency, the word order is head-final at the phrasal level but head-initial at the lexical level.

The word order in AP and PP constituencies is parallel to that in VP. At the phrasal level, modifiers in an AP or PP generally occur before the head, while at the lexical level, the object or the complement of a preposition or an adjective occurs to the right of the head. The following are examples with the relevant parts bracketed.

(61) a. Zhangsan [$_{PP}$ zai xuexiao] gongzuo.
Zhangsan at school work
'Zhangsan works at the school.'

b. Zhangsan [$_{PP}$ zong [$_{PP}$ zai xuexiao]] gongzuo.
Zhangsan always at school work
'Zhangsan works always at the school.'

(62) a. Zhe ge beizi [$_{AP}$ rongyi dapo].
this CL cup easy break
'This cup is easy to break.'

b. Zhe ge beizi [$_{AP}$ feichang [$_{AP}$ rongyi dapo]].
this CL cup extremely easy break
'This cup is extremely easy to break.'

Given the discussion thus far, the following are the most basic sentence structures in Chinese, with the assumption that NP, VP, AP, PP, and S are phrasal categories and N, V, A, and P are the lexical categories.[20]

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20 Forms like those in (63) are used to represent instances of syntactic structures (quivalent to trees), where the symbol "+" is used, in contrast to phrase structure rules. Clearly, some of the structures in (63) may be expressed collectively by means of the unspecified category XP, which will be used from time to time in the following chapters. By listing the possible instances, I simply hope that the relevant structures may be more obvious and intuitive. Here I also omit the structures which expand into single-daughter categories.

(63) a. S --> NP + VP
b. S --> NP + S
c. S --> VP + S

d. VP --> ADVP + VP
e. VP --> PP + VP
f. VP --> V + NP
g. VP --> V + VP
h. VP --> V + AP
i. VP --> V + PP
j. VP --> V + NP + PP
k. VP --> V + S
l. VP --> V + NP + S

m. NP --> NP + NP
n. NP --> VP + NP
o. NP --> AP + NP
p. NP --> PP + NP
q. NP --> S + NP
r. NP --> DET + N

s. AP --> ADVP + AP
t. AP --> A + VP

u. PP --> ADVP + PP
v. PP --> P + NP

The structures (with the linear order possibilities) listed here are by no means exhaustive; they are merely the most common and representative cases. One thing should be noted: if the observations about constituent structure adopted above are generally correct, then the word order facts in Chinese appear rather complex, since given two sister categories, one category may occur before or after the other as shown by (63a) and (63n), or (63b) and (63q). But the situation will immediately become straightforward if the notion of "head" is incorporated into the account. To sum up, the word order in Chinese is, as Huang (1982) points out, largely head-final at the phrasal level for all the major category types, while it is head-initial at the lexical level for all the category types except for the expansion of NP, where the head-final rule is used.

Thus far, I have reviewed the basic characteristics of Chinese sentence structures. Though the review is quite brief, it provides minimal background knowledge of Chinese syntax necessary for the following discussion. In the next chapter, I will start considering theoretical issues concerned in this dissertation. Whenever needed, I will further present particular aspects of the Chinese language relevant to the discussion.

Chapter III

ANTECEDENT-GAP DEPENDENCIES AND GOVERNMENT BINDING THEORY

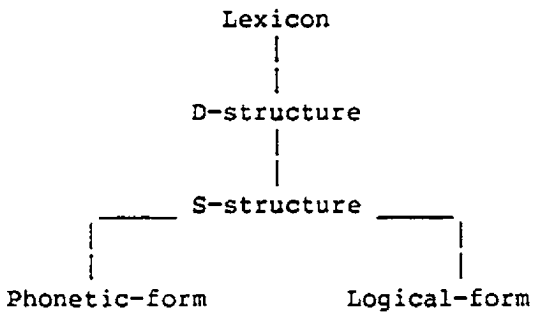
In this Chapter, I will discuss antecedent-gap phenomena in Government Binding Theory. The discussion will center around the two central principles concerning empty categories, i.e., the Subjacency Condition and the Empty Category Principle (ECP). I will show that though the general conceptions of extraction domain and extraction position are quite plausible, the present formulations of Subjacency and the ECP are not general enough to accommodate relevant data from Chinese as adequately as they do those from English and other languages.

3.1 Overview of Government Binding Theory

Government-Binding (GB) Theory was developed initially by Chomsky, without a radical break from earlier work in transformational generative grammar (TG), in particular, from research in the Extended Standard Theory. GB research tends to focus on language universals, attempting to account for cross-linguistic variations in terms of "parameters". While the grammatical description of a sentence involves multi-level representation as in TG, GB incorporates two other levels of

representation, i.e., Phonetic Form (PF) and Logical Form (LF), in addition to the two traditional levels of representation, i.e., D(eep)-structure and S(urface)-structure.[21] The overall organization of the GB grammar can be depicted by the diagram in (1).

(1)



Before getting into the discussion, it will be useful to clarify some terminology. Following the practice commonly adopted in the literature, I will refer to the mapping from D-structure to S-structure and the operations defined on these two levels as matters of syntax, while referring to the mapping from S-structure to LF and the operations at LF as matters of LF, though LF as well as D-structure and S-structure in GB is formally conceived of as a level of syntax. Now let me look at these components one by one.

The lexicon specifies the inherent properties of lexical items. In particular, it specifies subcategorization requirements and what is called theta-marking properties of lexical items that serve as heads of constructions. For example, while the verb *find* subcategorizes for an NP, it has the property of assigning two thematical

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21 D-structure and S-structure in GB are similar but not idential to TG notions of Deep-structure and Surface-structure. See Chomsky (1977, 1981) for discussion, and see particularly Riemsdijk and Williams (1986, pp. 172-173) for the similarities and differences between these models presented in diagrams.

roles (theta-role), i.e., agent and theme, thus requiring two arguments.[22] These properties encode the information of the argument structure of the lexical head.

D-structure is projected from lexical properties in accordance with certain fundamental well-formedness conditions, such as the Theta-Criterion, and X'-theory. The Theta-Criterion says roughly that each NP must be taken as the argument of some predicate, bearing one and only one theta-role and, each theta-role is assigned to one and only one argument. Thus the Theta-Criterion rules out structures like (2).[23]

(2) *John sneezed Mary.

Since the lexical properties of the intransitive verb *sneeze*, as specified in the lexicon, assign only one theta-role (thus taking only one argument), then by the Theta-Criterion, the two NPs in the structure cannot be construed as its argument at the same time, bearing the same theta-role. From this point of view, the specification of lexical properties, to a great extent, determines the properties of D-structure.

GB theory makes an important distinction between two types of sentence positions. Each position that is obligatorily filled with an NP is referred to as an A-position (predicate's argument position). Notionally, A-positions are those to which grammatical functions (e.g., subject, object) are assigned that are potentially associated with theta-roles. The NP positions other than the predicate's argument

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22 In GB, the domain of subcategorization is limited to the domain of the maximal projection containing the head. Since the subject NP is external to the VP, the subject is not assumed as subcategorized by the verb. Accordingly, a verb indirectly assigns the theta-role to the argument in subject position, while directly assigning the theta-role to the argument in the object position.

23 See footnote 28 for a more precise definition of the Theta-Criterion.

positions, such as COMP, are referred to as A'-positions.

S-structure is derived from the corresponding D-structure by the transformational operation of Move-α. Thus, the S-structure associated with the sentence in (3a) can be represented as that in (3b), in which Move-α has moved the Wh-phrase *who* from the object position to the COMP, leaving a trace in the object position.[24]

(3) a. Who did John see.

b. $[_{S'}[_{COMP}\ who_i][_S$ did John see t_i]]

Relations between positions are indicated by coindexing. Each of the A-positions is assigned an index, and the index is preserved under movement, which, therefore, relates the moved element and its trace by coindexing as shown in (3b).

In Contrast to earlier transformational generative grammar, a very important aspect of GB is that it assumes that there are no construction-specific rules. Thus, the two movement rules "Move NP" and "Move Wh" are reduced to a general rule Move-α. In principle, Move-α can move any arbitary constituent to any other structural position, and independent principles constrain the rule application and determine the well-formedness of a given construction. The Subjacency Condition is a central principle in GB, which imposes restrictions on the operation of Move-α. The Subjacency Condition can be stated as follows:[25]

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24 In general, I will not incorporate recent hypotheses about clause structure IP in representations except the few cases which specifically require such a representation.

25 An important issue discussed in the literature concerning the Subjacency condition is whether it should be taken as condition on the application of movement, or as a well-formedness condition on output representations. Traditionally, Subjacency is taken as a condition on movement. See Chomsky (1977, 1981) for discussion.

(4) The Subjacency Condition

Any single application of Move-α may not cross more than one ***bounding node.***

In most languages, certain constructions are syntactic islands in the sense that it is impossible for a transformational operation to relate a position outside such a construction to a position inside it, or conversely. Given appropriate assumptions (such as assuming NP and S as bounding nodes) the Subjacency Condition correctly predicts that no constituent may be moved out of island constructions, such as complex NP constructions, Wh-question constructions, sentential subject constructions and so forth, as shown by the following examples:

(5) *Who$_i$ did you hear the news that John married t_i?

(6) *Who$_i$ did you ask whether John married t_i?

(7) *Who$_i$ did that John married t_i surprise you?

Thus, although the theory assumes that Move-α can move any constituent anywhere, the Subjacency Condition constrains the domain in which Move-α possibly applies.

The output of Move-α, i.e., S-structure, is constrained by the Empty Category Principle, which, as a well-formedness condition, requires that empty categories created by movement can only occur in those positions which are properly governed. The notion of government is a fundamental concept in GB theory, which states the local domain (i.e., the smallest maximal projection) within which a c-command relation holds between some category α (typically a head) and some other category β. Thus, α properly governs β if and only if α lexically governs

β or locally A'-binds β.[26] For languages such as English, the ECP provides an account for the well-known subject-object asymmetry with respect to Wh-movement as shown by the grammatical contrast between (8a) and (8b):

(8) a. Who_i do you think [S' that [S John married t_i]]

b. *Who_i do you think [S' that [S t_i married John]]

Sentences like (8a) satisfy the ECP since the trace in the object position is lexically governed by the verb head, therefore properly governed, in contrast to sentences like (8b), where the trace in the subject position is not properly governed because it is neither governed by a lexical category, nor locally governed by its antecedent since the complementizer ***that*** intervenes between the two coindexed traces. Thus, the ECP correctly predicts that structures like (8a) are well-formed but structures like (8b) are ill-formed. See section 3.2.2 and section 3.2.3 for further discussion of the ECP and related issues.

A basic idea in GB theory, as briefly mentioned before, is that the syntactic structure of a sentence is largely determined by the lexical properties of the predicate. This idea is formulated as a fundamental principle of the theory, i.e., the Pro-

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26 There are a number of proposals concerning the notion of government. The version which is generally adopted in GB literature is one proposed by Aoun and Sportiche (1983):

Government
α governs β if and only if:
(a) α c-commands β, and
(b) α is an X^0, and
(c) every maximal projection dominating α dominates β and vice versa.

See Reinhart (1976), Aoun and Sportiche (1983) for discussions on the definition of the notion of c-command. See Chomsky (1980) for the original proposal of the notion government, and see footnote 30 for the notion of binding.

jection Principle, which essentially requires that the Theta-Criterion hold at all representation levels.[27] In other words, the syntactic structure must respect the subcategorization requirement of lexical heads anywhere.

Thus, the Theta-Criterion is another important principle which is relevant to S-structure. The requirement that every NP must be taken as one unique argument of some predicate, in effect, imposes a strong restriction on the transformational mapping between levels, and in general prevents Move-α from outputting a structure in which an argument NP has been moved to a subcategorized position, therefore having two theta-roles.[28] Thus, the Theta-Criterion rules out structures

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[27] The Projection Principle is stated as follows (cf. Chomsky 1981, p. 29):

The Projection Principle:
Representations at each syntactic level (D-structure, S-structure, and LF) are projected from the lexicon, in that they observe the subcategorization properties of lexical items.

[28] An NP and its coindexed trace is treated as one NP. To facilitate this, the notion of "argument chain" is introduced and the Theta-Criterion may be stated as follows:

Theta-Criterion
Every argument chain must receive one and only one theta-role, and
Every theta-role must be assigned to one and only one argument chain.

In control structures like (i) below, there are (at least) two theta-role positions involved, i.e., the subject position of the main verb and that of the subordinate infinitive verb. The empty subject of the infinitive is generally assumed to be PRO (a phonetically null pronoun) rather than a trace, as shown by the structure in (ii).

(i) John wants to leave.

(ii) John wants PRO to leave.

PRO is assumed to be base-generated and counts as a lexical NP for the Theta-Criterion. Thus, the subject of the main verb does not bear the two theta-roles assigned by both the main verb and the infinitive. See Riemsdijk and Williams (1986, pp. 129-138) for a summary of this topic.

As far as passive constructions are concerned, it is assumed that the attachment of the passive morphology *-en* to the verb causes the theta-role

like the following:

(9) *The students$_i$ found t_i.

Since the transitive verb *find* takes two arguments, the NP *the students* cannot be construed as the two arguments at the same time.

Case Theory is also one of the principles relevant to S-structure, which, like the Theta-Criterion, constrains in large part the distribution of noun phrases, in general requiring that noun phrases (at S-structure) occur only in case-marking positions such as object positions of verbs and prepositions, and the subject positions of tensed sentences.[29] Thus, Case Theory differentiates the following structures:

(10) a. It is unclear how John solved the problem.

b. *It is unclear how John to solve the problem.

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for the subject position of the verb phrase (known as the external theta-role) to be suppressed, thus, no theta-role being assigned to the subject position at D-structure. This allows the possibility of movement of the object to the subject position without violating the Theta-Criterion. See footnote 29 for related discussion.

29 In view of the cases involving movement, there is much similarity in the operation of Case Theory and the Theta-Criterion, in that Case Theory actually applies in terms of chains. Each chain must have one and only one case assigned. Given the assumption that the passive morphology *-en* disables the verb from assigning the case (and from assigning an external theta-role), Case Theory provides a principled account of why in passive sentences the NP moves obligatorily from the object position to the subject position. If the NP remains in the object position or moves to a position other than subject position, the NP will either have no case or have more than one case (or theta-role), thus violating the Case Theory (or the Theta-Criterion).

It is assumed that finite verbs, but not infinitives, have the ability of assigning case (in English). Thus, the subject of the infinitive in (10b) is assigned no case at all, and the structure violates Case Theory.

While the Theta-Criterion and Case Theory constitute a partial theory about the NP-types and NP-positions, Binding Theory characterizes the possible interpretative relations between NPs and largely describes the distribution of anaphors and pronouns. Moreover, it plays an important role in the partition of empty categories, which will be further discussed in the following sections

A rough generalization about the binding relations between an anaphor (or pronoun) and its antecedent is that the anaphor (or pronoun) is usually c-commanded by its antecedent. However, while an anaphor (in English) must find its antecedent in the minimal clause, a pronoun cannot have an antecedent in the minimal clause. Thus, Binding Theory is defined crucially in terms of the c-command condition and the notion of governing category.[30]

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30 The notions of Binding, Governing Category, and the Binding Theory may be stated as below respectively (cf. Chomsky 1981, pp. 184, 221, 188):

(i) Binding
α binds β iff
(a) α and β are coindexed, and
(b) α c-commands β.

(ii) Governing Category
α is a governing category for β if and only if α is the minimal category containing β, a governor of β, and a SUBJECT accessible to β.

(iii) The Binding Theory
(a) an anaphor is bound in its governing category.
(b) a pronominal is free in its governing category.
(c) an R-expression is free (R-expressions mainly include lexical NPs).

PF is a level of phonetic representation derived from S-structure. The properties of PF are not the focus of much attention in GB literature. Since these properties are not essential to the discussion in this dissertation, I will say little about them.[31]

LF is a level of representation also derived from S-structure. It is assumed that the mappings onto LF are transformational and also involve just one universal transformational rule Move-α. Furthermore, the movement onto LF shares fundamental properties with Wh-movement onto S-structure, in that both of them move constituents to A'-positions, leaving A'-coindexed traces within A-positions. According to May (1985), LF representation characterizes syntactic properties which are relevant to semantic interpretation, and thus Move-α at LF mainly involves the movement of quantifier phrases, and Wh-phrases that have not been moved in syntax. Various conditions are relevant to LF as discussed in the literature. Since they are not essential to the discussion to be presented in this dissertation, it would not be appropriate to go into them here. See Chomsky (1981, 1986), Koopman and Sportiche (1982), Huang (1982), Reinhart (1983), and May (1985) for discussion of those conditions and related issues.

So far, I have presented a very brief review of the GB theory. I here simply hope to lay an introductory base for the following discussion. In the following sections, I will present a detailed discussion of the two central principles, i.e., Subjacency and the Empty Category Principle, which are crucial to the analysis of empty categories. The discussion will be conducted particularly with respect to data from Chinese, though data from English and other languages will be considered from

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[31] See Jaeggli (1980) for discussion, where it is argued that properties of S-structure in part determine the phonetic structure assigned to a sentence.

time to time.

3.2 Empty Categories, Subjacency, and the Empty Category Principle

The most central part in GB framework is, perhaps, the study of empty categories, along with the related investigation of anaphors and pronouns. As mentioned in section 3.1, the Projection Principle requires that the structure determined by the subcategorization properties of the lexical head in a construction cannot be altered in essential ways. This imposes a strong constraint on syntactic representations regardless of any particular representation level. In other words, if there is a NP-position in some structural configuration at a certain representation level, that NP-position must be present at all representation levels. Obviously, the Projection Principle states a basic intuition that a position will exist in a structure just in case some other lexical item requires it to exist. This has been taken as an important argument for the existance of empty categories. Thus, an empty category is present whenever a position is required by some lexical item but the corresponding theta-position contains no lexical material.

GB theory recognizes four types of empty categories (EC), i.e., Wh-trace, NP-trace, PRO, and pro. The former two are typical empty categories, resulting from Move-α. They are collectively known as traces (gaps). The latter two share important properties with pronouns and thus are essentially pronominal. According to Chomsky (1981, 1982), these four types of empty categories are in complementary distribution and can be functionally determined on the basis of the following criteria (cf. Chomsky 1982, pp. 34-36):

(11) a. An EC is a pronominal (PRO or pro) if and only if it is either free or locally A-bound by an antecedent with an independent theta-role, and a non-pronominal otherwise.

b. A non-pronominal EC is an anaphor (NP-trace) if and only if it is in A-position and locally A-bound, and a variable (Wh-trace) if and only if it is locally A'-bound.

Compared with a pronominal EC (particularly PRO), a non-pronominal EC, i.e., trace, has the properties: the trace is governed; the antecedent of the trace is not in a theta-position; and the relation between the trace and its antecedent observes the Subjacency Condition. Thus, the theory of bounding and the theory of government are crucial to the analysis of traces.[32] In the following section , I will focus on non-pronominal empty categories, especially Wh-trace, which will be referred to simply as empty categories unless indicated specifically. The discussion will consider properties of empty categories and antecedent-gap relations, particularly with reference to the Subjacency Condition and the Empty Category Principle.

3.2.1 Subjacency

As mentioned in section 3.1., certain constructions such as complex NP constructions, Wh-question constructions and sentential subject constructions are syntactic islands for transformation operations. With respect to these island constructions, Ross (1976) in his famous dissertation ***Constraints on Variables in Syntax*** suggests a series of constraints.[33] However, the applicational scope of each of

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32 In the current literature, the topic of Subjacency is often referred to as bounding theory.

the island constraints is fairly limited. In fact, these constraints are by and large construction-specific, directly reflecting the essential aspects of such island constructions in which certain transformations cannot apply. Since then, much research has concentrated on generalizing and unifying Ross's constraints, seeking more general conditions and principles. For Chomsky, merely to label a set of constructions as islands in a grammar does not attain the ultimate goal of explanatory adequacy. The formulation of the Subjacency Condition (Chomsky 1973) is a major step toward such generalization and unification. The Subjacency Condition may be stated as follows:

(12) The Subjacency Condition (cf. Riemsdijk and Williams 1986, p. 62):

No rule may move an element in the position Y to the position of X (or conversely) in the structure as below:

$$\ldots X \ldots [_{\alpha} \ldots [_{\beta} \ldots Y \ldots \quad \text{(or:} \quad \ldots Y \ldots]_{\beta} \ldots]_{\alpha} \ldots X \ldots)$$

where α and β are bounding nodes.

The notion of Subjacency expresses a general idea that the trace and its antecedent must be relatively close to each other in terms of structure. The Subjacency Condition in effect states locality requirements on possible antecedent-gap dependencies with respect to Move-α.

As far as the Subjacency Condition is concerned, two things are essential, namely the notion of successive cyclicity and the definition of bounding nodes. Let me consider them one by one. First, much of the content of the Subjacency Condition is embodied in the notion of successive cyclicity. The idea of successive

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33 The Wh-island constraint and the A-over-A constraint among other things are originally proposed by Chomsky (1962).

cyclicity is that though each application of Move-α may not cross more than one bounding node, it may operate cyclically through an intermediate node (e.g., COMP) not lexically filled with a Wh-phrase. Consider the cases in (13) and (14). In each of the structures, a Wh-phrase has been moved to sentence initial position.

(13) [$_{S'}$ Which school$_i$ did you say [$_{S'}$ t_i that [$_S$ John thinks [$_{S'}$ t_i that [$_S$ Bill should visit t_i]]]]]

(14) *[$_{S'}$ Which school$_i$ did you say [$_{S'}$ t_i that [$_S$ John asked [$_{S'}$ when [$_S$ Bill visited t_i]]]]]

In (13), the Wh-phrase has been moved successively from COMP to COMP without giving rise to a violation of the Subjacency Condition, since each application of Move-α crosses only one S node, assuming S and NP as bounding nodes for English. In (14), however, the lowest COMP is filled by a Wh-phrase and therefore is not available as a mediating point for the Wh-phrase ***which school***, which can only be moved to a higher COMP. Thus, in this structure the Wh-phrase crosses two S nodes in a single application of Move-α, violating the Subjacency Condition.[34] Thus, successive-cyclic operation of Wh-movement accounts for the grammatical contrast between structures like (13) and those like (14). This provides an account for Wh-island phenomena in a way more general than that in terms of the Wh-island Constraint, since the Wh-island phenomenon is now related to the more general syntactic notions of S and NP as bounding nodes.

Given successive-cyclic application of Wh-movement, the Subjacency Condition with appropriate assumptions may not only account for the Wh-island phenomena, but also for the phenomena traditionally subsumed under the Complex NP

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[34] The difference between a Wh-phrase in COMP and the complementizer ***that*** in mediating cyclic movement is that the latter is assumed not to be indexed.

Constraint and the Sentential Subject Constraint, as has been extensively discussed in the literature. Furthermore, the notion of Subjacency has interesting consequences for a wide range of phenomena in other languages.

One of these interesting phenomena concerns the definition of bounding nodes, which constitutes the second notion essential to Subjacency. The idea is that bounding nodes may be defined on a language-specific basis. As has been generally assumed in the literature, NP and S are bounding nodes for English, while NP and S' are bounding nodes for Italian (cf. Rizzi 1982). This variation of bounding nodes explains the difference between English and Italian (cf. Rizzi 1982, pp. 50-51 for the Italian examples).

(15) *this man who$_i$ [$_S$ I didn't know [$_{NP}$ the news [$_{S'}$ that[$_S$ John criticized t_i ...]]]]

(16) *this woman who$_i$ [$_S$ I didn't know [$_{S'}$ when [$_S$ John married t_i ...]]]

(17) *questo incarico, che$_i$ non sapevi la novita
this task which$_i$ [$_S$ I didn't know [$_{NP}$ the news[$_{S'}$
che avrebbero affidato t_i a te, ...
that [$_S$ they would entrust t_i to you, ...]]]

(18) Il solo incarico che$_i$ non sapevi a chi averbbero
the only charge which$_i$ [$_S$ I didn't know [$_{S'}$ to whom [$_S$ they
affidato t_i ...
would entrust t_i]

As in English, in Italian movement out of a complex NP is generally impossible as shown by (17); but movement out of an embedded question is possible in Italian as shown by (18), in contrast to its English counterpart in (16). Given NP and S' (instead of NP and S) as the bounding nodes for Italian, the similarity and difference between sentence structures in Italian and those in English are expected. In

(17) the movement crosses two bounding nodes, i.e., S' and NP, thus violating the Subjacency Condition. In (18), however, the movement crosses only one bounding node, i.e., S', thus satisfying the Subjacency Condition (though it crosses two S nodes).

The analysis of Italian seems to suggest that though languages presumably share much in common in terms of some fundamental principles, the settings of parameters such as bounding nodes included in the Universal Grammar are not constant for all languages. They may differ somewhat from language to language, but such parametric difference is merely of minimal variation.

Having reviewed the Subjacency Condition and the related notions thus far, let me turn to Chinese and examine the relevance of the Subjacency Condition to the Chinese data, especially in terms of topicalization constructions. As has been mentioned before, topicalization is a prominent phenomenon in Chinese which typically creates antecedent-gap relations. Recall the relevant examples presented in section 2.1, repeated in the following:

(19) Zhangsan$_i$, ta renshi t_i.
Zhangsan he know
'Zhangsan, he knows ____ .'

(20) Neiben shu$_i$, wo xiangxin Zhangsan renwei Lisi hui xihuan t_i.
that book I believe Zhangsan think Lisi will like
'That book, I believe that Zhangsan thinks that Lisi will like ____ .'

(19) is an example of the simplest case of topicalization, in which the antecedent-gap dependency crosses only one sentence boundary. The sentence in (20), however, involves a sentential complement clause which contains an empty category coindexed with the topic. This construction displays an apparent long-distance

dependency, where the antecedent-gap dependency crosses more than one sentence boundary. In principle, the distance between the gap and its antecedent in such constructions can be infinitely far away. This is consistent with the Subjacency Condition, since in the cases like (20), nothing prevents successive-cyclic movement and an embedded element may always be moved to sentence initial position through an intermediate COMP not lexically filled with a Wh-phrase.

However, it is quite common in Chinese that the antecedent-gap relation in a sentence may cross one or even more than one Wh-island. For example, the following sentences are perfectly grammatical:

(21) Neiben shu$_i$, wo bu zhidao shui hui xihuan t_i.
that book I not know who will like
'That book, I don't know who will like ____ .'

(22) Neiben shu$_i$, wo xiang zhidao Lisi shenme-shihou qing shui
that book I want know Lisi when ask who
jiaodui guo t_i.
edit ASP
*'That book, I want to know who Lisi asked to edit ____ when.'

The well-formedness of (21) and (22) shows that the extraction is unaffected by the Wh-island constraint. It is assumed in Huang (1982) that the Wh-island Constraint is not in effect in Chinese syntax (i.e., in the D-structure to S-structure mapping), because Wh-questions are formed without overt movement in Chinese (though they may be topicalized) and Wh-phrases remain in situ in syntax. Huang argues that if Subjacency is assumed as a condition on the application of Move-α, Wh-questions are not islands in Chinese since Wh-phrases do not move in syntax in this language and intermediate COMP nodes will always be available when topicalization applies.[35]

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[35] Huang further argues that the Subjacency Condition holds at S-structure but

Although it appears that an element in a sentence can be quite freely topicalized, structures like the following are not well-formed:

(23) * Zhangsan$_i$, wo mai-le xie [$_{NP}$ [$_S$ t_i xihuan] de] shu].
Zhangsan I buy ASP some like MO book
*'Zhangsan, I bought some books that ____ likes.'

(24) * Heping$_i$, zhe shi [$_{NP}$ [$_S$ renmin xunqiu t_i] de] fang'an].
peace this is people seek MO plan
*'Peace, this is the plan that people seek ____ .'

In (23), an NP is extracted from the relative clause, and in (24) an NP is extracted from the NP complement clause. Their ill-formedness is due to extraction. These examples seem to indicate that Chinese exhibits the effects of the Complex NP island, suggesting the relevancy of the Complex Island Constraint and therefore the Subjacency Condition.

Besides the complex NP constructions as shown above, certain other constructions such as those like (25) may be considered as further evidence for the relevancy of Subjacency (cf. Huang 1982).

(25) *Zhangsan$_i$, zhe [$_{S'}$ gen [$_S$ Lisi bu xihuan t_i] wuguan.
Zhangsan this with Lisi not like no-relation
*'Zhangsan, this has nothing to do with Lisi's not liking ____ .'

In this construction, the embedded COMP is occupied by a preposition. The ill-formedness of (25) reflects the fact that no extraction of an element is possible from within a S' whose COMP is lexically filled with a preposition. Huang (1982) notes that this fact can be straightforwardly brought under the notion of Subjacency, in that any extraction out of a S' whose COMP is lexically filled will result in

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not at LF since a number of cases of LF movement in Chinese do not obey Subjacency, assuming Wh-phrases in Chinese involve LF movement.

crossing two S nodes and thus violating the Subjacency Condition.

Cases concerning multiple topic constructions may also be regarded as evidence showing the relevancy of the Subjacency Condition. Recall the examples shown in section 6, chapter 2 repeated below:

(26) Nei-ke shu, yezi hen da.
That-CLA tree leaves very big
'As for that tree, the leaves are big.'

(27) Shuiguo, wo zui xihuan xiangjiao.
fruit I most like banana
'As for fruit, I like bananas most.'

In chapter 2, it was indicated that constructions with the form of topic-comment are quite common in Chinese. Sentences like (26) and (27) are typical examples of topic constructions. Furthermore, topic constructions may have multiple topics, especially when they involve extraction (i.e., topicalization). What is interesting about extraction in topic constructions is that it is possible to topicalize an NP as shown in (28a), but not as in (28b).

(28)a. Shuiguo, xiangjiao$_i$ wo zui xihuan t_i.
fruit banana I most like
'As for fruit, banana, I like ____ most.'

b. *Xiangjiao$_i$, shuiguo, wo zui xihuan t_i.
banana fruit I most like
*'Banana, as for fruit, I like ____ most.'

As Huang (1982) notes, in sentences like (28), the gap in the lowest clause is usually construed as bound by the lowest topic, not by any higher one. The same can be observed in the following sentences:

(29) [S Zhangsan$_i$, [S neixie ren$_j$ [S yige$_k$ [S ta dou bu
Zhangsan those man one he all not
renshi t*i/*j/k]]]]
know
'Zhangsan, of those men, not even one, he knows ____'

(30) [S Zhangsan$_i$ [S ta xiangxin [S neixie shu$_j$ [S mei yiben$_k$[S Lisi
Zhangsan he believe those book every one
dou zhidao t*i/*j/k]]]]]
all know
'Zhangsan believe that of those books, every one Lisi knows ____ .'

These constructions can be accounted for in terms of the Subjacency Condition, with the assumption that topic constructions have a structure roughly like the following (cf. Huang 1982):

(31) [S' COMP [S TOP [S TOP [S ... t ...]]]

Supposing that S is a bounding node in Chinese, it follows from the Subjacency Condition that the gap in the lowest clause can only be construed as bound by the lowest topic.

Given all the examples above, there seems to be good reason to believe that the notion of Subjacency is relevant to Chinese, and thus a number of restrictions on antecedent-gap relations can be conveniently subsumed under the Subjacency Condition. In view of these observations, among other things, Huang (1982) argues that though the exact formulation may need further speculation, the notion of Subjacency is generally applicable to Chinese (see Huang 1982,1984, 1987, and Liu 1987 for detailed discussion of this viewpoint).

Xu and Langendoen (1985) considered various types of topic structures in Chinese. With respect to the Subjacency Condition, the data they presented include the following:

(32) Zhexie shi$_i$, wo juede [$_S$ [$_S$ ta shuo t_i] bu heshi].
these thing I think he say not proper
'These things, I think it's not proper for him to say ____ .'

(33) Zheben shu$_i$, wo renwei [$_{NP}$ [$_S$ du guo t_i] de ren] bu duo.
this book I think read ASP MO man not many
*'This book, I think there are not many people who have read ____ .'

(32) is an example which involves extraction out of a sentential subject; (33) is an example which involves extraction from a complex NP. The well-formedness of the sentence in (32) shows that Chinese topicalization is not subject to the Sentential Subject Constraint.[36] With the presence of this fact, one might still save the

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36 Huang (1982) presents the following example and claims that Chinese exhibites the effects of the Sentential Subject Constraint, as a subcase suggesting the relevancy of the Subjacency Condition.

(i) ??Neiben shu$_i$, [$_S$ [$_{NP}$ [$_S$ Lisi mei kan t_i] zhen qiguai.]
that book Lisi not read real strange
*'That book, that Lisi didn't read ____ is really strange.'

This sentence may sound unnatural to some native speakers, but it is not unacceptable by my intuition. Furthermore, if one replaces the phrase ***zhen qigui*** meaning 'really strange' with ***mei guanxi*** meaning 'doesn't matter', the sentence will be perfectly grammatical. Thus, the unnaturalness does not lie in the violation of the Sentential Subject Condition, but rather the lexical idiosyncrasy of the phrase ***zhen qigui***, which actually means 'how strange' showing the exclamation effect. Even Huang himself agrees that sentences like (i) sound unnatural only when there is a heavy pause right after the topic and no pause between the sentential subject and matrix predicate. Huang attributes the "relative well-formedness" of sentences like (i) to the possibility of constructing the topic within the sentential subject as shown in (ii) below:

(ii) [$_S$ [$_S$ Neiben shu$_i$, Lisi mei kan t_i] zhen qiguai.]
that book Lisi not read real strange
*'That book, that Lisi didn't read ____ is really strange'.

But as Xu and Langeodoen (1985) note, Huang's reasoning is not correct, because sentences like (32) above, which cannot be constructed in a structure like (ii), are quite common in Chinese.

Huang (1984) changes his previous position and agrees with the judgement that Chinese does not exhibit the effects of the Sentential Subject Constraint. While insisting on the general relevance of the Subjacency Condition to Chinese, Huang seems to suggest that the Sentential Subject Constraint is unre-

Subjacency Condition, assuming that topicalization is a process of successively cyclic applications of TOP-to-TOP movement. Xu and Langendoen (1985) point out that this explanation cannot stand, because sentences like (33) show that a phrase can also be extracted out of a Complex NP, which contains no TOP node. Xu and Langendoen (1985) and Xu (1986) argue that if the Subjacency Condition is relevant to Chinese, topicalization should be subject to the condition and extraction in sentences like (33) would be impossible no matter whether NP and S or S' are assumed as bounding nodes (see Tang 1976, and Lu 1987 for related discussion).[37]

Given the discussion above, it seems difficult to determine the relevance of the Complex NP Constraint and thus the Subjacency Condition to the study of Chinese syntax, since sentences like (23) show that extraction from a relative clause is impossible, while sentences like (33) show the opposite. There is a seeming difference between (23) and (33). In (23), an NP is extracted from the subject position of the relative clause, while in (33) an NP is extracted from the object position of the relative clause. However, this asymmetry is merely apparent; the real situation is far more complex, as shown by the following examples:[38]

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lated to the Subjacency, following Kayne (1981, 1983) and Pesetsky (1982). See Huang (1984, p. 562, footnote 31) for discussion. I will return to this issue in section 3. 3 below.

37 Xu and Langendoen (1985) propose the following rule as a general principle for Chinese topic structures:

[s' X [s ... Y ...]], where X is a major category and Y, possibly empty, is related to X.

As Huang (1987) points out, what Xu and Langendoen's proposal achieves, is no more than a restatement of a familiar phenomenon: the comment clause must say something about the topic. A proposal like this has neither achieved anything in the sense of generative grammar, nor has said something specific about Chinese topic structures.

38 The generalization (Xue 1989) that object extraction, but not subject extraction,

(34) Zhexie ren$_i$, wo renwei [$_{NP}$ [$_S$ t_i fangwen guo] de difang] bu duo.
these people I think visit ASP MO place not many
*'These people, I think that there are not many places that ____ have ever visited.'

(35) *Zhangsan$_i$, wo renshi [$_{NP}$ [$_S$ xihuan t_i] de neiwei xuesheng.
Zhangsan I know like MO that student
*'Zhangsan, I know that student who likes ____.'

(34) is grammatical although an element is extracted from the subject position of the relative clause, but (35) is ungrammatical even though it is the object which is extracted. Thus, with respect to the position from which an element is extracted, the situation displayed by the grammatical contrast betweem (34) and (35) appears to be the reverse of that displayed by the contrast between (23) and (33), repeated in (36) and (37) respectively, where subject extraction is impossible, while object extraction is possible.

(36) *Zhangsan$_i$, wo mai-le xie [$_{NP}$ [$_S$ t_i xihuan] de] shu].
Zhangsan I buy ASP some like MO book
*'Zhangsan, I bought some books that ____ likes.'

(37) Zheben shu$_i$, wo renwei [$_{NP}$ [$_S$ du guo t_i] de ren] bu duo.
this book I think read ASP MO man not many
*'This book, I think there are not many people who have read ____ .'

However, on closer examination it can be noticed that an important pattern of extraction exists among these examples. (34) and (37) involve extraction out of a complex NP which is located in the subject position, while (35) and (36) involve extraction out of a complex NP which is located in the object position. As Huang (1984) notes, it is generally possible to topicalize an element (i.e., the subject or

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is possible out of a Chinese relative clause seems rather simplified, though quite often object extraction is relatively easier than subject extraction (see Huang C.-R 1990 for the same judgement). It seems more accurate to assume that the difference between object extraction and subject extraction does not result in grammatical contrast in Chinese.

the object of the relative clause) out of a complex NP located in subject position, but it is impossible to topicalize an element out of a complex NP located in object position. Thus, a subject-object asymmetry does exist, but the relevant asymmetry does not concern whether the subject or the object of the relative clause is extracted, rather, it concerns whether the complex NP from which extraction has taken place is located in subject position or located in object position. Such a subject-object asymmetry is among the really peculiar distributional facts of Chinese empty categories.

Huang (1984, 1987) argues that the fact that certain antecedent-gap relations may violate the Subjacency Condition in Chinese simply shows that the gaps found in those constructions are not created by movement. Huang (1984) proposes that the relevant facts can be derived from the interaction of some independently motivated and generalized principles, in particular the rule of disjoint reference (i.e., Condition B of the Binding Theory of Chomsky 1981) and the Generalized Control Rule (basically Chomsky's (1980) rule of control), which are stated as below:

(38) Disjoint Reference (DJR)

A pronoun must be free in its governing category.

(39) Generalized Control Rule (GCR)

Coindex an empty pronominal with the closest nominal element.

Following Tsao (1977), Huang assumes that one of the parametric differences between Chinese and English is that Chinese as a discourse-oriented language allows an empty topic binding a variable, whose reference is determined under the identity with a topic in a preceding sentence. Huang claims that in contrast to

empty categories in languages like English, in Chinese an empty category has a potential dual status: it may be an empty pronominal or it may be a variable that is bound to a topic (possibly empty). Consider a structure like the following:

(40) Bill said that John saw e.

According to Huang, the empty category *e* in (40) cannot be a pronominal due to the interaction of the GCR and DJR, since the former requires that it must be coindexed with the closest nominal element, i.e., the embedded subject *John*, but the latter requires that the empty category in (40) must be disjoint from the embedded subject *John*. Now a contradiction results and neither of the two principles can be satisfied because of the other. This accounts for the ill-formedness of English sentences like (40). Similarly, the empty category in a sentence like (40), according to Huang, cannot be a pronominal in Chinese either because of the interaction of the GCR and DJR, but it can be a variable bound to an (empty) topic. Thus, the following Chinese sentence is grammatical, with the empty category unambiguously interpreted as bound by an empty topic, since the empty category in the embedded object position may refer only to someone whose reference is fixed outside of the entire sentence, but not to the matrix subject.

(41) Zhangsan shuo [$_S$ Lisi bu renshi e]
Zhangsan say Lisi not know
'Zhangsan$_i$ said that Lisi did not know (him)$_j$.'

The variation of allowing an empty topic binding a variable or not allowing such a topic results in the difference between Chinese-type languages and English-type languages with respect to the Subjacency, in particular the Complex

NP Constraint. Huang maintains that a Subjacency violation is possible in Chinese, as in other languages, just in case a given gap is base-generated. According to Huang, for each variable bound to a topic, there are, in principle, two possible ways to derive it: it may be created by movement as a Wh-trace, or it may start out as an empty pronominal at D-structure and later be coindexed with the topic and become a variable. Thus, in order to allow a Subjacency violation, the relevant empty category has to be base-generated. By the functional definition (11), such an empty category is a pronominal. As a pronominal, it must be coindexed with the closest nominal element in accordance with the GCR. As indicated above, no empty pronominal is possible in object position in English due to the interaction of the DJR and GCR. In English, no empty pronominal is possible in subject position either, since it must be identified by the AGR, which is assumed as a potential "antecedent" of an empty pronoun and thus the closest nominal element to the subject position.[39] But, as is assumed in Chomsky (1982), the AGR in English is too meager to determine its content and therefore the relevant sentence would violate the principle of recoverability. Thus, empty categories involving Subjacency violation are not possible in English since they cannot be derived either by movement or by base-generation.

Now consider the Chinese sentences in the following (taken from Huang (1984), pp. 560-561):

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39 AGR(eement) is technically defined as a nominal element in GB theory, since AGR may have the typically nominal features for gender, number and person. See Chomsky (1981) for discussion.

(42) a. Zhangsan$_i$, t_i changge de shengyin hen haoting.
Zhangsan sing MO voice very good-to-hear
*'Zhangsan, the voice with which ____ sings is good.'

b.*Zhangsan$_i$, wo hen xihuan t_i changge de shengyin.
Zhangsan I very like sing MO voice
*'Zhangsan, I like the voice with which ___ sings.'

Assuming that Subjacency is also relevant to Chinese, none of the empty categories in (42) can be derived by movement since they involve Subjacency violations. The empty categories here therefore must be base-generated. According to Huang, in (42a) the empty category as a pronominal must be identified by the closest nominal element. The head of the relative clause is the closest nominal element, but it cannot be the antecedent of the empty category, since the head of the relative clause is already coindexed with something else (i.e., the relativized instrument of 'sing') and thus does not count as a potential antecedent of another empty category, a consequence of a properly formulated version of the i-within-i condition on accessibility (see Chomsky 1981 for discussion of the relevant notions). Huang contends that this enables the empty category to be coindexed with the next closest nominal element, i.e., the topic *Zhangsan* in this case. Thus, (42a) is well-formed. The empty category in (42b), however, cannot be derived in the same manner, because the closest pronominal element is the matrix subject *wo* 'I', not the topic *Zhangsan*. As a result, sentences like (42b) with the indices indicated are ill-formed.

Attractive though it appears, Huang's analysis has several technical and conceptual problems. As indicated above, Huang claims that no empty pronominal is possible in object position, because of the contradiction resulting from the interaction of the DJR and GCR, and structures with such empty categories are thus ruled

ungrammatical. Similarly, in (42a) the empty category as a pronominal must be identified with the closest nominal element, i.e., the head of the relative clause in accordance with the GCR, but presumably at the same time the i-within-i condition requires that it cannot be identified with the head of the relative clause. This also involves a contradiction. The question is why the grammar now does not simply rule out the relevant sentences as it did before due to the contradiction in a course of a derivation, but rather enables the empty pronominal to look up further to a nominal element in a higher position and changes the pronominal into a variable. This amounts to saying that the contradiction from the interaction of the GCR and the DJR will result in ill-formedness of a sentence but the contradiction from the interaction of the GCR and the i-within-i condition will not. Such an proposal is clearly ad hoc and thus unattractive.[40]

Moreover, Huang's analysis depends crucially on the functional determination of empty categories. An empty category is defined, for instance, as a variable at a given representation level if and only if it is locally A'-bound at that level, regardless of its derivational history. In other words, an empty category is not intrinsically specified for the features [+/- pronominal] and [+/- anaphoric]. Rather, these features may change according to the position occupied by the empty category at a given level. In recent work, it has been argued that empty categories have

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40 Consider the following example, presented by Huang (1982):

(i) *John saw [$_{NP}$ pro's trees].

In accordance with the GCR, here the pro must be identified with the closest nominal element, i.e., the head of the NP, but this will result in a referential circularity, violating the i-within-i condition. Thus, according to Huang (1982), this structure is ruled out. Actually, one can find a number of cases, whose ill-formedness may be considered the result of the contradiction from the interaction of the GCR and the i-within-i condition.

intrinsic features and cannot change their identities in the courses of derivation. It has been shown in the literature that the functional determination has some empirical problems in addition to a number of conceptual problems. Consider the following example (taken from Brody 1984, p. 363):

(43) Who$_i$ did PRO$_i$ losing his$_i$ way annoy t_i.

In (43), the first empty category must be pronominal anaphor PRO, since otherwise it would be ruled out by the ECP. Given this, Brody (1984) points out that the functional determination apparently makes a false claim that locally A'-bound empty categories are all non-pronominal non-anaphors (variables) since there are locally A'-bound empty categories that are not variables, as (43) shows. Also see Epstein (1984) and Lasnik (1985) for more arguments and examples showing that the functional determination of empty categories is not valid.

Besides technical and conceptual problems, Huang's proposal in fact makes wrong predictions in a number of cases. First, Huang's system predicts that base-generated empty categories (including those in complex NPs) will be identified generally with a nominal element in A-position unless the closest nominal element is not in A-position. Thus, this analysis wrongly predicts that in a structure like (42b) the empty category will refer to the matrix subject, since the empty category as a pronominal must be identified with the closest nominal element. But the fact is that a sentence like the following with the indices indicated is ungrammatical in Chinese:

(44) *Zhangsan, wo$_i$ hen xihuan t_i changge de shengyin.
Zhangsan I very like sing MO voice
*'Zhangsan, I like the voice with which ____ sing.'

As Huang (1984) himself adds (in footnote 29), the empty category in a sentence like (42b) actually will not normally be interpreted as referring to the matrix subject. In short, though Huang's system correctly rules out a set of ungrammatical sentences like (42b), at the same time it wrongly admits a set of ungrammatical sentences like (44). Of course, one may rule out ungrammatical sentences like (44) by turning to some other conditions or principles. The point here is that it is generally impossible in Chinese that an empty category in a complex NP (or any embedded clause) may refer to an element in an A-position if there is an overt topic in the sentence.

Secondly, Huang assumes that an empty category involving a Subjacency violation is base-generated and subject to the GCR. This will predict that it is generally impossible for a topic to be coindexed with an empty category in object position of a sentential island construction even though such a construction is located in subject position. Consider the example shown in (37) above, with the structure in (45) as Huang (1982) assumes:

(45) Zheben shu$_i$, wo renwei [$_{NP}$ [$_S$ t_j du guo t_i] de ren$_j$] bu duo.
this book I think read ASP MO man not many
*'This book, I think there are not many people who have read ____ .'

This sentence violates the Subjacency, since the empty category in the object position of the relative clause is coindexed with the topic. According to Huang, this empty category must be base-generated and thus must be coindexed with the closest nominal element, which in this case is not the topic in any event, since the matrix subject, for instance, is clearly closer to the empty category than the topic. As a result, the grammatical sentence in (45) will be wrongly ruled out.

It can be easily shown that the same problem also exists with object extraction from a sentential subject:

(46) Zhexie shi$_i$, wo juede [$_S$ [$_S$ ta shuo t_i] bu heshi].
these thing I think he say not proper
'These things, I think it's not proper for him to say ____ .'

This sentence also violates Subjacency since the empty category in the object position of the sentential subject is coindexed with the topic. Here again the contradiction from the interaction of the GCR and DJR will wrongly rule out this sentence, without special assumptions. One may assume that the sentential subject construction is unrelated to Subjacency. With such an assumption, the explanatory adequacy of the notion of Subjacency and those of bounding nodes, as has always been assumed, would be greatly diminished. This would be undesirable and in a way potentially dangerous for the theory. The major reason why the Subjacency Condition has been preferred to the traditional island constraints is that the former is defined in terms of some more general grammatical notions such as bounding nodes (S or NP) rather than specific sentence constructions, as discussed before. If one says that the sentential subject construction is unrelated to Subjacency, he is then virtually going back to the previous position, determining the locality condition by referring to construction-specific properties.[41]

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41 It seems that there is an difference between an embedded null subject and an embedded null object in terms of referential ability, particularly in a construction in which there is no overt topic. As noted by Huang (1984), an null object can refer only to someone outside the sentence as shown by the example (41). An embedded null subject, however, usually refers to a superordinate subject rather than an empty topic. This is a judgement I do not share with Huang (1984), where an embedded null subject may refer either to a superordinate subject or someone in the discourse. Since it is controversial whether such null categories are pronominal or not, I am not going to discuss these issues here. See Huang (1984), Xu (1986) and Zhang (1988) for relevant discussion.

Furthermore, what has been discussed so far about extraction from complex NPs is only part of the story. The situation concerning complex NPs containing NP complement clauses is different. Though it is possible to topicalize an element from a relative clause, it is generally difficult or impossible to have extraction from an NP complement clause as shown by the example in (24) above. The following are more examples:

(47) *Xuesheng$_i$, zhe shi [$_{NP}$ [$_S$ t_i xunqiu heping] de fang'an.]
student this is seek peace MO plan
*'Students, this is the plan that ____ seek peace.'

(48) *Heping$_i$, zhe shi [$_{NP}$ [$_S$ xuesheng xunqiu t_i] de fang'an.]
peace this is student seek MO plan
*'Peace, this is the plan that students seek ____ .'

(49) ?Xuesheng$_i$, Lisi renwei [$_{NP}$ [$_S$ t_i xunqiu heping] de fang'an]
student Lisi think seek peace MO plan
hui yingde guangfan de zhichi.
will win wide MO support
*'Students, Lisi thinks that the plan that ____ seek peace
will win wide support.'

(50) *Heping$_i$, Lisi xiangxin [$_{NP}$ [$_S$ xuesheng xunqiu t_i] de fang'an.]
peace Lisi believe student seek MO plan
hui yingde guangfan de zhichi.
will win wide MO support
*'Peace, Lisi believes that the plan that students seek ____
will win wide support.'

To be more precise, neither subject extraction nor object extraction is possible from NP complement clauses located in object position, as shown by (47) and (48). What is strange is that when a complex NP containing a NP complement clause is located in subject position, object extraction is impossible from the NP complement clause, while subject extraction from the NP complement clause is acceptable though sentences involving such extraction show certain degree of unnaturalness,

as indicated by the contrast between (49) and (50) above.[42] As has been shown, both subject extraction and object extraction are possible from relative clauses when the relevant complex NPs are located in subject position. The question is why there should be such a discrepancy between relative clauses and NP complement clauses. Whatever reasons there may be, this discrepancy certainly calls for explanation. As should be obvious, such a discrepancy between relative clauses and NP complement clauses cannot be related to Subjacency, nor can it be accounted for by the base-generation strategy. If it is possible to base-generate empty categories in relative clauses, regulated by the GCR, why is it impossible to derive empty categories in NP complement clauses in the same manner?

In summary, there is no clear evidence showing the relevance of the Complex NP Constraint to Chinese, since the fact that extraction is possible from a complex NP (located in subject position) clearly shows that complex NP on its own is not a island construction in Chinese and thus the impossibility of the extraction from a complex NP located in object position should not be attributed to the effects of the Complex NP effects. Furthermore, as indicated before, there are no observable effects of the Sentential Subject Constraint and Wh-island Constraint in Chinese, whatever reasons this may be attributed to. In view of these facts, a natural question is what this would mean for a theory according to which the Complex NP constraint, the Wh-island Constraint and the Sentential Subject Constraint are supposed to be central subcases of Subjacency. In fact, assuming any suggested version of parameters, the Subjacency Condition can say nothing about the subject-

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42 There is some disagreement about the acceptability of sentences like (49) among the native Chinese speakers I have consulted, but it seems certain to everyone that sentences like (49) are clearly much better than sentences like (50). I will return to the discussion of this difference in chapter 5.

object asymmetry in terms of the location of the complex NP from which extraction has taken place, nor can it say anything about the difference in extractability between complex NPs containing relative clauses and those containing NP complement clauses. These facts strongly indicate that the Subjacency Condition, or Subjacency in its present form, does not constitute an adequate generalization of the formal properties of antecedent-gap relations in Chinese.

Having identified the difficulties related to a Subjacency account of antecedent-gap dependencies in Chinese, let me turn in the next section to the examination of the Empty Category Principle. I will show that though there are good reasons to believe that a more general conception of the ECP is quite plausible, its present formulation is not general enough to accommodate the formal properties of antecedent-gap relations in Chinese without special stipulation.

3.2.2 The Empty Category Principle

As briefly mentioned in section 3.1, the Empty Category Principle is a well-formedness condition on representations at S-structure, requiring that empty categories created by movement (i.e., NP-trace and Wh-trace) only occur in those positions which are properly governed in some sense.[43] More specifically, the ECP, as originally proposed (cf. Chomsky 1981), is largely responsible for the cases of subject-object asymmetry, such as the *that*-trace phenomenon.[44] Consider the contrast in the following examples:

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43 In fact, it is generally assumed that the ECP applies at both S-structure and LF. See Chomsky (1981, 1982, and 1986) for discussion.

44 The "superiority" phenomenon and the "ne-personne" phenomenon are among the major cases of subject-object asymmetry, though such asymmetry is assumed to obtain at LF. See footnote 48 for related discussion.

(51) a. *Who$_i$ do you think that t_i married John?

b. Who$_i$ do you think t_i married John?

The interesting thing is that such contrast does not exist in the cases in which the Wh-phase is related to the object position instead of the subject position, as shown by the following examples:

(52) a. Who$_i$ do you think John married t_i?

b. Who$_i$ do you think that John married t_i?

The generalization here is that the complementizer may be either present or absent when the Wh-phrase is moved from an object position, but it must be absent when the Wh-phrase is moved from a subject position. Thus, there is an asymmetry between subject position and object position in terms of grammaticality. It seems that such subject-object asymmetry cannot be predicted by the grammar without an independent principle. Obviously, the Subjacency Condition can say nothing about the ill-formedness of structures like (51a), thus about the subject-object asymmetry, since it applies on the basis of the notion of bounding nodes regardless of positions within a bounding category. The Theta-Criterion can say nothing either, since the two coindexed positions, i.e., the COMP and the subject position, form a chain that bears a single theta-role. Nor can Case Theory say anything about structures like (51a), since the Wh-trace is assigned nominative case, whereas the moved Wh-trace receives no other case in the COMP position.[45]

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[45] Binding Theory has nothing to do with the ill-formedness of (51a), since it is generally assumed that Binding Theory is limited to A-binding. Wh-trace is A'-bound and thus is outside the domain of the Binding Theory.

Furthermore, recent research has indicated that the output of Wh-movement is not subject to the Opacity Condition of Chomsky (1980).[46] Though one could ensure that in English Wh-movement need not violate the Opacity Condition by assuming that COMP is an escape hatch for Wh-movement, such a strategy will not work for Italian. As mentioned before, in Italian S', not S, is the bounding node for Subjacency, since this language allows double Wh-extraction, shown in example (18) above. If Rizzi's (1982) analysis of the violations of the Wh-Island Constraint is generally correct, then Wh-movement in Italian may cross an intermediate COMP, suggesting that empty categories left behind by Wh-movement should not taken as subject to the Opacity Condition. Given all the considerations above, it seems clear that an independent principle is needed that may distinguish subject position and object position with respect to empty categories created by movement. In order to account for such subject-object asymmetry, Chomsky (1981) introduces the Empty Category Principle.

(53) The Empty Category Principle

An empty category must be properly governed.

An empty category here is understood as restricted to one of those resulting from Move-α, i.e., Wh-trace and NP-trace (not PRO and pro). The notion of government plays a crucial role in defining the Empty Category Principle. The essential idea which needs to be expressed here is that though object position is governed by the lexical head, subject position in general is not and it is governed only when the empty category in subject position is locally bound by the Wh-phrase (or its

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46 The Tensed-S Condition and the Specified Subject Condition are jointly referred to as the Opacity Condition, since these two conditions behave alike with respect to phenomena such as NP-movement and Wh-movement.

trace) in COMP. Now a problem arises. The empty category in subject position presumably has case. According to the usual definition of Case Theory, nominative case is assigned to the subject NP under government by the tense element, i.e., the INFL (or AGR) node. In order to avoid this problem, the ECP is formulated so that though INFL (or AGR) potentially governs subject position, it is not a proper governor. Proper government is defined as follows (cf. Chomsky 1981):

(54) Proper Government

α properly governs β if and only if α governs β and:

(a) α is a lexical category, or

(b) α is co-indexed with β.

According to this definition, an empty category is properly governed if it is a complement of a lexical category, i.e., N^0, V^0, A^0, P^0, but not INFL (or AGR).[47] Thus, both (52a) and (52b) are well-formed with respect to the ECP since the empty category in each of the two sentences is in the object position, which is governed by the verb ***married***, a proper governor according to clause (a) in the definition of proper government stated in (54). On the other hand, the empty category in subject position in sentences like (51) is not governed by the verb ***married*** because the maximal projection VP dominating the verb does not dominate the subject. Thus, sentences like (51) cannot satisfy clause (a) of (54). However, the contrast between (51a) and (51b) can be accounted for in terms of clause (b) of proper goverment stated in (54). Assuming successive-cyclic movement, the representa-

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47 Since lexical categories are defined as those with features [+N] or [+V], INFL (or AGR) is not considered as a proper governor for empty categories, though it may be considered as a proper governor for pro in pro-drop languages. See Chomsky (1981) for discussion.

tions for (51a) and (51b) at S-structure are like the following:

(55) a. *[$_{S'}$ Who$_i$ [$_S$ do you think [$_{S'}$ [$_{COMP}$ t_i that][$_S$ t_i married John?]]]]

b. [$_{S'}$ Who$_i$ [$_S$ do you think [$_{S'}$ [$_{COMP}$ t_i][$_S$ t_i married John?]]]]

In (55a), since the complementizer ***that*** is present and thus the node COMP branches, the intermediate Wh-trace in COMP does not c-command and hence does not properly govern the empty category in the subject position. Thus, (55a) is a violation of the ECP. When the complementizer ***that*** is absent as in (55b), the COMP exclusively dominates the intermediate Wh-trace and hence the trace in the COMP properly governs the empty category in the subject position. Thus, (55b) is well-formed with respect to the ECP.

More recent research has indicated that the Empty Category Principle has a much broader range of application than the consideration of English ***that***-trace phenomena. Kayne (1981) shows that French permits NPs of the form ***de N ...*** to occur in object position but not in subject position as shown in the following:

(56) a. Jean n'a pas trouvé de livres.
John (neg.) has not found (of) books

b. *De livres n'ont pas été trouvés.
(of) books (neg.) has not been found

French also has sentences like (57), which is entirely comparable to (56), except that while each of the sentences in (57) contains a quantified phrase (QP) ***beaucoup*** 'many', each of those in (56) contains an empty QP.

(57) a. Jean n'a pas trouvé beaucoup de livres.
John (neg.) has not found many (of) books

b. Beaucoup de livres n'ont pas été trouvés.
many (of) books (neg.) has not been found

Assuming that the NPs of the form *de N* ... are analyzed as $[_{NP}\ [_{QP}\ e\ ]$ de N ...], the contrast between (56a) and (56b) follows from the ECP, since an empty QP in subject position is not properly governed and thus an empty QP may only occur in object position.

Similarly, Belleti and Rizzi (1981) observe a number of cases of subject-object asymmetry. For instance, in Italian *ne*-cliticization is permitted from the object position but not from subject position. In view of these facts and many others,[48] it is widely believed that the ECP or some version of ECP is a central principle of the grammar.

In view of the general applicability of the ECP to English, French and other languages, there seems little doubt that the ECP or some version of ECP should obtain in one way or another in Chinese, if it is a general principle in the Universal Grammar. Now let me return to Chinese and examine the status of this principle in light of the relevant Chinese data. Furthermore, since, as has been shown, there are a number of cases in Chinese indicating difficulties with respect to the notion of Subjacency, if the Subjacency Condition is considered irrelevant to Chinese, it will be interesting to find out whether the distribution of Chinese empty categories can be largely accounted for in terms of the ECP.

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[48] Kayne (1981) shows that if the ECP is assumed to apply at LF, the scope possibilities of interpretation of French quantified NPs such as *personne* 'nobody' can be immediately accounted for. Chomsky (1981) indicates that what was subsumed under the Superiority Condition of Chomsky (1973) can be also considered as a phenomenon of the same subject-object asymmetry, assuming a rule of LF movement that raises Wh-phrases in situ.

First of all, as has been extensively mentioned in the literature, in Chinese a subject as well as an object can be quite freely extracted out of a sentential complement clause, as shown by the following examples:

(58) a. Neiben shu$_i$, wo renwei Lisi bu-hui xihuan t_i.
that book I think Lisi won't like
'That book, I think Lisi won't like ____.'

b. Lisi$_i$, wo renwei t_i bu-hui xihuan neiben shu.
Lisi I think won't like that book
'Lisi, I think ____ won't like that book.'

This phenomenon may be attributed to the fact that Chinese in general does not use an overt lexically-filled COMP to introduce sentential complements to verbs. Though the absence of overt complementizers in constructing sentential complements does not clearly exhibit the *that*-trace effect and therefore, in this respect, does not provide interesting evidence for (or against) the ECP, the fact that both (58a) and (58b) are grammatical is compatible with the ECP. Clearly, the empty category in subject position in (58b) is properly governed by the intermediate trace in COMP, as the ECP predicts. The point here is that the relevant facts in both English and Chinese are accommodated by the ECP.

Another case concerns preposition stranding. It has been well-noted in the literature (e.g., Huang 1982, Zhang 1990) that Chinese does not allow preposition stranding in any event (whether the relevant PP is subcategorized or not), as shown by the following examples.

(59) *Zhangsan$_i$, neijian shi [$_{VP}$[$_{PP}$ yu t_i] wugan].
Zhangsan that thing with no-relation
*'Zhangsan, that has nothing to do with ____.'

(60) *Beijing$_i$, Zhangsan [$_{PP}$ zai t_i][$_{VP}$ jiandao le Lisi].
Beijing Zhangsan in see ASP Lisi
*'Beijing, Zhangsan saw Lisi in ____.'

In view of the observation that most languages in the world do not allow preposition stranding,[49] Kayne (1981) suggests that if prepositions are assumed in general not to be proper governors, the general impossibility of preposition stranding follows from the ECP, since stranding a preposition will leave a trace improperly governed in violation of the ECP. Thus, the ECP also makes correct predictions about preposition stranding facts in Chinese.

Besides the cases discussed above, what was usually attributed to the Left Branching Condition of Ross (1967) may also be subsumed under the ECP. As Chomsky (1981) suggests, if the notion of proper governor is formulated in such a way that the head of the NP may not properly govern its subject, the impossibility of subject (or possessor) extraction from an larger NP is readily accommodated by the ECP. Thus, in English the extraction of the possessive NP is not possible from the NP containing it unless the whole NP is extracted, as shown by the contrast between the following sentences:

(61) a. *Whose student's did you see ____ wife?

b. Whose student's wife did you see ____?

In this respect the ECP also seems to offer correct prediction for Chinese. As Huang (1982) observes, Chinese in general does not allow extraction of a possessive NP, whether the NP from which the extraction takes place is in subject position or object position, as shown by the following examples:

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[49] See Van Riemsdijk (1978), Hornstein and Weinberg (1981) for related discussions.

(62) a. *Zhangsan de$_i$, wo xihuan [$_{NP}$ [$_{NP}$ t$_i$] shu]].
Zhangsan MO I like book
*'Zhangsan's, I like ____ book.'

b. *Zhangsan de$_i$, [$_{NP}$ [$_{NP}$ t$_i$] shu] hen youqu.
Zhangsan MO book very interesting
*'Zhangsan's, ____ book is very interesting.'

Furthermore, as noted in Huang (1982), extraction of any peripheral elements from an NP is generally impossible since NPs in Chinese are head-final and any such extraction will violate the Left Branch Condition.

In fact, the ECP predicts that in general subject extraction (from sentential and non-sentential constructions) is not possible, simply because subject position is not properly governed by the lexical head; if governed at all, the subject position of a sentence is governed by INFL (or AGR), which is not a proper governor according to the definition of proper government. Accordingly, as Kayne (1981) suggests, the asymmetry between the possibility of extraction from an embedded sentential complement and the impossibility of extraction from a sentential subject may be treated as a special case of the subject-object asymmetry. Since subject position is generally not properly governed, sentential subjects (as well as their non-sentential counterparts) are usually not accessible in terms of extraction. I will return to the discussion of Kayne's formulation of the ECP in some detail in section 3.3.

The same, however, does not obtain in Chinese. The cases concerning extraction from sentential complements are straightforward. As mentioned above, subject extraction as well as object extraction is always possible from a sentential complement, in that the subject position of a sentential complement is properly governed by its antecedent (or the trace left by the antecedent in an intermediate

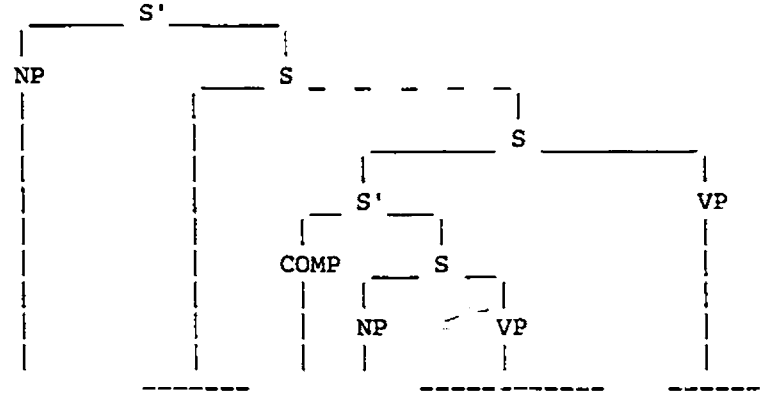
COMP), since there is no overt complementizer in Chinese intervening between the intermediate COMP and the subject position. But, both subject extraction and object extraction are also possible from other constructions such as sentential subjects and complex NPs, as indicated before. Consider the following examples:

(63) a. Zheben shu$_i$, wo renwei [$_S$ [$_S$ Zhangsan kan t_i] bu heshi].
this book I think Zhangsan read not proper
'This book, I think it's not proper for Zhangsan to read ____ .'

b. Zhangsan$_i$, wo renwei [$_S$ [$_S$ t_i kan zheben shu] bu heshi].
Zhangsan I think read this book not proper
*'Zhangsan, I think it's not proper for ____ to read this book.'

In (63a), the empty category in the object position of the sentential subject is properly governed by the verb *kan* 'read', but in (63b) the empty category in the subject position is presumably not governed by its antecedent (or the trace left by the antecedent). One might assume a structure like the following for (63b), in which there is an intermediate COMP that governs the subject position.

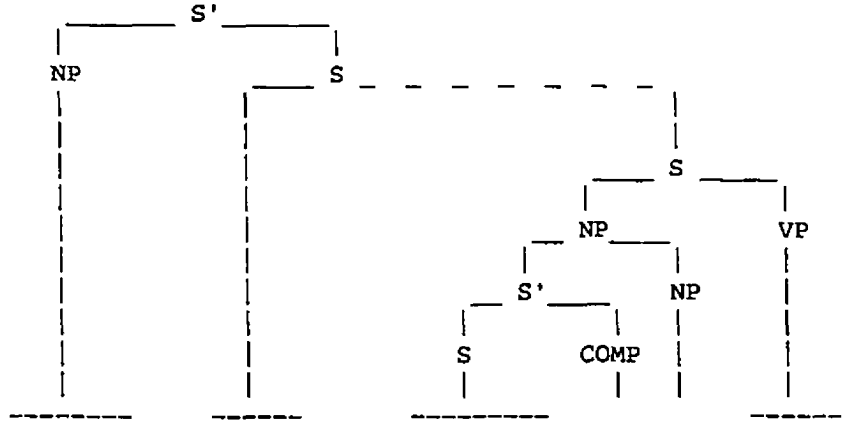
(64)



Zhangsan$_i$, wo renwei [t_i [t_i kan zheben shu] bu heshi.
Zhangsan I think read this book not proper
*'Zhangsan, I think it's not proper for ____ to read this book.'

However, the same strategy cannot be extended to cases involving subject extraction from complex NPs as shown by the example below, since there is no independent evidence showing that there is a COMP position not lexically-filled which may properly govern the subject position of the relative clause.

(65)



Zhexie ren$_i$, wo renwei [[t_i du guo] de shu] hen duo.
these people I think read EXP MO book quite lot
*'Zhexieren, I think that the books ____ read are quite a lot.'

If there is a COMP node, it should be that filled by the lexical item ***de***. Accordingly, the empty category in sentences like (65) is not properly governed according to the formulation of the ECP stated in (53), whose definition refers crucially to the notion of lexical government.

Thus, subject extraction is quite free in Chinese. In fact, subject extraction is as free as object extraction with respect to sentential complements, sentential subjects, and complex NPs. In general, subject extraction is possible in a construction wherever object extraction is possible in that construction. This indicates that no subject-object asymmetry exists in Chinese in terms of the position in which

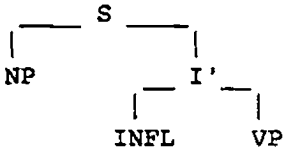
an empty category may occur. In view of this fact, one might conclude simply that languages may differ in whether they require proper government for empty categories and that the ECP is irrelevant to Chinese Grammar. As should be obvious, this position would bring about a new crisis, since both the ECP and the Subjacency Condition are dismissed now. Furthermore, the assumption that the ECP is irrelevant to Chinese does not provide any answers to the questions so far encountered and thus does not offer any explanations for the distribution of the Chinese empty categories. Note that the important fact about extraction phenomena in Chinese is that not every constituent can be extracted everywhere though subject extraction is as free as object extraction.

Huang (1982) suggests that the ECP should be regarded as a universal principle and the apparent absence of certain or all of its effects in a language should be derived from some independent properties of that language (or some other more directly learnable parameters). As for subject extraction, Huang assumes that there is an independent syntactic constituent of INFL in Chinese and that the difference between Chinese and English is that the INFL in Chinese has much more lexical content to it than the INFL in English, and thus the INFL is as a proper governor in Chinese as other lexical categories. Assuming INFL as a proper governor, it follows that subject positions are governed as properly as objects.

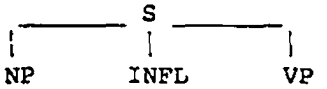
In order to derive subject extraction as freely as object extraction, it seems necessary to assume an obligatory INFL node for a Chinese sentential structure, though quite often there are no INFL materials at all contained in the preverbal position or other positions in a Chinese sentence since Chinese is not a inflectional language. In this regard, the assumption of an obligatory INFL has undesirable

consequence. If an INFL node exists and always properly governs the NP position, it should also always properly govern the VP, assuming either of the following two structures for Chinese:

(66) a.



b.



Then it would be expected that the VP could be extracted as freely as the subject. This is false. In fact, while subject extraction is always possible whether there is an overt INFL item in the relevant sentence or not, VP extraction is possible only if an overt independent INFL item (particularly a modal) is present, as shown by the following contrast:[50]

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50 As mentioned earlier in this dissertation, Xu and Langendoen (1985) distinguish such contrast in terms of A'-position vs. A-position. The following are more examples:

(i) *[Bu de ta tongyi zuo jueding]$_i$ mei ren [$_{VP}$ t_i].
not get he consent make decision no man
*'Make a decision without his consent, nobody ____.

(ii) [Bu de ta tongyi zuo jueding]$_i$ mei ren gan [$_{VP}$ t_i].
not get he consent make decision no man dare
'Make a decision without his consent, nobody dare ____.

In other words, only when there is an overt independent INFL item in the sentence, the VP extraction site may be in an A-position.

(67) a. *Shuo zhexie hua$_i$, wo nande [$_{VP}$ t_i].
say these words I seldom
*'Say these words, I seldom ____.

b. Shuo zhexie hua$_i$, wo bu gan [$_{VP}$ t_i].
say these words I don't dare
*'Say these words, I don't dare ____.

Huang's (1982) assumption about the lexical INFL in Chinese is largely based on the following three arguments. First, in Chinese the categories dominated by INFL are often lexical categories. Second, these elements may occur preverbally as independent lexical categories, not as affixes. Finally, most INFL elements can also occur as independent verbs. In fact, these arguments are not very strong; parallel phenomena which may be considered as arguments for the opposite assumption can be easily found. In English the INFL contains tense and aspect, among other things. Chinese is not a inflectional language and there are no morphemes or lexical items that may be considered as entirely equivalent to tense markers in English. Chinese has no verbal markers of tense at all; the time of the occurrence is expressed largely by adverbial phrases. On the other hand, there is a set of lexical items which are used as verbal aspect markers. Among these verbal aspect markers, there are five lexical items which are most commonly used and have been considered as the most basic aspect markers in Chinese. These aspect markers are *-le* (perfective), *-you* (perfective), *-zhe*, (durative), *zai-* (durative), and *-guo* (experiential). The two perfective aspect markers *-le* and *-you* alternate with each other. As Wang (1965) shows, the former, which has a positive meaning, is used immediately after the verb, while the latter is always used together with a negative marker (i.e., *-mei* 'not') immediately before the verb, as indicated by the following

examples, where the relevant parts are underlined:[51]

(68) Zhangsan mai-le yi-bu qiche.
Zhangsan buy PER one CL car
'Zhangsan bought a car.'

(69) Zhangsan mei-you mai qiche.
Zhangsan not PER buy car
'Zhangsan did not buy any car.'

As indicated above, the perfective aspect marker *-you* is used preverbally instead of being attached to the verb as a suffix, in contrast to *-le*. However, *-you* can never be used independently; it must be used together with the negative marker *mei* 'not', as shown by the ungrammaticality of the following sentence:

(70) *Zhangsan -you mai qiche.
Zhangsan PER buy car
'Zhangsan did not buy any car.'

As for *-zhe* and *zai*, both of the two durative aspect markers signal the ongoing or durative nature of an event expressed by the relevant verb, and the usage of the durative markers in sentence depends crucially on the meaning of the verb. The class of the verbs that can take *-zhe* and *zai* to indicate the durative aspect are usually those which are associated with activities. Generally speaking, the durative aspect marker *zai* typically denotes the ongoing nature or the duration of an activity, while *-zhe* denotes the state associated with an activity, as demonstrated by the following examples:

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[51] In Chinese, the perfective aspect marker *-le* may be distinguished from the sentence final particle *-le*. The latter denotes roughly that some state of affairs is current with respect to some particular situation. See Li and Thompson (1981) for discussion.

(71) Zhangsan zai kan baozhi.
Zhangsan DUR read newspaper
'Zhangsan is reading a newspaper.'

(72) Zhangsan na-zhe liang-ben shu.
Zhangsan hold DUR two CL book
'Zhangsan is holding two books.'

Although *zai* has been traditionally considered as an independent lexical item, this is not true of *-zhe*, which has been regarded as a suffix attached to the verb, as indicated by the examples above. Thus, of the five basic aspect markers, only two of them are used preverbally and only one, i.e., *zai*, might be considered as truly lexical in the sense that it shows up as an independent lexical item. Semantically, however, *zai* does not have substantial lexical meaning any more than the other four aspect markers. They all function in a sentence as signaling perfective or durative or experiental aspect of what is presented by a particular verb. Syntactically, *zai* cannot be stranded from the verb as the following example shows:

(73) *Kan baozhi$_i$, Zhangsan zai t_i.
read newspaper Zhangsan DUR
*'Reading a newspaper, Zhangsan is ____.'

As mentioned above, Chinese does not use verbal elements to signal tense; the time relation between a situation and the moment of its being mentioned in speech is expressed largely in terms of adverbial phrases. As a result, there is often nothing verbal in a sentence showing whatever may be related to the notion INFL, especially when the relevant verb in the sentence is one of those which may not be clearly associated with the notion of aspect. Thus, there is not as much evidence in Chinese as in English for postulating a separate syntactic constituent labelled INFL. In Chinese, however, there is a set of auxiliary verbs such as *hui*

'will', *neng* 'can', *gan* 'dare', *gai* 'should', etc. All of these auxiliary verbs in general are used in preverbal positions and occur as independent lexical items. But, in contrast to their English counterparts, Chinese auxiliary verbs do not have any agreement features or encode any information of tense. Furthermore, as noted by Li and Thompson (1981), in Chinese an auxiliary verb must co-occur with a verb in a sentence.[52] In this respect, Chinese auxiliary verbs do not have lexical content any more than their English counterparts.

Another phenomenon which is relevant to the discussion is that the complement of a lexical category other than a verb usually cannot be extracted in Chinese. For instance, the complement of an adjective cannot be moved to sentence initial position (or any other positions), as shown by the following examples:

(74) a. Li xiaojie hen rongyi shengqi.
Li miss very easy be-angry
*'Miss Li is easy to get angry.'

b.*Shengqi$_i$, Li xiaojie hen rongyi t_i.
be-angry Li miss very easy
*'To get angry, Miss Li is easy ____.'

(75) a. Zhangsan hen le yu bangzhu bieren.
Zhangsan very happy to help others
'Zhangsan is very happy to help others.'

b.*Yu bangzhu bieren$_i$, Zhangsan hen le t_i.
to help others Zhangsan very happy
*'To help others, Zhangsan is very happy ____.'

Besides, Chinese does not allow preposition stranding, as indicated before. Thus, adjectives and prepositions cannot be considered as proper governors with respect to the ECP in Chinese. Furthermore, nouns are not proper governors either in Chi-

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52 A sentence with an auxiliary verb but not a verb is generally considered to be incomplete though such a sentence may be understandable with enough contextual information.

nese. As indicated before, noun phrases have all their peripheral elements occurring before the head, and none of these peripheral elements may be extracted out in accordance with the Left Branch Condition. Thus, Chinese allows subject extraction on the one hand, and does not allow extraction of complements of prepositions and adjectives, or extraction of any peripheral elements from noun phrases. As should be obvious, the assumption that INFL is a proper governor in Chinese does capture the facts of subject extraction, but at the same time the theory also needs the stipulation that N^0, A^0, and P^0 are not proper governors, although they are lexical categories. A natural question is why one should keep the requirement of lexical government in terms of the ECP for Chinese. Is there any simpler way in which one may capture the ECP generalization on the one hand and express the difference between Chinese and English on the other hand?

Furthermore, though Huang's suggestion of lexical INFL seems to provide an account for the possibilities of both subject extraction and object extraction, the questions about the important extraction facts in Chinese remain: what are the reasons for the difference between subject-located complex NPs and object-located NPs, and for the extraction discrepancy between relative clauses and NP complement clauses? In view of the discussion given so far, a natural question, which has been raised and pursued in the literature, which I would like to raise here again, is whether the relevant cases of extraction phenomena in Chinese may be identified as different aspects of one single phenomenon and thus may be accounted for in a unified way under some general notion or principle. In the next section, I will consider some more recent proposals, particularly concerning the notion of government and the formulation of the ECP. Given the suggested ver-

sions in the literature, it seems that the notion of government alone is not sufficient to accommodate relevant cases of extraction phenomena in Chinese.

3.3 More Recent Proposals

In the last section, it was indicated that extraction phenomena in Chinese are quite peculiar in comparision with those observed in other languages such as English. There is no standard subject-object asymmetry in terms of extraction position in Chinese on the one hand, and there is a subject-object asymmetry in terms of the location of the complex NP from which extraction takes place on the other hand. Besides, though extraction is possible from a relative clause, a corresponding object extraction is not possible from a NP complement clause even though the relevant complex NP is in subject position. Furthermore, Chinese exhibits a general ban on preposition stranding and extraction of any peripheral elements from a larger NP, as indicated by the examples discussed earlier, i.e., (59)-(60) and (62)-(63). It has been shown that the Subjacency Condition has serious problems with these phenomena and is essentially irrelevant to Chinese. In the following, I will examine these phenomena in terms of some recent approaches and see whether they can be subsumed under some general notion or principle such as the notion of government and the ECP.

3.3.1 Kayne's ECP extension

In section 3.2, it was shown that the formulation of the ECP suggested in Chomsky (1981) cannot adequately account for the relevant extraction phenomena in Chinese. As is well-known, the standard formulation of the ECP has two distinct parts: an empty category must be governed either by a lexical category or by a coindexed category. Kayne (1981) observes that government by a lexical category does not remove the need of the empty category for an antecedent. Consider the following examples:

(76) a. the books$_i$ that it became difficult to talk about t_i.

b.*the books$_i$ that talking about t_i became difficult.

(76b) is ill-formed even though the empty category in (76b) is lexically governed as much as that in (76a).[53] On the other hand, the presence of an antecedent is a necessary, but not a sufficient, condition for an empty category to be legitimate, as shown by a number of cases discussed before. The contrast between the following French sentences is one such case (cf. Kayne 1981, p. 102):[54]

(77) Jean n'a pas trouvé [$_{NP}$ de livres].
John (neg.) has not found (of) books

(78) *Jean ne voudrait pas que [$_{NP}$ de biere] lui coule dessus.
Jonn (neg.) would not like that (of) beer spill on him

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53 In Chomsky (1982), the ill-formedness of (76b) is attributed to Subjacency. Kayne points out that corresponding examples involving parasitic gaps cannot be ruled out by Subjacency, and this seems to suggest that such cases should be attributed to the ECP.

54 Remember that the NPs of the form ***de N...*** are assumed to have a structure like the one below as shown in examples (56) and (57).

[$_{NP}$ [$_{QP}$ e] de N ...]

(78) is ungrammatical because the empty QP in it fails to meet the government requirement of the ECP. Kayne suggests a reformulation of the ECP that incorporates both the notion of necessary antecedent and that of government. Kayne's version of the ECP is defined in terms of the notion of percolation projection, which makes crucial use of the co-superscripting mechanism of Rouveret and Vergnaud (1980) as a way of expressing the relation of sharing the subcategorization feature between a lexical category and a subcategorized complement. The notion percolation projection is stated as below (cf. Kayne 1981, p. 104):

> A is a percolation projection of B iff A is a projection of B, or A is a projection of C, where C bears the same superscript as B and governs a projection of B, or a percolation projection of B.

The co-superscipting then is effected as follows (cf. Kayne 1981, p. 105):

> A V^0 assigns its superscript to a subcategorized complement (i.e., S') down to the head of the subcategorized complement (i.e., the embedded V), yielding ... V^i ... (ς^i ... V^i ...) ...

Informally, Kayne's reformulation of the ECP imposes the following requirements: an empty category must have an antecedent; the antecedent may itself govern the empty category; if not, the empty category must, through its governor, be "closely connected" to the antecedent.[55] Thus, an empty category not only must be governed by a lexical category, but also must find its antecedent in a domain which

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55 Formally, the ECP is stated as follows (cf. Kayne 1981, p. 105): An empty category β must have an antecedent α such that (1) α governs β, or (2) α c-commands β and there exists a lexical category X such that X governs β and α is contained in some percolation projection of X.

has the same superscript with the local head of the projection containing the empty category.

Assuming that lexical categories N^0 and P^0 are not sufficient governors, Kayne argues that Subjacency can be subsumed under the ECP as well as the impossibility of preposition stranding. Kayne shows that N^0 does not have the ability to assign a superscript to its complement of any type and thus is unable to govern across S'. Given this, the Complex NP Constraint is reduced to the ECP. Consider the following example:

(79) *Who$_i$ don't you believe the hypothesis that John loves t_i.

In (79), the empty category is governed by the verb *loves*. The question is whether the antecedent *who* is contained in the percolation projection of the verb governing the empty category and thus the empty category is properly linked to its antecedent. The V^0 in the matrix clause can percolate its superscript to the N^0 *hypothesis*, but it cannot percolate any further since N^0 has the property of never assigning superscripts. Consequently, the verb of a relative clause can never have the matrix S' as its percolation projection and the empty category in a complex NP can never be linked to its antecedent outside the complex NP, yielding a violation of the ECP.

The same can be extended to the analysis of sentential subject island effects. Since subject position (in English) is not properly governed, the subject will not have the same superscript as the matrix S'. As a result, the matrix S' will not be the percolation projection of a sentential subject. Thus, the Sentential Subject Constraint directly follows from Kayne's version of the ECP. Kayne's reformulation of

the ECP also seems to subsume several apparently unrelated phenomena such as the general ban on preposition stranding and the Left Branch Condition.

Now consider the relevant phenomena in Chinese. As can be easily shown, the possibilities of extraction from sentential subjects in Chinese could be accommodated quite straightforwardly by Kayne's formulation of the ECP. Assuming that the INFL in Chinese properly governs the subject and presumably assigns a superscript to the subject, the matrix S' is then the percolation projection of the verb in the sentential subject . This predicts that either subject or object extraction is possible from a sentential subject, since the relevant empty category is not only properly governed (by INFL or the verb) but also has its antecedent in the percolation projection of the clause containing the empty category, thus satisfying the ECP.

However, the extraction phenomena with respect to complex NPs cannot be derived in terms of percolation projection, and in fact they pose serious problems for Kayne's formulation of the ECP. On the one hand, in order to allow subject extraction as well as object extraction and to allow extraction from sentential subjects as well as from sentential complements, one needs to assume that both subject position and object position are properly governed, and to assume that a sentential subject is assigned the same superscript as the sentential complement, thus having the matrix S' as the percolation projection of both of them. On the other hand, in order to allow extraction from complex NPs, one needs to assume that N^0 in Chinese is a proper governor and has the ability of assigning superscripts. Then the matrix S' is the percolation projection of the V in, for instance, a relative clause. But this assumption causes difficulties in explaining the fact that extraction is not possible from complex NPs located in object position. In Kayne's system,

extraction from complex NPs located in object position should be as possible as extraction from complex NPs located in subject position, since object position is governed no less than subject position in any sense and the N^0 of a complex NP located in object position should have the ability of assigning its superscripts no less than that of a complex NP in subject position does. Furthermore, the general impossiblity of extracting a possessive NP (or any modifiers) from a larger NP requires that N^0 be a non-proper governor. Now, there is a dilemma: if N^0 is a proper governor, extraction from NPs should be generally possible everywhere, and this is desirable for extraction from complex NPs located in subject position but not elsewhere; if N^0 is not a proper governor, extraction from NPs should be generally impossible, and this is desirable for the facts of the Left Branch Condition and other cases but not for the possibility of extraction from complex NPs in subject position. Given the above, one thing seems clear: it is not possible to subsume all these phenomena under one single principle, i.e., the ECP in terms of the notion of government.

3.3.2 Huang's condition on extraction domains

It has been indicated that Kayne's (1981) attempt to tie together several otherwise unrelated phenomena under the notion of government has a number of difficulties in dealing with antecedent-gap relations in Chinese. Huang (1982) notes that elimination of Subjacency in favor of the ECP is difficult. According to Huang, there are certain cases in Chinese where Subjacency is at work but the ECP is not. Consider, for instance, the multiple topic construction shown in (29), repeated below:

(80) [S Zhangsan$_i$, [S neixi ren$_j$ [S yige$_k$ [S ta dou bu
Zhangsan those man one he all not
renshi t*i/*j/k]]]]
know
'Zhangsan, of those men, not even one, he knows ____'

As indicated before, in multiple topic construction, the gap in the lowest clause is usually construed as bound by the lowest topic, not by any higher one. But, there appears to be no reason to assume that only the lowest topic is contained in a percolation projection of the verb contained in the lowest clause, but not the higher topic. Thus, Kayne's formulation of the ECP can say nothing about this case. Huang further points out that Kayne's theory of the ECP leads to an internal contradiction of the grammar and the ECP will not apply uniformly. If Subjacency, the ban on preposition stranding and other phenomena are subcases of the ECP, these restrictions should also hold at LF since the ECP is independently motivated to apply at the LF.[56] Huang argues that Subjacency, the Left Branch Condition, the general ban on preposition stranding, and the ban on extraction from adjuncts are phenomena at S-structure, not at LF. While maintaining the original form of the ECP and the Subjacency Condition, Huang suggests adding a condition on extraction domain (CED) applying only in syntactic component, which says that extraction is possible only out of properly governed domains.[57] This condition rules out the possiblity of extraction from subjects (sentential or otherwise) or from adjuncts in English. Thus, according to Huang, it may also account for the distinction between allowed and disallowed preposition stranding in English, as shown by the contrast

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56 Since the phenomena at LF do not greatly concern our discussion, I will not discuss these issues here. See Huang (1982) for discussion.

57 The Condition on Extraction Domain is formally stated as (cf. Huang 1982, p. 505): A phrase α may be extracted out of a domain β only if β is properly governed.

in the following examples:

(81) a. Which table$_i$ did you [$_{VP}$ put the book [$_{PP}$ on t_i]

b.*Which class$_i$ did you [$_{VP}$ fall asleep][$_{PP}$ during t_i]

In (81b), since the PP is an adjunct and hence not properly governed by the verb, extraction from the PP is impossible in accordance with the CED.

What the CED basically achieves is to relate the property of subcategorization and certain island constructions, having the effect of saying that unsubcategorized constructions are islands. However, the CED achieves little in regard to the extraction phenomena of Chinese. Although the CED correctly permits extraction from sentential subjects as well as sentential complements in Chinese, assuming subject position is properly governed (by INFL), it does not constitute a substantial innovation in the study of Chinese syntax. As Huang notes, one must continue to assume Subjacency as an independent condition to rule out the impossibility of extraction from certain constructions, such as complex NPs located in object position and complex NPs containing NP complement clauses. But, as has been indicated, the Subjacency Condition makes wrong predictions with respect to a number of constructions in Chinese. Furthermore, if the Subjacency Condition is assumed for Chinese, there would be contradictions in the grammar. For instance, extraction from sentential subjects would be possible with the CED but impossible with the Subjacency Condition.

The CED cannot say anything about the facts of the Left Branch Condition either, since the NP from which a possessive is extracted is a properly governed domain, as the example in (82) shows, assuming the version of government proposed in Aoun and Sportiche (1981), as adopted in Huang (1982).

(82) *Zhangsan de$_i$, wo bu renshi [$_{NP}$ t_i jiejie]
Zhangsan MO I not know sister
*'Zhangsan's, I don't know [$_{NP}$ ____ sister]

Furthermore, though the CED correctly makes the distinction between the extraction from subcategorized PPs and that from non-subcategorized PPs in English, it makes wrong predictions for the facts concerning preposition stranding in Chinese (and obviously many other languages) without special stipulation, since preposition stranding is absolutely prohibited in this language no matter whether the extraction is from a subcategorized PP or an unsubcategorized PP. Thus, the CED as a general condition is not very attractive.

3.3.3 Kayne's path theory

In section 3.3.1, it was shown that Kayne's reformulation of the ECP requires that proper government is a necessary, but not sufficient, condition for an empty category, which must also find its antecedent in the percolation projection of the lexical head governing it. In other words, an empty category not only must be properly governed but also must be connected with its antecedent through some path. The idea of percolation projection expresses essentially some notion of a path connecting an empty category and its antecedent through a tree. While maintaining the basic idea of this formulation of the ECP, Kayne (1983) proposes that a proper path in a language will be one that goes up strictly left or right branches, depending on whether lexical government in the grammar of that language is to its left or to its right.[58] In English, for example, the phenomenon of no

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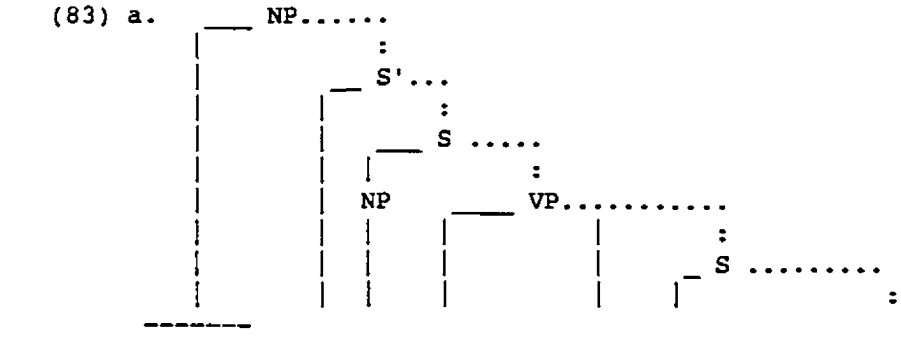
[58] Kayne's proposal is formally stated in his notion "g-projection" (cf. Kayne 1983, p. 225):

extraction from a left branch is attributable to the fact that English is largely head-initial and, in particular, that lexical categories govern items to their right and not to their left. Consider the contrast between the following structures, where the path from an empty category to its antecedent is shown by dotted lines.

(83) a.



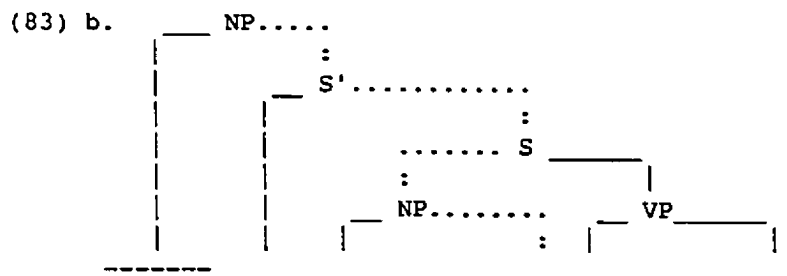
the books that it became difficult to talk about t

Y is a g-projection of X iff:
a) Y is a projection of X (in the usual sense of X'-theory) or of a g-projection of X, or
b) X is a structural governor and
Y immediately dominates W and Z, where Z is a maximal projection of a g-projection of X, and W and Z are in a canonical government configuration.

The following is the definition of canonical government configuration:

W and Z (Z a maximal projection, and W and Z immediately dominated by some Y) are in a canonical government configuration iff:
a) V governs NP to its right in the grammar of the language in question and W precedes Z, or
b) V governs NP to its left in the grammar of the language in question and Z precedes W.

(83) b.



*the books that talking about t became difficult

In (83a), the path from the empty category to its antecedent goes up a strictly right branch, in contrast to (83b) in which the maximal projection NP containing the empty category constitutes a left branch. Thus, (83a) is well-formed, whereas (83b) is ill-formed.[59] Thus, Kayne's path theory relates the connection between an empty category and its antecedent directly to the notion of government and hence the ECP, since the ECP is already defined in terms of government.

As far as Chinese is concerned, the relevant cases are not so straightforward. In order to accommodate the possibilities of subject extraction as well as object extraction, and extraction from sentential subjects as well as from sentential complements, one clearly needs to allow both left branching and right branching paths in this language. Assuming that both subject and object positions are properly governed in Chinese, lexical government in the grammar of this language is then both to its right and to its left. This predicts correctly that in Chinese there is no subject-object asymmetry of the sort displayed in English and French, and that an

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59 As Kayne notes, a governed empty category itself constituting a left branch is legitimate, as the following sentence shows:

(i) Which runner do you believe to have won the race?

Here, the empty category is governed by the V ***believe***, a g-projection of which contains the antecedent.

empty category in this language can be unbound within a maximal projection whether that maximal projection constitutes a left branch or a right branch. Thus, the possibilities of subject extraction as well as object extraction, extraction from sentential subjects as well as from sentential complements fall naturally under Kayne's (1983) path theory.

However, since Kayne's theory crucially depends on the notion of lexical government, here again, it is difficult to account for the difference between extraction from a complex NP located in subject position and that from a complex NP in object position. Given the assumption that both left branching and right branching paths are possible, subject position and object position are indistinguishable and the theory allows extraction from a complex NP located either in subject position or in object position.[60] A further difficulty is that the notion of government and thus the ECP cannot distinguish complex NPs containing relative clauses from those containing NP complement clauses.[61]

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60 Though these Chinese cases cannot be accounted for directly in terms of Kayne's proposal, the extraction asymmetry between a subject-located complex NP and an object-located complex NP, I believe, can be attributed to the relation between the NP and the head of the construction. See chapter 5 and chapter 6 for discussion.

61 Adopting Kayne's notion of path, Pesetsky (1982) shows that the ECP and some related phenomena can be derived in another way, namely, in terms of the Path Containment Condition (PCC), which says that if two paths intersect, one of them must be properly contained inside the other. The idea of the PCC was originally motivated from consideration of double extraction structures. It has long been recognized that double extraction structures seem to follow a "last-in-first-out" rule (cf. Fodor 1978). Pesetsky shows that the application of the PCC is much broader and its generalization is consistent with the ECP. Pesetsky assumes that in addition to the path from the empty category to its antecedent, there is always another path, i.e., a path from INFL to COMP, and that the latter intersect with the former. Pesetsky's path theory basically rejects subject extraction and extraction from within a subject, since otherwise antecedent-gap path and INFL-COMP path will intersect but neither will be properly contained in the other. Although the PCC accounts for a number of phenomena in languages like English, it is not clear how it can be implement-

3.3.4 Chomsky's barrier theory

As has been shown throughout the discussion thus far, government and movement are two central notions in GB theory. The theory of government mainly deals with the relation between the head of a construction and its dependent categories; the theory of movement is concerned with the dependency between an empty category and its antecedent. Chomsky (1986) attempts to approach these two topics in a unified way with the notion of barriers. He proposes that a two-level X'-theory can be generalized to the non-lexical categories and that the clausal categories conventionally labeled S and S' may be respectively represented as IP and CP.[62]

The framework of barriers allows two types of movement, substitution and adjunction. Substitution moves a maximal projection to the specifier position, while adjunction is permitted only to non-argument positions. As a consequence of adjunction, the notion of maximal domination is adopted and government is defined in terms of exclusion.[63] A head α theta-governs its complement that it directly theta-marks. If it is lexical, the head α L-marks its complement.[64] The

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ed in dealing with those Chinese extraction phenomena discussed above.

62 The lexical categories refer to those defined on the basis of the conventional features [+/- N, +/- V], namely, the categories Noun, Verb, Adjective and Preposition; the non-lexical categories, on the other hand, mainly include Complementizers and INFL.

63 The form $[_{\alpha^1} \ \beta \ [_{\alpha^2} \ \ldots \ ]]$ is a typical adjunction structure where β is adjointed to α and α consists two segments, i.e., α^1 and α^2. The notion of exclusion and that of government are stated as the following respectively (cf. Chosmky 1986, p. 9):

(i) α excludes β if no segment of α dominates β.
(ii) α governs β iff α m-commands β and there is no γ, γ a barrier for β, such that γ excludes α.

notion barrier is defined in terms of "blocking category" (cf. Chomsky 1986, p. 14):

(84) γ is a barrier for β iff (a) or (b):

a) γ immediately dominates δ, δ a BC for β.

b) γ is a BC for β, $\gamma \neq$ IP.

Thus, the maximal projection of a category is a blocking category (BC) for a category it dominates, if it is not L-marked. There are two cases in which a category has the status of being a barrier. By (84a), a maximal projection of a category is not a barrier intrinsically but inherits the barrierhood from a BC it immediately dominates; by (84b), a maximal projection is a barrier intrinsically if it is an non-IP BC. Thus, CP or IP in general will not be a barrier by itself though IP is usually a BC. Furthermore, the definition of (84) amounts to saying that any non-IP maximal projection that is not L-marked is a barrier for a category it dominates.

In this framework, proper government is defined in terms of theta-government or antecedent-government. In other words, An empty category must be theta-governed or antecedent-governed in accordance with the ECP. According to Chomsky, movement is optimal when it crosses no barriers, and it degrades sharply when it crosses more than one barrier.[65] Consider now a concrete example:

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[64] The relevant notions are stated as the following (cf. Chomsky 1986, pp. 14-15):

a) α directly theta-marks β only if α and β are sisters.
b) α theta-governs β iff α is a Bar-0 category that directly theta-marks β.
c) α L-marks β iff α is a lexical category that theta-governs β.
d) γ is a blocking category for β iff γ is not L-marked and γ dominates β.

[65] The Subjacency Condition is formally defined as (cf. Chomsky 1986, p. 30):

If (a_j, a_{j+1}) is a link of a chain, then a_j+1 is subjacent to a_j.

To be more concrete, a well-formed construction may not involve movement

(85) John decided [$_{CP}$ e [$_{IP}$ PRO to [$_{VP}$ see the movie]]]

In this structure, CP is not a barrier for government of the empty category *e* by ***decided*** since it is L-marked by the verb, but it is a barrier for government of PRO by ***decided*** since it dominates a BC (i.e., IP) and therefore inherits barrierhood from the BC.

Assuming that both subject position and object position in Chinese are theta-governed in one way or another, it follows that subject extraction is possible as much as object extraction.[66] However, assuming the relevance of the Subjacency Condition to Chinese, the framework of barriers has essentially the same difficulties in dealing with extraction from standard island constructions, such as sentential subjects, Wh-questions and Complex NPs, as discussed above with reference to other proposals. Though subject position may be assumed as being theta-governed by INFL, it is not L-marked. Even though one may be able to assume INFL to be lexical L-marking subjects, it may help with the cases involving extraction from sentential subjects but not those involving extraction from complex NPs. Consider the following example:

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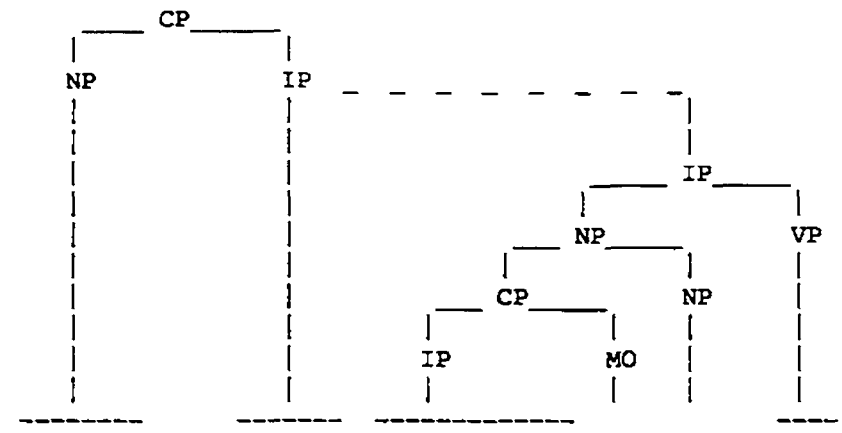
crossing two barriers.

66 Here I am not going to discuss the possibility of how subject position can be theta-governed in the framework of Chomsky (1986), since it is not the major concern of the discussion

(86)



Zhexie ren$_i$, wo renwei t_i fangwen guo de difang bu duo
these people I think visit ASP MO place not many
*'These people, I think that there are not many places which ____
have visited.'

In (86), the relative clause CP is not L-marked and therefore a BC and a barrier. The complex NP is not a BC itself since it is, presumably, L-marked, but it inherits barrierhood from the CP it immediately dominates according to clause (a) of the definition of barrier stated in (84). Thus, in this structure, at least two barriers are crossed and the sentence is wrongly ruled out as a Subjacency violation. To avoid this, one may simply assume that empty categories in the cases involving Subjacency violations are base-generated. But if empty categories are allowed to be base-generated in a complex NP located in subject position, the immediate question will be why empty categories cannot be base-generated in the same way in a complex NP located in object position. As should be obvious, the notion of barrier cannot distinguish complex NPs located in subject positions from those located in object positions since they basically involve the same number of barriers to be

crossed, assuming that both subject position and object position are L-marked.[67]

3.4 Extraction Position and Extraction Domain

Thus far, it has been indicated that extraction phenomena in Chinese cannot be adequately accounted for either by the standard formulations of Subjacency and the ECP, or by more recent modified proposals of these two principles. It seems that the Subjacency Condition is irrelevant to Chinese syntax and the ECP, which is crucially based on the notion of lexical-government (or theta-government), is not adequate to accommodate the relevant cases in Chinese. However, I agree with previous proposals that extraction phenomena involve two related yet distinguishable notions. One of these notions has to do with the position in which an empty category may occur, regardless of the construction from which extraction takes place; the other concerns the construction domain beyond which the antecedent-gap dependency may (or may not) cross, regardless of the position of the resulting empty category within that construction. In English, for instance, an empty category in general may occur only in the position governed by the lexical head. But the fact that an empty category occurs in a lexically governed position is not sufficient for the relevant structure to be well-formed. As Kayne (1983) notes, an empty category must also be connected with its antecedent. Antecedent-gap dependencies, however, cannot cross over certain (island) constructions such as complex NPs (in

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[67] Following May (1985), Fiengo et al. (1988) argues that in an adjunction structure, the top segment of a multi-segment node is an absolute barrier to government, but only a complete category, one that dominates all of its segments, is a barrier for movement. Thus, the theory of government and the theory of movement can only be partially unified under the notion of barriers.

English). Thus, a sentence with antecedent-gap dependency over an island construction is not well-formed even though the empty category is in a properly governed position. While the ECP mainly constrains the positions in which empty categories may occur, the island constraints or the Subjacency Condition restricts the structural domain beyond which antecedent-gap dependency may cross. As discussed in the last section, the latter cannot be reduced to the former. Aoun (1981) presents an interesting case from standard Arabic, where a completive sentence generated with the complementizer *?anna* is ungrammatical if the element following the complementizer is fronted. Assuming that *?anna* is not a proper governor, Wh-fronting of the element following the complementizer will leave an empty category in a non-properly governed position, yielding a ECP violation. However the sentence will become grammatical if a resumptive clitic appears after the complementizer. What is interesting here is that although the resumptive clitic occurring after *?anna* in case of Wh-movement permits violation of the ECP, it does not permit violation of island constraints. This indicates that island constraints (or Subjacency) are independent of the ECP. See Aoun (1981) for more examples and detailed discussion.

The assumption that the Subjacency Condition is irrelevant to Chinese should not be taken as implying that there are no island constructions in this language. As indicated throughout this chapter, though Chinese allows subject extraction as well as object extraction, and extraction from sentential subjects as well as sentential complements, it does not allow any extraction from complex NPs located in object position. In some sense, object-located complex NPs are islands. But such islands cannot be expressed in terms of bounding nodes (i.e., S and NP) and thus be relat-

ed to the notion of Subjacency, since corresponding extraction is possible from their counterparts located in subject position. The point here is that there are certain structural domains in Chinese over which no extraction is possible even though the resulting empty category is in a properly governed position.

Another case showing a similar phenomenon concerns embedded clauses introduced by a preposition. It was mentioned in section 3.1 that no extraction of an element is possible from within a S' whose COMP is lexically filled with a preposition, while local extraction is possible, as shown by the following contrast:

(87)a. *Zhangsan$_i$, zhe [$_S$' gen [$_S$ Lisi bu xihuan t_i] wuguan.
Zhangsan this with Lisi not like no-relation
*'Zhangsan, this has nothing to do with Lisi's not liking ____ .'

b. Zhe [$_S$' gen [$_S$' Zhangsan$_i$, Lisi bu xihuan t_i] wuguan.
this with Zhangsan Lisi not like no-relation
'This has nothing to do with the fact that Zhangsan, Lisi does not like ____ .'

The empty category in (87a) is properly governed as much as that in (87b). While the latter is grammatical, the former is ungrammatical, simply because the former involves extraction out of a clause introduced by a preposition. Thus, such a clause is an island in Chinese, out of which no extraction is allowed, regardless of whether the relevant empty category is in a properly governed position.

As has been mentioned, Kayne (1981) suggests that the general impossibility of extraction from a PP may be subsumed under the ECP, specifically under the notion of percolation projection, which was defined in terms of co-superscripting. The general absence of preposition stranding in French was claimed to reflect the inability of French Ps to inherit a superscript from their maximal projection. This correctly rules out sentences like (88a), but also wrongly rules out those like (88b) below (cf Kayne 1983, p. 225):

(88) a. *Ce qu'elle tient à.
that that she holds to
'What she is keen on.'

b. Ce qu'elle tient à faire.
that that she holds to do
'What she is keen on doing.'

if the P à cannot receive a superscript, the antecedent of the empty category is not contained within a percolation projection of the V *faire*. According to Kayne (1983), however, the empty category in (88b) is governed by V (but not P), which is a structural governor and has the matrix S' as its g-projection. Thus, (88b) can be distinguished from (88a) by the ECP in terms of the notion of g-projection.

Thus, though Kayne's (1983) theory prohibits preposition stranding, it allows extraction from within a prepositional phrase (or a clause introduced by a preposition) so long as the empty category is properly governed. This accounts for the cases of allowed and disallowed extraction from PPs in English and French, but not for the cases in Chinese since nothing can be extracted from the domain of a PP (or a clause introduced by a preposition) in Chinese, no matter whether what is extracted is the object of the preposition or some other constituent which is properly governed. Notice that in (87) the S' introduced by the preposition *gen* 'with' is a constituent subcategorized by the verb *wuguan* 'having-no-relation', not a free adjunct. But this does not make any difference in not allowing extraction from this structural domain.

In conclusion, extraction phenomena involve two independent notions, namely, extraction position and extraction domain. Generally speaking, the position in which an empty category may legitimately occur is one which almost always has a "close" relation to the head of the construction, and such a close relation between

an empty category and the head of the construction may minimally vary cross-linguistically. In contrast, the domain out of which extraction is (or is not) allowed may vary more freely from one language to another, in view of the fact that the difference between English and Chinese in island effects cannot be subsumed under some unified notion such as Subjacency. In the following chapters, I will further discuss these two notions.

Chapter IV

ANTECEDENT–GAP DEPENDENCIES AND GENERALIZED PHRASE STRUCTURE GRAMMAR

As discussed in the previous chapter, GB theory has a transformational component in addition to the phrase structure component. In fact, it has often been assumed that constructions with long–distance dependencies cannot be encoded in an adequately constrained type of phrase structure grammar without the aid of transformational devices. In this chapter, I will discuss antecedent–gap phenomena in the framework of Generalized Phrase Structure Grammar (GPSG). I will show that though dependency phenomena in Chinese, as indicated in the previous chapter, are peculiar in comparision with other languages such as English, a phrase structure grammar can not only conveniently handle long–distance dependencies in this language, but also capture certain non–obvious generalizations about interactions between structures. Furthermore, I will show that the treatment of word order independent of constituent structure enables the grammar to express certain important generalizations about the relations between empty categories and the heads of the constructions in question. Our major concern here is to discuss how GPSG may be modified to accommodate the relevant extraction phenomena of Chinese as well as other languages.

4.1 Overview of Generalized Phrase Structure Grammar

The theory of Generalized Phrase Structure Grammar was originally proposed in a series of articles by Gazdar (1979, 1981, 1982) and was developed mainly in his subsequent research with colleagues. A striking characteristic of GPSG is that it employs phrase structure rules and feature constraints but not movement rules. Thus, the grammar consists of only one level of syntactic representation. The most complete version of the theory can be found in Gazdar, Klein, Pullum, and Sag (1985) ---- henceforth GKPS, which I will generally assume in this discussion.[68]

GKPS develops an explicit theory of syntactic features and their distribution in syntactic representations. A syntactic configuration is viewed as a representation of a flow of linguistic information. This information is encoded by means of a set of features which are regulated by a set of general principles. Thus, the theoretical framework of GKPS is basically a feature instantiation system, consisting of (cf. Hukari and Levine 1986, p. 6):

(1) a) a set of features.

b) a definition of the set of syntactic categories induced by the set of features.

c) a set of principles which jointly license the distribution of features and categories in syntactic representations.

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68 In GPSG, every syntactic structure is associated with a semantic interpretation rule and quite a few syntactic processes are assumed as semantically-driven. Thus, GPSG consists of a syntactic theory with a model-theoretical semantics. Here I will be concerned largely with the syntactic theory of GPSG.

For instance, there may be a RE(flexive) feature on a given NP in a structure which indicates that the NP in question is a reflexive pronoun. Intuitively, this piece of information is linguistically significant, in that if there is a reflexive pronoun in a structure, there usually must be another NP in that structure with which the reflexive pronoun may find its reference. Thus, the category representing a reflexive pronoun consists of an RE feature in addition to the features that an NP necessarily contains.

A syntactic category in GPSG is regarded as a set of ordered pairs of features and feature-values. For instance, an NP is represented in the form of {<N, +>, <V, ->, <BAR, 2>}. Here the values are atomic symbols, namely those defined on a binary or integer scale. GPSG, however, also allows features which have categories as their values, such as SLASH, AGR, and RE. The category-valued feature SLASH is essential in the GPSG analysis of long-distance dependencies. Intuitively, a constituent assigned to a category C[SLASH, C'] (often represented as C/C') is a constituent of category C which contains a phonologically null constituent of category C'. Thus, S/NP represents a sentential category which has an NP "missing" somewhere internally.

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69 The notion of unification and that of extension are informally stated as the following respectively (cf. GKPS, P.27):

Extension
A category A is an extension of a category B if and only if
(i) the atom-valued feature specifications in B are all in A, and
(ii) for any category-valued feature *f*, the value of *f* in A is an extension of the value of *f* in B.

Unification
Let K be a set of categories. The unification of K is the smallest category

The theory of syntactic categories is heavily based on the notions of unification and extension.[69] Formally, a category is defined as a partial function from a finite set of features to the set of possible values.[70] Since a unification of sets of feature specifications is the smallest category which includes every member in those sets of feature specifications, it is not possible to form the unification of two sets of feature specifications that contain some feature but disagree on the value of that feature. This is because no category may contain a feature specification like {<V, +>, <V, ->} as a subset, since categories are partial functions.

Syntactic categories need not be fully specified and any legitimate set of feature-value pairs may be considered as a category. Thus, {<BAR, 2>} is as much a category as the set {<N, +>, <V, ->, <BAR, 2>}. While the former denotes XP, i.e., maximal projection of any major category, the latter denotes NP, a more specified category. This convention permits extremely general statements in rules, which I will come to discuss later.

The distributional regularities of syntactic features are further constrained by Feature Cooccurrence Restrictions (FCRs) and Feature Specification Defaults (FSDs). FCRs state incompatibilities or obligatory dependencies among features, particularly with respect to a given language. For instance, the feature VFORM (in English) may be used to specify whether the verbal category in question is FIN(ite) or

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which is an extension of every member of K, if such a category exists, otherwise, the unification is undefined.

70 A finite set of features itself does not ensure a finite set of categories. Since features can take categories as values, there is the potential for producing an infinite set of categories. GPSG posits the restriction that no feature *f* can be assigned a category as its value which contains the same feature *f*. This avoids the recursive use of a feature and guarantees a finite set of feature-value pairs.

INF(initive), which, as is well-known, are only relevant to verbal categories and cannot be associated with categories of other types. This restriction can be stated in the form of the FCR: [VFORM] ⊃ [-N, +V], which says that if a category exhibits a distinction in FIN versus INF, then that category must be a verbal category, not any of the other categories. Furthermore, FCRs in GPSG are understood as absolute restrictions on the possible feature composition of a category; no category may be specified in a way contradictory to what a FCR says. Thus, it is not possible to form a category like {<VFORM, FIN>, <N, +>} due to the FCR above.

In contrast, FSDs operate as markedness conventions specifying unmarked (default) values for features in the usual cases. In the special cases, marked (non-default) feature specifications do occur, but they must be specifically sanctioned by rules or forced by principles in the grammar. For instance, a verbal element usually takes as its subject an ordinary NP, as opposed to the expletive pronoun *there*, which has an extremely restricted distribution. This generalization can be captured by a FSD: [+V, BAR 0] ⊃ [AGR NP[NFORM NORM]], which says that if it is a Bar-0 verbal category, this category will agree with a normal NP subject in unmarked cases. Thus, only sentences like (2), not (3), are permitted by the grammar.

(2) John bought a book yesterday.

(3) *There bought a book yesterday.

there-sentences like (3) will be sanctioned by the rule in (4), which specifically mentions an AGR value distinct from the default value and thus overrides the default value stated in the FSD above.

(4) VP[AGR NP[there, αPLU]] --> H[22], NP[αPLU]

Like traditional generative grammar, GPSG also consists of a set of grammatical rules, which regulate basic relations among syntactic categories, thus licensing phrase structures for a given language. However, GPSG adopts Immediate Dominance (ID) rules, which unlike traditional phrase structure rules, specify the constituent relation between the mother and the daughter categories, but not the linear order among sister categories. Linear order is handled independently by Linear Precedence (LP) rules. ID rules are stated in a form like the example in (5), where the comma indicates that the categories are unordered with respect to each other.[71]

(5) A --> B, C

In principle, this ID rule admits two phrase structures containing the same constituents with different ordering between the sister categories. But the grammar admits only one structure, i.e., A --> B + C, if a LP rule like the following is added to the grammar:

(6) B < C

Note that this LP rule ensures not just that B precedes C when they are sister categories expanded from the category A, but that B always precedes C whenever they are sisters expanded from any one category. This is an important property assumed in GPSG, which I will further discuss in section 4.4.

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71 The rule in (5) may also be stated as A --> C, B, since ordering is irrelevant to an ID rule.

In GPSG, lexical items do not directly carry information as to what complements they subcategorize for. Rather, lexical items are marked with a subcategorization feature SUBCAT, which takes integers as its values. Accordingly, the lexical head of an ID rule is also marked with such a feature, as shown in the following examples:

(7) VP --> V[SUBCAT 2], NP

(8) <love, [[- N], [+ N], [BAR 0], [SUBCAT 2]], ... >

Thus the feature SUBCAT relates particular lexical items and the structures in which they may occur. This ensures that in the cases like the above, the transitive verb *love* will only occur in a local tree licensed by the rule in (7). Thus, the subcategorization possibilities of lexical items in GPSG are encoded largely in syntactic rules.

Related to subcategorization, there are systematic regularities among ID rules. For instance, any verb which subcategorizes for an NP (and possibly some other complements) can in general occur in a passive configuration with the NP as the subject.[72] In other words, any ID rule which licenses an NP and some other complements (in addition to a lexical head) has a corresponding rule which licenses a passive configuration. In order to capture generalizations of this type, GPSG introduces metarules. The passive metarule as given in GKPS has the following form, where W is a variable over any categories in a ID rule.

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72 As is well-known, in English and other languages there is a large set of verbs which take an NP and some other categories as complements, but these verbs vary from one to another in terms of the subcategorized complements besides an NP. Thus, it should be obvious that this set of verbs may be licensed by different ID rules.

(9) VP --> W, NP ===> VP[PAS] --> W, (PP[by])

This rule says that for any ID rule which expands VP into an NP and some other categories, there is also a rule which expands VP[PAS] into the same categories less the NP and with an optional PP[by]. Other metarules given in GPSG are Subject-Aux Inversion Metarule, Extraposition Metarule, etc. which I will not discuss one by one.

Metarules are used in GPSG to capture generalizations beyond those which have traditionally required transformational operations.[73] Slash categories are terminated also by means of metarules, namely the Slash Termination Metarule 1 and Slash Termination Metarule 2, as given in GKPS. Slash termination is one of the central parts in the GPSG analysis of long-distance dependencies, which I will discuss in detail in section 4.3.

As has been indicated, the categories mentioned in ID rules are highly abstract. A single ID rule is in effect an abbreviation of a large collection of phrase structure rules. In order to enable the grammar to characterize actual structures for a particular language, GPSG assumes free feature instantiation which expands the categories mentioned in ID rules by further specifying feature specifications on those categories. In addition to the definition of categories, among other things, feature instantiation must satisfy a set of feature instantiation principles, i.e., the Head Feature Convention (HFC), the Foot Feature Principle (FFP), and the

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73 Metarules are not transformations by some other name and there is substantial difference in terms of expressive power between the two devices. As noted in GKPS, transformations map trees into trees, while metarules map ID rules into ID rules. Thus, transformations can provide any recursively enumerable set of sentences; metarules operating on a given set of (lexically headed) ID rules cannot produce such a set. See Peters and Ritchie (1973), Gazdar and Pullum (1982), Shieber et al. (1983) for discussion of related issues.

Control Agreement Principle (CAP). The restrictions on the distribution of features discussed so far are largely applied on the basis of individual categories. The HFC, FFP and CAP are principles responsible for regulating the relations of features that hold between categories in a local tree. It is important to note that these principles operate crucially with respect to the ID rule which has licensed the local tree.

GPSG defines a set of head features, which mainly include features indicating major category type, person, number, etc., and whose distribution, as the name suggests, involves the notion ***head***, an idea from the X'-theory.[74] The HFC says essentially that the head feature specifications on the mother in a local tree must agree with the head features on the head daughter(s) in that local tree unless other principles, i.e., the FCRs, FFP, and CAP, independently require certain disagreement.[75] Thus, the HFC is a principle relativized to other principles in the grammar.

In terms of feature specifications, there is an distinction between instantiation and inheritance. Instantiated features are distinguished from inherited features in the operation of the feature instantiation principles, particularly the FFP. Instantiated feature specifications are those which are not specified in an ID rule but occur

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74 The set of head features given in GKPS is as follows:

{N, V, PLU, PER, VFORM, SUBJ, PFORM, AUX, INV, PAST, PRD, ADV, SUBCAT, BAR, LOC, AGR, SLASH}.

75 The HFC can be stated as the following (cf. Sag et al. 1985, p. 131):

(i) The head feature specifications on each head are an extension of the head features of the category created by taking the intersection of the mother with the free feature specifications on the head.
(ii) The head feature specifications on the mother are an extension of the head features of the category created by taking the intersection of the heads with the free feature specifications on the mother.

Informally, the ***free feature specifications*** of a category in a tree are the set of all feature specifications which can freely occur in a category without violating the requirements of the FCRs, FFP, CAP, and stipulations in ID rules.

in the local tree licensed by the rule, while inherited feature specifications are those which are specified in an ID rule. A set of features, including SLASH, are called foot features. The FFP requires roughly that the foot feature specifications which are instantiated on a daughter node in a local tree must also be instantiated on the mother node in that local tree.[76] Thus, the FFP in effect ensures that the information encoded in the feature SLASH will be passed from the gap to its antecedent. Note that the inheritance-instantiation distinction is crucial to the operation of the FFP. If the ID rule in question explicitly mentions a foot feature on a daughter and not on the mother, then the mother node in a tree will not carry this feature; the reverse is also true: an ID rule may explicitly mention a foot feature on the mother but not on any of the daughters. This allows a general rule S --> XP, S/XP to introduce long-distance dependency constructions. Consider the following structure with the relevant ID rules:

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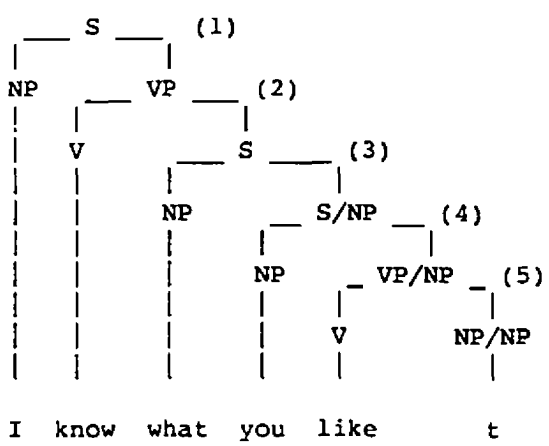
76 The set of foot features as given in GKPS include basically SLASH, WH, and RE, which are all category-valued features. The FFP is informally stated as follows (cf. Sag et al. 1985, p.46):

The foot features instantiated on the mother in a tree fragment are identical to the unification of the foot features instantiated on the daughters.

(10) a. S --> NP, S/NP
b. S --> NP, VP
c. VP --> V, NP



In local tree (3) the FFP does not apply, since the feature SLASH is introduced by the ID rule, i.e., (10a), and therefore inherited. In local trees (4) and (5), since the feature SLASH is not mentioned by the relevant ID rules, i.e., (10b) and (10c), SLASH must be instantiated on the mother node and a daughter node in each of the local trees in accordance with the FFP. Thus, a structure is well-formed only if each of the local structures satisfies the FFP, and long-distance dependencies become sequences of local dependencies.[77]

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77 Chung (1982) observes that in Chamorro, an Austronesian language, a verb morphologically agrees in the grammatical function with a local subcategorized constituent that contains a gap. If a gap is deeply embedded, the information about the gap must be encoded successively through every intervening verb. This phenomenon, known as Wh-agreement, provides empirical evidence arguing for the treatment of long-distance dependencies as sequences of local dependencies. See e.g., Goldberg (1985), Zaenen (1983) for discussion. See also section 4.3 for further discussion of this phenomenon.

The Control Agreement Principle (CAP) is the theory designed in GKPS to deal with agreement phenomena, particularly that of subject-predicate agreement. In the light of the insight of Keenan (1974) that functor categories (in general predicative categories) agree with nominal arguments, the CAP involves crucially the notion of control, which is defined in terms of semantic types. Roughly, the VP in simple sentential structures is controlled by the subject NP since the VP has the semantic type <TYP(NP), TYP(S)>, while the infinitive complement is controlled by the object NP in cases involving object-control verbs (e.g., ***persuade***), which have the semantic type <TYP(VP), <TYP(NP), TYP(VP)>>.[78] The agreement is formally encoded in the control features. According to GKPS, SLASH is the control feature if it is inherited, otherwise AGR is the control feature. The CAP can be stated roughly as follows:

> The value of the control feature on a predicative category must be identical to the (head) feature specifications of the controller of the predictive category if there is a local controller; otherwise the control feature specification must be identical to that on the mother.

Basically, there are three cases of agreement. The operations of the CAP on these cases can be illustrated by the following diagrams:

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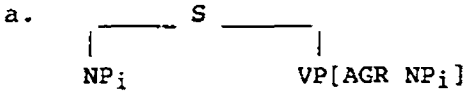
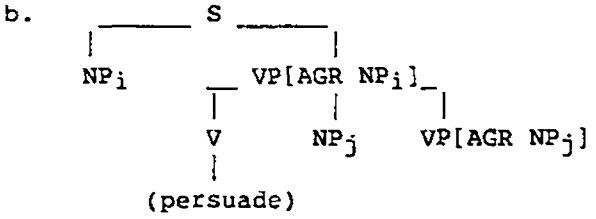
78 The infinitive complement is not controlled by the object NP in cases involving subject-control verbs (e.g., ***promise***) since such verbs have the type <TYP(NP), <TYP(VP), TYP(VP)>>. In subject control cases, since there is no local controllor, the infinitive complement is controlled by the controllor of the mother node, as defined in the CAP.

The semantic analysis found in GKPS is couched largely within the framework of Montague semantics. Interested readers may refer to Dowty, Wall and Peters (1981) for technical details of the semantic theory.

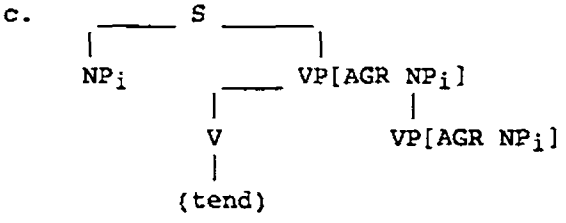
(11) a.



b.



c.



Since agreement is not central to the discussion in this dissertation, I am not going to dwell on it.

Thus far, I have presented a very brief review of the current version of GPSG, i.e., GKPS. In the following sections, I will discuss the relevant cases of antecedent-gap dependencies in Chinese and other languages within this framework. The feature SLASH and related principles, in particular the FFP and the Slash Termination Metarules, are central to the discussion. It will be shown that certain modification of the definitions of the feature SLASH and the related principles are not only necessary but also possible to accommodate the relevant cases from Chinese as well as from other languages.

4.2 The Foot Feature SLASH and the FFP

As mentioned in the preceding section, the category-valued feature SLASH together with the feature instantiation principles, in particular the FFP, is crucial to the analysis of long-distance antecedent-gap dependencies. SLASH in GPSG is a foot feature. Being a foot feature, SLASH must be instantiated on at least one daughter if it is instantiated on the mother in a local tree, as required by the FFP. Furthermore, SLASH has the potential of being freely instantiated and nothing in the grammar prevents the instantiation of SLASH on more than one daughter. Thus, more than one gap can be licensed by a single extracted constituent. This correctly predicts that English parasitic gap constructions like the following are grammatical.

(12) Which article$_i$ did Bill [$_{VP/NP}$ [$_{VP/NP}$ file t_i][$_{PP/NP}$ without reading t_i]]

(13) Bill wondered which man$_i$ [$_{S/NP}$ [$_{NP/NP}$ the picture of t_i][$_{VP/NP}$ could hardly please t_i]]

SLASH, however, is not just a foot feature; it is also assumed to be a head feature in GKPS and therefore must obey the HFC, which requires that the head features on the daughter head(s) in a local tree agree with the head features of the mother unless some overriding conditions make this agreement impossible. Thus, if SLASH is instantiated on the mother, it must be instantiated on the daughter head. This predicts that the sentences in (14) and (15) are ungrammatical, in contrast to sentences in (16) and (17), and those in (12) and (13) above.

(14) *What$_i$ did you [$_{VP/NP}$ [$_{VP}$ file the article][$_{PP/NP}$ without reading t_i]]

(15) *John wondered which man$_i$ [$_{S/NP}$ [$_{NP/NP}$ the picture of t_i][$_{VP}$ could hardly please Bill]]

(16) What$_i$ did you [$_{VP/NP}$ [$_{VP}$ file t_i][$_{PP/NP}$ without reading the article]]

(17) John wondered which man$_i$ [$_{S/NP}$ [$_{NP/NP}$ the picture of Bill][$_{VP}$ could hardly please t_i]]

The assumption of SLASH as both a head feature and a foot feature achieves, inter alia, the effect of what is traditionally accomplished by the Subject Condition, blocking extraction from subjects. The interaction of HFC and FFP ensures that SLASH is instantiated on the head, wherever else it may also be instantiated. In other words, it is possible to have an extraction from a non-head constituent only if there is also an extraction concomitantly from the head constituent.

Now consider the relevant cases in Chinese. As indicated in the previous chapter, Chinese allows extraction quite freely from a non-head constituent without a concomitant extraction from the head constituent. More precisely, for instance, extraction out of subjects is possible in Chinese, as shown by the following examples:

(18) Zhe-ben shu$_i$, [$_{S/NP}$ [$_{S/NP}$ Zhangsan kan t_i][$_{VP}$ bu heshi]]
This-CL book Zhangsan read not proper
*'This book, for Zhangsan to read ____ is not proper.'

(19) Nei-ben shu$_i$, [$_{S/NP}$ [$_{NP/NP}$ xiang kan t_i de ren][$_{VP}$ bu shao]]
That-CL book want read DE not few
*'That book, people who want to read ____ are not few.'

Both (18) and (19) involve extraction merely from the subject. If SLASH is also a head feature, as GKPS assumes, sentences like (18) and (19) would be impossible.

The fact that extraction from subjects is possible in Chinese seems to suggest that SLASH in this language is a foot feature, not a head feature, and thus does not obey the HFC.

Sells (1984) points out that the assumption of SLASH as a head feature is inadequate for English as well, for there are certain cases of parasitic-gap constructions which cannot be accommodated simply under the assumption that SLASH is a head feature. Consider the following sentences:

(20) a. Who$_i$ do you [$_{VP/NP}$ [$_V$ consider][$_{NP}$ friends of Bill][$_{AP/NP}$ angry at t_i]]

b.*Who$_i$ do you [$_{VP/NP}$ [$_V$ consider][$_{NP/NP}$ friends of t_i][$_{AP}$ angry at Bill]]

c. Who$_i$ do you [$_{VP/NP}$ [$_V$ consider][$_{NP/NP}$ friends of t_i][$_{AP/NP}$ angry at t_i]]

According to the formulation of GKPS, (20b) should be well-formed as well as the other two sentences, since the fact that SLASH is not also instantiated on the lexical head of the VP does not violate the HFC, due to the FCR: [SUBCAT] ⊃ ¬[SLASH], which says that a lexical category cannot carry the feature SLASH. Remember that the HFC is a principle relativized to other principles in the grammar. If certain incompatibility of head features between the mother and the head daughter is required by some other principles such as FCRs, then this incompatibility is tolerated. Thus, nothing is illicit in the relevant structure in (20b), since the HFC is overriden by the FCR above in this case. In order to predict that sentences like (20b) are ungrammatical, the AP should be a head daughter. Notice that the contrast in the distribution of gaps among (20a), (20b) and (20c) does seem to suggest that the AP is a head daughter, since there may or may not be a gap in

the NP. But if there is a gap in the NP, there must be a gap in the AP. However, assuming the AP as a head daughter would wrongly predict that sentences like the following are ungrammatical:

(21) Who$_i$ do you consider [$_{NP}$ t$_i$][$_{AP}$ angry at Bill]?

Accordingly, sentences like (22) would also be ruled ungrammatical since the infinitive VP has a status similar to the AP in (21).[79]

(22) Who$_i$ do you expect [$_{NP}$ t$_i$][$_{VP}$ to help Mary]?

Thus, though it is generally agreed that SLASH is a foot feature, it is controversial if SLASH should also be assumed to be a head feature.[80] One of the central issues concerns the question of whether the feature SLASH ever plays a role which is relevant to head features, such as a role in agreement phenomena. SLASH does not seem to play a role in agreement in languages like English, but SLASH does play a role relevant to agreement in some other languages. Based on the observation by Chung (1982) and Chung and Georgopolous (1984), Goldberg (1985) proposes an analysis of Wh-agreement phenomenon in Chamorro. In Chamorro, when a constituent (e.g., subject) is questioned (extracted), the relevant verb marks the

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79 Assuming the version of Slash Termination Metarule 1 suggested by Hukari and Levine (1978), one may distinguish sentences like (21) and (22) from those like (20b) as will be discussed in section 4.3. But how to treat the AP as a head daughter is a question. One way to achieve the head status for the AP in (21) is to assume a "small clause" structure as the complement to the verb *consider*, containing an internal subject NP and predicate AP. However, as Farkas et al. (1983) point out, such an assumption would also rule out sentences like (21) and (22) since the NP now becomes the subject of a non-lexical rule which is not a finite VP. Thus, neither STM 1 nor STM 2 may apply.

80 See e.g., Sells (1984), Jacobson (1987), and Hukari and Levine (1990) for discussion of the related issues.

grammatical relation of the constituent. Furthermore, the verb marks the grammatical function of its complement containing a gap instead of the gap itself, if the constituent is extracted from a embedded constituent. Consider the examples in the following (cf. Goldberg 1985, originally from Chung 1982):

(23) **ha**-istoba häm na malägu'i lahi-nmami ni kareta.
3s-disturbs us COMP want the son-our OBL car
'That our son wants the car disturbs us.'

(24) hafa **um**-istoba hao ni malago'-nã i lahi-mu.
what **Subj.wh**-disturbs you COMP OBL.WH.want the son-your
'What does it disturb you that your son wants?'

In (23), the sentential subject contains no gap and agreement is marked by ***ha***; if the subject contains a gap, as in (24), agreement is marked by ***um***.[81] What is important here is that there is a systematic morphological agreement which depends crucially on whether or not the argument contains a gap. This phenomenon is clearly a strong argument for the potential of treating SLASH as a head feature, since agreement is generally sensitive to head features. Thus, as Hukari and Levine (1990) point out, a theory of grammar should make provision for this possibility, even though SLASH plays no role in agreement in languages like English, a fact which may be simply due to morphological impoverishment. While there are good reasons to believe that an adequate grammatical theory should allow the potential of implementing SLASH (or some equivalent) as a head feature whenever required by a particular language, there are no compelling reasons to think that SLASH should always be implemented as a head feature in every language. In fact, many languages exhibit extraction patterns different from those

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[81] The element ***in*** is used to mark a sentential complement if it contains a gap. See Goldberg (1985) for the relevant examples.

found in English. Sells (1984) shows that in Swedish extraction out of non-head constructions is possible:

(25) den deckare som$_i$ de sista sidorna i t_i hade kommit bort
that detective novel that the last pages in ____ had come away

(26) en symfoni som$_i$ många kritiker anser de två sista satserna i
a symphony that many critics consider the two last movements in
t_i vara oöverträffade
____ to be underpassed

Each of the examples involves extraction out of a constituent other than a head, suggesting, as Sells notes, that SLASH is not a head feature in Swedish. Along the same line, I would like to assume that SLASH is merely a foot feature in Chinese, though this hypothesis needs further evaluation in the context of the whole grammar.

Besides the consideration of parasitic gap constructions and the subject condition, the assumption of SLASH as a head feature in GKPS is also motivated by the consideration of the Across-the-Board effects in extraction out of coordination constructions.[82] Assuming that all conjuncts are heads, the HFC will require each of the daughter heads to agree in head features with the mother. Thus, the Across-the-Board extraction effects directly follow from the HFC, since once SLASH is instantiated on the mother, it must be instantiated on every head, i.e., every conjunct.

Assuming that SLASH is a foot feature, but not a head feature in Chinese, the theory then needs to derive the Across-the-Board effects and therefore account for extraction out of coordination constructions in some other way. Here I have

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82 See Ross (1967) and Williams (1978) for discussion of the Across-the-Board phenomenon.

little to say about independent arguments for such an approach to coordination constructions, which are rather complex and beyond the scope of our concern in this discussion. Let me note briefly that it is not quite clear that the treatment of coordination constructions by appeal to the general notion of head is correct cross-linguistically. As pointed out by Hukari (personal communication), the behavior of Wh-phrases in English may be taken as an argument against treating the Across-the-Board phenomena as involving the HFC. Consider the following examples:

(27) a. I wonder <u>when</u> and <u>how</u> Kim met John at that party.

b. *I wonder <u>whom</u> and <u>John</u> Kim met at the party.

It is clear that Wh should not be a head feature, yet it participates in the Across-the-Board effects. This seems to indicate that the Across-the-Board effects are a phenomenon independent of the notion of head. Furthermore, Sells (1984) notes that conjuncts, as shown by Swedish data, may not be heads of the coordination constructions in the same way, say, as VP is the head of S. Similarly, coordination constructions in Chinese involve a much broader range of phenomena. In any event, it seems impossible to unify the effects of the Across-the-Board extraction and the facts of extraction from non-head constituents under the notion of head.

Another consequence of assuming SLASH as a foot feature but not a head feature is that one would then expect the possibility of extraction from adjuncts. But this is false. Along with many other languages, Chinese in general does not allow extraction from an adjunct PP or an adverbial clause, as the following exam-

ple shows:[83]

(28) *Shanghai$_i$, nei-zhong shi [$_{VP/NP}$ [$_{VP}$ keneng hui fasheng][$_{PP/NP}$
Shanghai that-CL thing possibly will happen
zai t_i]]
in
*'Shanghai, that sort of thing may happen in ____.'

Furthermore, as indicated in the last chapter, in Chinese extraction from prepositional phrases (or clauses introduced by prepositions) is absolutely prohibited even though the PP (or S' introduced by a P) may be subcategorized by the verb of the construction in question:

(29) *Zhangsan$_i$, zhe [$_{S'}$ gen [$_S$ Lisi bu xihuan t_i] wuguan.
Zhangsan this with Lisi not like no-relation
*'Zhangsan, this has nothing to do with Lisi's not liking ____.'

In short, PP (or S' introduced by a preposition) in Chinese is an island domain, from which no extraction is possible, as indicated in the previous chapter. If this is correct, it seems to suggest that the impossibility of extraction from a PP (or S' introduced by a preposition) is independent of the status of SLASH (being a foot feature or head feature), and that an independent principle is needed to block extraction from such constructions. Within the general theory given in GKPS, this can be accomplished in terms of a Feature Coocurrence Restriction. I assume that there is a FCR like the following in the grammar,

(30) FCR: PP ⊃ ¬[SLASH]

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83 Clearly, Huang's (1982) Condition on Extraction Domain entails this generalization.

which says that if the category is a PP, then it cannot contain SLASH. Thus, a category containing feature specifications of both PP and SLASH will not be allowed to be specified. This restriction prevents the instantiation of SLASH on a PP category and thus blocks extraction from PPs.

4.3 Slash Termination Operation

While the category-valued foot feature SLASH marks a category containing a gap and the FFP ensures that the gap and its antecedent are linked through a series of local mother-daughter feature correspondencies, at the bottom of the Slash "projection path" the feature specification [+NULL] is used to encode the fact that a constituent is phonologically empty. The empty string *t* (or *e*) is listed in the lexicon and it is assumed that only categories of the form α[+NULL]/α may dominate an empty string. The feature [+NULL], however, cannot be freely instantiated due to the Feature Specification Default ¬[NULL], and it can only be achieved through ID rules introduced by metarules, namely, the Slash Termination Metarule 1 and Slash Termination Metarule 2. They read as in (31a) and (31b) respectively:

(31) a. Slash Termination Metarule 1 (STM1)

$$X \dashrightarrow W,\ X^2 \quad ===> \quad X \dashrightarrow W,\ X^2[+NULL]$$

b. Slash Termination Metarule 2 (STM2)

$$X \dashrightarrow W,\ VP^2[+SUBJ,\ FIN] \quad ===> \quad X/NP \dashrightarrow W,\ VP^2[-SUBJ]$$

STM1 says roughly that any ID rule that introduces a Bar-2 category and some other categories has a corresponding rule in which that Bar-2 category contains the feature [+NULL]. STM2 has the effect that any ID rule that introduces a sentential complement has a corresponding rule in which a VP takes the place of that sentential complement and SLASH[NP] is introduced on the mother node.

One of the constraints assumed as central to the current formulation of GPSG theory is that metarules apply only to lexical ID rules to yield lexical ID rules. Thus, being metarules, STM1 and STM2 can apply only to lexical ID rules, i.e., those introducing lexical heads. Consequently, STM1 may apply only to rules like those in (32), yielding the rules in (33). Each of the rules in (33) is necessary to license the bracketed part of the corresponding example, where the effect of the FFP is ignored.[84]

(32) a. VP --> H[2], NP
b. VP --> H[5], NP, NP
c. VP --> H[6], NP, PP

(33) a. VP --> H[2], NP[+NULL]

Which book did Bill say that Sandy [VP bought ____]?

b. VP --> H[5], NP[+NULL], NP

Which girl did you [VP give ____ a ticket]?

c. VP --> H[6], NP, PP[+NULL]

On which table did you [VP put the book ____]?

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84 In GKPS, every [+NULL] category contains a SLASH specification due to a FCR. I will discuss this and related issues later in this section.

But STM1 may not apply to rules like those in (34) to yield the rules in (35), since both of the rules are non-lexical rules. This correctly predicts that the corresponding examples are ungrammatical.

(34) a. S --> NP, VP
b. NP --> NP[+POSS], N'

(35) a. *S --> NP[+NULL], VP

*Who do you think that [$_S$ ____ married Bill]?

b. *NP --> NP[+POSS, +NULL], N'

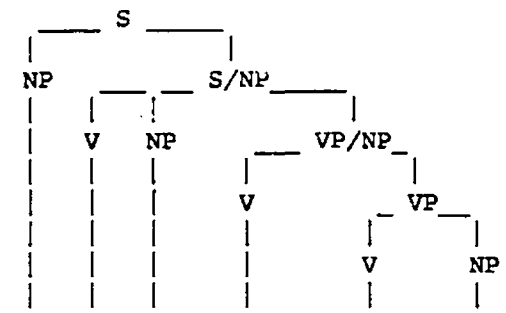
*Whose student's did you see [$_{NP}$ ____ wife]?

Thus, subject extraction is generally impossible in English since the subject of an English sentence is not introduced by a lexical ID rule. However, this also rules out grammatical sentences like the following, where a gap does occur in the subject position, in contrast to those like (35a) above.

(36) Who do you think [$_S$ ____ married Bill]?

For cases like this, STM2 must be posited for licensing the relevant structures. Thus, a structure like (37) can be licensed through STM2 for (36).

(37)



STM2 may not apply to the rule S' --> COMP, S, which introduces a clause with an overt complementizer, since this rule is not assumed to be a lexical ID rule and thus a metarule cannot apply. This distinguishes sentences like (35a) from those like (36), predicting the ***that***-trace effect. Thus, given the restriction that metarules may only apply to lexical ID rules, only the sister of a lexical head or the subject of a sentential complement which is the sister of a lexical head may be assigned the feature [+NULL] and therefore may be an empty category. Consequently, as Hukari and Levine (1987) note, the grammar effectively captures a strong version of the Empty Category Principle (Chomsky 1981).

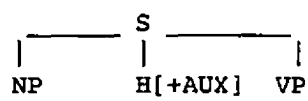
The slash termination operation given in GKPS is quite compatible, by applying STM1, with the cases in Chinese in which extraction from object position is generally possible; it also correctly accommodates, by applying STM2, the fact that a subject can be freely extracted out of a sentential complement, since Chinese in general does not use an overt lexically-filled COMP to introduce sentential complements to verbs, as discussed before and shown by the following example:

(38) Lisi$_i$, Zhangsan renwei t$_i$ bu-hui xihuan neiben shu.
Lisi Zhangsan think won't like that book
'Lisi, Zhangsan thinks ____ won't like that book.'

However, as indicated in the previous chapter, subject extraction is possible not only out of sentential complements but also out of embedded clauses of other types such as sentential subjects and relative clauses. In fact, extraction from subject position is possible as much as extraction from object position in Chinese. Though STM2 may apply to terminate a Slash category in the subject position of a sentential complement, it cannot apply to introduce empty categories in subject positions of sentential subjects and relative clauses, simply because sentential subjects and relative clauses are normally not licensed by lexical rules. Obviously, the fact that no subject-object asymmetry exists in Chinese with respect to the position in which an empty category may occur poses a problem for the Lexical Head Constraint on metarules, and therefore a problem for the theory of Slash termination.

It seems that there are two possible ways to approach this problem. One way is to maintain the Lexical Head Constraint and assume that the subject of a sentence is introduced by a lexically headed ID rule, with appropriate LP statements, yielding a structure like the following:[85]

(39)



This assumption correctly predicts that extraction from subject position is always possible since now subject is a sister of a lexical head as object is. Thus, STM1 may apply equally in both of the cases. However, this approach suffers from

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85 Clearly, this structure is similar to what is assumed in GB theory.

essentially the same problem as Huang's (1982) proposal, discussed in section 2, chapter 3. In order to account for the fact that subject extraction is possible even if there is no overt AUX category in the relevant sentence, one needs to assume that subjects are always introduced by a lexical ID rule and there should always be an AUX category as the lexical head of the ID rule in question though AUX may or may not have substantial material. This assumption provides the possibility that STM1 may always be able to apply. This, however, leaves the fact unexplained that VP extraction, as indicated in section 2, chapter 3, is possible only if there is an overt AUX category in the sentence in question as shown by the examples repeated below:

(40) a. *Shuo zhexie hua$_i$, wo nande [$_{VP}$ t_i].
say these word I seldom
*'Say these words, I seldom ____.'

b. Shuo zhexie hua$_i$, wo bu gan [$_{VP}$ t_i].
say these word I not dare
'Say these words, I don't dare ____.'

Given a structure like (39), VP extraction should be always as possible as subject is, since VP is equally a sister of the lexical head AUX.[86]

Furthermore, even if the lexical head requirement for slash termination is tenable in one way or another, it is still not adequate to account for the relevant extraction cases in Chinese. As discussed in the previous chapter, on the one hand, Chinese allows subject extraction though the subject might not be the sister of a lexical head; on the other hand, Chinese does not allow extraction of complements of prepositions or adjectives, nor extraction of any peripheral elements from

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86 Assuming (39) as the Chinese sentential structure may lead to some unnecessary complication of the word order generalizations in this language, which will be discussed in the following section.

noun phrases even though these categories may be the sisters of the lexical heads of the constituents in question. Clearly, the Lexical Head Constraint fails to capture the relevant generalization about the set of ID rules to which STMs may apply and thus the positions in which empty categories may occur in Chinese. The relevant generalization seems to be: an empty category will always be the sister to a verbal category -- phrasal or lexical -- which is the head of the constituent. This idea can be accomplished by imposing the following constraint on grammar of Chinese:

(41) Slash termination metarules apply only to those ID rules which introduce verbal heads.

This seems to be the constraint on slash termination relevant to Chinese, rather than the Lexical Head Constraint.[87]

The need to parameterize the Lexical Head Constraint is not just exhibited in Chinese; it is also exhibited in other languages. Maling and Zaenen (1982) present perfectly acceptable examples from Icelandic in which a subject NP immediately following a complementizer is extracted, as shown by the following:

(42) Þetta er maðurinn, sem þeir segja að ____ hafi
this is the-man, that they say that ____ has
framið glæpinn.
committed the-crime.

Clearly, STM1 may not apply in cases like this, since the rule responsible for expanding the subject will not be a lexical rule. STM2 may not apply either, in that the relevant rule introducing a sentential complement is not a lexical rule any

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87 Whether there are other constructions which require metarule analysis is a question beyond the scope of this dissertation. I leave it open what would be the relevant constraints which might be needed for the application of other metarules in Chinese.

more with the presence of a complementizer. Similar examples may also be observed in Norwegian, such as (43), cited by Pollard (1985) originally from Engdahl (1984).

(43) Desse konstruksjonar trur eg at ____ er meir naturlege
these constructions think I that ____ are more natural
uttrykksmåtar.
expressions.

Given the restriction stated in (41), STM1 now may apply to both of the rules in (44i), yielding the corresponding rules in (44ii). But STM1 may apply to neither of the rules in (45i), yielding the rules in (45ii), since neither of them is a rule introducing a verbal head.

(44) i. a) VP --> H, NP
b) S --> NP, H

ii. a) VP --> H, NP[+NULL]
b) S --> NP[+NULL], H

(45) i. a) NP --> NP[+POSS], H
b) AP --> H, VP

ii. a) *NP --> NP[+POSS, +NULL], H
b) *AP --> H, VP[+NULL]

Note that though the application of STM1 to the rules in (45) is impossible due to the restriction of (41), nothing prevents STM1 mapping a rule like (44ib) into a corresponding rule where the head category VP contains the feature [+NULL], since the rule is a verbally headed ID rule and either of the two daughter constituents in the rule is a Bar-2 category. This is undesirable, since VP extraction is not allowed

unless there is an overt auxiliary verb and the VP is the complement of the auxiliary verb (cf. examples in 40). Following GKPS, I propose here that auxiliary verbs take VPs as complements, as in the following ID rule: VP[+AUX] --> H, VP. Cases in which the head category contains the feature [+NULL] can be eliminated by slight modification of STM1. Informally, the modified STM1 may be stated as the following, where the feature specification [-H] is used tentatively to denote a non-head category:

(46) STM1 (a preliminary version for Chinese)

X --> W, X^2[-H] ===> X --> W, X^2[+NULL]

Before proceeding to the next section, I would like to mention one issue concerning the proper formulation of STM1. Recall that I assume that there is a FCR: PP ⊃ ¬[SLASH] in the grammar of Chinese, which says that if it is a category PP, then it doesn't contain SLASH. In other words, the grammar does not allow PP to have any subconstituent "missing". However, given the version of STM1 found in GKPS, the FCR: PP ⊃ ¬[SLASH] will block not only the extraction of PPs but also that from PPs. Though the prohibition of extraction from PPs is well-motivated, a corresponding prohibition of extraction of PPs has much less motivation.[88] Before

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88 It is not clear that what is the relevant restriction on the distribution of Chinese PPs. The following examples seem to show that the extraction of PP is not allowed, where the PPs are subcategorized constituents. See Zhang (1990) for the discussion of the prepositional status of the lexical item *gei* in (ii) below.

(i) *Yu Zhangsan$_i$, neijian shi t_i wugan.
with Zhangsan that thing no-relation
*'With Zhangsan, that has nothing to do ____ .'

(ii) *Gei Lisi$_i$, Zhangsan song le yiben shu t_i.
to Lisi Zhangsan give ASP one book

the distribution of PPs in Chinese is sorted out, I would like to maintain the possibility for the extraction of PPs, which seems plausible cross-linguistically, as opposed to extraction from PPs. There is a way in which extraction of PPs and that from PPs can be naturally distinguished. Hukari and Levine (1987) suggest a reformulation of STM1, which is stated as follows:

(47) STM1 (cf. Hukari and Levine 1987, p. 207):

$$X \dashrightarrow W, \alpha \quad ===> \quad X/\alpha \dashrightarrow W, e$$

Here the variable α is restricted to Bar-2 categories and the symbol *e* denotes a syncategorematic terminal. In the output ID rule, the mother category contains a SLASH specification as an inherited feature and accordingly the daughter category which is missing contains no SLASH at all and thus no longer has the form α[+NULL]/α. The same idea seems also possible to be stated in a slightly different form:[89]

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*'To Lisi, Zhangsan gave a book ____ .'

However, other PPs may have a freer distribution, as shown by the following examples, where the PP is also a subcategorized constituent.

(iii) a. Zhangsan fang le yiben shu zai zhuoshang.
Zhangsan put ASP one book on table-up
'Zhangsan put a book on the table.'

b. Zhangsan zai zhuoshang fang le yiben shu.
Zhangsan on table-up put ASP one book

c. Zai zhuoshang Zhangsan fang le yiben shu.
on table-up Zhangsan put ASP one book

In this case, it is unclear which position should be assumed as the position subcategorized by the verb. In this dissertation, I am not going to discuss the relevant issues.

89 Hukari and Levine (1987) point out that STM1 stated with Y (or Y^2) instead of a

(48) STM1 (cf. Jacobson 1987, p 403):

X --> W, Y ===> X/Y --> W, Y[+NULL]

Either of the forms achieves the effect that the grammar distinguishes the categories which are extracted (gaps) from those which contain elements being extracted. As a result, the FCR: PP ⊃ ¬[SLASH] will not block extraction of a PP since the empty category carries no SLASH.[90] In view of this, I assume the formulation of STM1 as stated in the following:

(49) STM1 (a revised version for Chinese)

X --> W, α[BAR 2, -H] ===> X/α[BAR 2] --> W, e

The need to distinguish constituents containing gaps and constituents which are gaps themselves is quite general not only in Chinese but also in English and other languages. Consider the contrast in the following English sentences.

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variable may not guarantee that the gap and the extracted category match since Y (or Y^2) is merely an underspecified category.

90 The interesting result is that this FCR prevents the extraction from PPs (or a clause introduced by a preposition), while allowing topicalization locally. Consider the contrast in the following examples:

(i)a. *Zhangsan$_i$, zhe [gen [$_S$ Lisi bu xihuan t_i]] wu guan.
this with not like no relation
*'Zhangsan, this has nothing to do with Lisi's not liking ____ .'

b. Zhe [gen [$_S$ Zhangsan$_i$, Lisi bu xihuan t_i]] wu guan.
this with not like no relation
*'This has nothing to do with Zhangsan, Lisi's not liking ____ .'

(ia) involves the extraction out of PP and therefore violates the FCR: PP ⊃ ¬[SLASH], but (ib) does not have such a violation.

(50) a. Which student did you believe ____ to have seen Jane?

b. *Which student did you believe friends of ____ to have seen Jane?

(51) a. Which girl did you persuade ____ to let Bob accompany her?

b. *Which girl did you persuade friends of ____ to let Bob accompany her?

The structural difference between the sentence in (a) and that in (b) of both (50) and (51) is that the object of the main verb in sentence (a) is a gap but the object of the main verb in sentence (b) is a constituent containing a gap. Such difference shows a grammatical contrast in the relevant sentences. In short, the distribution of constituents containing gaps is not the same as the distribution of gaps themselves, as generally agreed in the literature.[91]

Furthermore, the version of the Slash termination mechanism proposed in GKPS requires additional stipulations to guarantee correct connectivity at the bottom of the tree. For instance, STM1 in GKPS in itself does not guarantee that a [+NULL] category contains a Slash specification and thus has no guarantee that the value of SLASH on the mother node will match the category of the empty string. In response, GKPS posits a FCR: [+NULL] ⊃ [SLASH] to ensure that every [+NULL] category contains a SLASH specification. In order to guarantee that the value for SLASH on the mother matches the category of the gap, GKPS assumes that the terminal category which permits the empty string *t* has the form α[+NULL]/α. Then by FFP it follows that whatever Slash specification is instantiated on a [+NULL] daughter is also instantiated on its mother. In contrast, the version of

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91 See Hukari and Levine (1987) for a detailed discussion and more examples concerning parasitic gap constructions in English, motivating the distinction between gaps and categories containing gaps, and also see Sells (1984) and Jacobson (1987) for related discussion.

STM1 like that in (49), as Jacobson (1987) points out, simplifies the analysis by dispensing with, at least, the need for the FCR requiring [+NULL] to co-occur with SLASH.

4.4 Linear Precedence Rules

As briefly indicated in section 4.1, GPSG theory is defined in ID/LP format. ID rules specify the constituent relation between the mother and daughter categories but do not imply any particular linear order among sister categories. Linear order is treated separately by LP rules. The motivation for adopting ID/LP format rather than the traditional phrase structure format is largely that the traditional formulations of phrase structure grammars fail to express generalizations about linear order that natural languages exhibit. In a phrase structure, as is well-known, there are two distinct relations among syntactic categories: the immediate dominance relation between the mother category and the daughter categories, and linear precedence relations among sister categories. Traditionally, these two types of relations among categories were jointly encoded in PS rules, as shown by the following two PS rules.

(52) a. S --> NP VP
b. VP --> V NP

(52a) says that S immediately dominates NP and VP, and NP linearly precedes VP. (52b) says that VP immediately dominates V and NP, and V linearly precedes NP. However, it has been long observed that linear order is not an idiocyncratic prop-

erty of individual grammatical rules. Ordering relations among sister categories exhibit regularities in many languages. For instance, it is well-known that in English the lexical head is always initial in verbal phrases as shown by the familiar structures in (53).[92]

(53) a. VP --> V + NP
b. VP --> V + NP + PP
c. VP --> V + NP + VP
d. VP --> V + S'

A grammar that states the ordering in each of these rules clearly fails to express an important generalization about English.

Many languages in the world have rather free sequential order among categories. For instance, in Latin the major constituents of a simple subject-verb-object sentence can occur in any order, as shown by the structures below:

(54) a. S --> NP_S + V + NP_O
b. S --> NP_S + NP_O + V
c. S --> V + NP_S + NP_O
d. S --> NP_O + V + NP_S
e. S --> NP_O + NP_S + V
f. S --> V + NP_O + NP_S

In the structure above, NP_S stands for the subject NP and NP_O stands for the object NP. Assuming the traditional PS rule format, the structures above require six individual rules, where the immediate dominance relation and linear precedence relation is stated in each of the rules. Sells (1985) notes that if immediate dominance and linear precedence are treated separately in an ID/LP format, the six Latin structures can be expressed in terms of a single ID rule like that in (55), where the

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92 Assuming hierarchical structures, linear order pertains only to cases where the categories are sisters.

commas indicate that the categories are unordered with respect to each other.

(55) S --> V, NP, NP

In the Latin case above, since the order of constituents is not relevant, it is clearly not appropriate to encode such information in grammatical rules. Thus, it is quite plausible to assume an ID/LP format (as opposed to PS format) for stating syntactic structures.

In the ID/LP theory proposed in GPSG, the set of expansions of any one category observes an ordering that is also observed by the expansions of all other categories. In other words, if there is a LP rule A < B in the grammar, it will always be expected that A precedes B in local trees and this precedence relation holds for A and B regardless of the category from which A and B are expanded through an ID rule. As a consequence, the theory predicts that there is an Exhaustive Constant Partial Ordering (ECPO) in a given language, which seems motivated in view of the word order phenomena found in English. As mentioned above, in English the lexical head is always initial in verbal phrases. In fact, it seems that in English lexical categories precede their phrasal sisters categories across all constituents, regardless of category types, as shown by the structures in (56), in addition to the structures in (53) above.

(56) a. N' --> N + PP
b. N' --> N + S
c. A' --> A + PP
d. A' --> A + S
e. A' --> A + VP
f. PP --> P + NP

Now consider the word order in Chinese.[93] The most basic phrase structures in Chinese are shown as below (cf. the discussion in chapter 2):

(57) Non-lexical structures:

a. S --> NP + VP
b. S --> NP + S
c. S --> VP + S
d. VP --> ADVP + VP
e. VP --> PP + VP

f. NP --> S + NP
g. NP --> VP + NP
h. NP --> AP + NP
i. NP --> PP + NP
j. AP --> ADVP + AP
k. PP --> ADVP + PP

Lexical structures:

l. VP --> V + XP
m. VP --> V + NP + PP
n. VP --> V + S
o. VP --> V + NP + S
p. AP --> A + VP
q. PP --> P + NP
r. NP --> DET + N

Before getting into the discussion, let me briefly comment on certain facts about the structures above. (57b) and (57c) refer to topic constructions. Since NP and VP are the most common categories which may occur as topics, I will concentrate on these two cases.[94] (57f), (57g), (57h) and (57i) describe the structures of NPs. As indicated in chapter 2, NPs in Chinese can consist of a head noun plus other modifying elements, which, immediately followed by a modifier marker ***de***, always occur before the head noun, and phrases of almost all category types may

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93 An earlier version of this section was presented in Xue (1991).

94 It can be shown that the possibility of other categories occuring as topics is not crucial to the analysis.

be used as prenominal modifiers. When a VP is used to modify a head noun, it can be regarded as a relative clause. An NP may also be modified by a clause, which may be a relative clause or an NP complement clause. Furthermore, the head of a Chinese complex NP (containing either a relative clause or an NP complement clause) is a phrasal category rather than a lexical category. Thus, the (local) constituent structures of Chinese in one way or another include the patterns in which S (or VP) precedes NP (cf. (57f)-(57i)), where I ignore some details which will be discussed later.

In view of the structures given in (57), the formal advantages of ID/LP format seem less apparent for Chinese, compared with languages such as Latin, which allow considerable degrees of word order freedom. An ID/LP grammar needs additional statements to express the generalizations about the linear order but will not drastically reduce the number of grammatical rules for a language like Chinese that relies heavily on word order to convey syntactic information. However, parallel to the situation for English, for Chinese there is at least one point that strongly motivates an ID/LP grammar. An ID/LP grammar, but not a PS grammar, may express the relevant generalization of word order in Chinese, while predicting that no structures like those in (58) will be expected to exist in Chinese:

(58) a. S --> VP + NP
b. VP --> NP + V
c. VP --> NP + V + PP
d. NP --> NP + S

Given the structures in (57), however, it seems that the relevant structures in Chinese exhibit a non-ECPO property, since the set of expansions for a given category are closed under a (partial) ordering that is not constant for the expansions of all categories. Consider the following pairs:

(59) a. S --> NP + VP
b. S --> NP + S

c. NP --> VP + NP
d. NP --> S + NP

The structure in (59a), for instance, seems to motivate a LP rule like (60), but this is contradicted by the structure in (59c).

(60) NP < VP

In fact, each of the two structures seems to motivate one LP rule, which is conflicting with the other. If so, both of the structures would be impossible since either of the structures would violate one LP rule. Thus, the set of structures cannot be directly converted into an ID/LP grammar.

The important generalizations about the word order in Chinese, as discussed in chapter 2, can be characterized straightforwardly: it is head-final at the phrasal level for all the major category types, while it is head-initial at the lexical level for all the major category types except for the expansion of NP, where the head-final rule applies (cf. Huang 1982). These generalizations can be observed clearly from the structures in (57). This seems to suggest that the notion of H(ead) is essential to stating the generalizations of the linear order in Chinese. By incorporating the notion of H, Chinese constituent structures can be expressed in ID/LP format with LP rules like those in (61).

(61) a. X < H[¬SUBCAT]

b. H[SUBCAT, ¬N] < X

Unfortunately, the LP rules in (61) cannot be formulated under the definitions given in GKPS, where LP rules are statements of linear order among categories, (i.e., feature specifications), and the symbol H is not a feature specification. According to GKPS, a constituent structure is LP-acceptable if and only if it contains no daughter categories that are respective extensions of the categories specified in a LP rule and the linear order exhibited by them does not violate the LP rule. Thus, LP rules in GKPS are not sensitive to the notion of H. A potential argument unfavorable for the use of H in LP rule is, as Shieber (1984) points out, that the symbol H as defined in Gazdar and Pullum (1981) and GKPS will extend the expressive power of ID/LP formalism and allow certain non-ECPO grammars to be encoded. Consider the grammar in (62), which is non-ECPO:

(62) a. A' --> B A
b. C' --> A B C
c. C' --> B A C
d. C' --> B C A

By incorporating the notion H, this non-ECPO grammar can be sufficiently stated in an ID/LP grammar as in (63), since the syntactic category represented by H may change from one ID rule to another.

(63) i. a. A' --> B, H
b. C' --> A, B, H

ii. a. B < H

As shown above, the same is true of the word order facts in Chinese. Though the relevant Chinese structures show an non-ECPO property, they can be stated in an ID/LP grammar by incorporating the notion H in the formulation.

Now there are two options. One is to return to encoding constituents and linear order in PS rules for Chinese, which is certainly undesirable for reasons discussed earlier. The other is to incorporate the notion of H in the formulation of an ID/LP grammar, but this requires redefinition of LP rules in the grammar.

One possible way out of the dilemma is to distinguish categories according to the grammatical functions that the categories in question perform in the relevant constituent structures. Consider again, for instance, the structures in (59), repeated in (64), which show conflicting word order.

(64) a. S --> NP + VP
b. S --> NP + S

c. NP --> VP + NP
d. NP --> S + NP

With respect to these structures, there seem to be two ways in which one may characterize the linear order of the daughter categories. One way is to look at the relation between the mother category and the daughter categories. As indicated earlier, a non-head category precedes a head category, regardless of the category types of the constituents in question. The other way is to distinguish categories by marking those which function as modifiers. An important difference between the structures in (64a-b) and those in (64c-d) is that the structures in (64a-b) are expansions of S and the daughter VP and S are head categories functioning as predicates, while the structures in (64c-d) are expansions of NP and thus the daughter VP and S are non-head categories functioning as modifiers. In fact, constituents functioning as modifiers in a structure are syntactically different from those functioning otherwise, regardless of their major category types. This is not

just because modifying elements in Chinese show a peculiar linear precedence, constantly preceding the head they modify, but more importantly that constituents functioning as nominal modifiers are in general marked by the particle ***de***, which denotes various modifying relations of the modifying elements to the head NP, as has been discussed before. For this reason, one may assume that categories that function as nominal modifiers in ID rules are specified as [+DE]. Thus the structures in (64) can be restated as those in (65).

(65) a. S --> NP + VP
b. S --> NP + S

c. NP --> VP[+DE] + NP
d. NP --> S[+DE] + NP

Accordingly, the relevant ID rules may be stated as in (66).

(66) a. S --> NP, VP
b. S --> NP, S

c. NP --> VP[+DE], NP
d. NP --> S[+DE], NP

It is possible now to state the relevant linear order generalization in the form of a LP rule:

(67) XP[+DE] < NP

Clearly, a LP rule roughly like the following is also needed to express the linear precedence facts of the structure in (65a-b). Thus, one may formulate LP rules in which the head-final character is not expressed directly, but is gleaned individually from the facts that NP precedes VP and a modifier precedes NP.

(68) NP < VP

Note, however, that the LP rules in (67) and (68) do not yet solve the problem of the ordering conflicts. According to GKPS, a constituent structure is LP-acceptable if and only if it contains no daughter categories that are extensions of the categories specified in a LP rule and the linear order exhibited by the daughter categories does not violate the LP rule. The violation of one LP rule is enough to rule out the structure. The problem now is that though the structures in (65a-b) may be LP-acceptable with respect to the LP rule in (67), the structures in (65c-d) will be ruled out by (68) since the daughter categories are extensions of the categories specified in the LP rule (68) and the ordering of the daughter categories violates the ordering specified by the LP rule.

Furthermore, I have said nothing so far that prevents free instantiation of the feature [DE] on non-modifying elements though there is no motivation at all for such an instantiation. This can be accomplished by means of Feature Specification Defaults. I would like to propose that the default specification for DE is that the DE specification is unspecified. This means that a category must lack a DE specification unless it is required by rules or principles. The relevant FSD can be stated as follows:

(69) FSD: ¬[DE]

The feature specification [+DE] (or [-DE]) will be introduced only through ID rules, e.g., (66c-d). Thus, if nothing is mentioned by any principles or rules, a category will not contain specifications for the feature [DE], according to the approach to defaults adopted in GKPS. Now with a slight modification, the two LP rules introduced in (67) and (68) can be restated as in (70):

(70) a. XP[+DE] < NP

b. NP < VP[¬DE]

Given this, the structures associated with the rules in (65c–d) no longer violate the LP rule in (70b), since the daughter categories associated with the rules in (66c–d) will never be unifiable respectively with the categories specified in the LP rules.

Besides the two LP rules in (70), one could add three more LP rules that correspond to the linear order facts reflected in the structures in (58). Thus, without resorting to the notion H, the LP rules necessary for Chinese would be like those in (71).

(71) a. XP[+DE] < NP

b. NP < VP[¬DE]

c. [SUBCAT, ¬N] < ¬[SUBCAT]

d. {PP, ADVP} < {VP, AP}

e. ADVP < PP

This set of LP rules covers, for the most part, the linear order facts in Chinese. However, the LP rules in (71) are inadequate. One of the potential problems concerns topic constructions. As mentioned earlier, other types of phrases (e.g., VPs) as well as NPs may also occur in sentence initial position. Assuming a general rule like S --> XP, S for the constituents of the relevant structures, nothing so far proposed in the grammar ensures that the XP always precedes the S.[95] Of course, one might be able to invoke a LP rule like [+TOP] < [-TOP]. Here I am not going to discuss the argument for or against such an LP rule and the related features, nor explore further the possibility for this direction. The point is that assuming a set of

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95 Assuming S as an instance of VP, the LP rule NP < VP has the effect of blocking a linear order like S < NP.

context-free rules, one can always encode such a set of rules in an ECPO ID/LP grammar, as noted in Shieber (1984). However, to encode a set of non-ECPO structures in ECPO ID/LP format seems bound to increase the number of syntactic features and LP rules in the grammar.

In contrast, the correct linear order with respect to topic constructions is straightforwardly ensured by the LP statements in terms of the notion of H(ead) that it is head-final at the phrasal level, as stated in (62) and repeated in (72).[96]

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96 It should be pointed out that some word order phenomena in Chinese seem to posit problems for the set of LP rules in (72) as well as the LP rules in (71). Though Chinese is generally head-initial at the lexical level, sentences like the following seem to be counterexamples to this generalization.

(i) Neijian shi [VP [PP yu Zhangsan] wuguan].
that-CL thing with Zhangsan no-relation
'That has nothing to do with Zhangsan.'

In this structure, the PP is subcategorized by the verb ***wuguan*** 'have-no-relation'. This seems to indicate that the relevant local structure is one in which the PP precedes the V (i.e., VP --> PP + V). Note that though it is generally agreed that the PP is subcategorized by the verb, the relation between the PP and the V is looser than the one found between a verb and a subcategorized complement, since one may always insert an adverb between the PP and the verb as the following example shows:

(ii) Neijian shi [VP [PP yu Zhangsan] wanquan wuguan].
that-CL thing with Zhangsan at-all no-relation
'That has nothing to do at all with Zhangsan.'

This may be a piece of evidence suggesting that the string ***wuguan*** 'have-no-relation' is not a lexical constituent, but rather a phrasal constituent, probably a V'. This seems plausible, following the general assumption that adjunction is possible only at the phrasal level. In fact, it is generally assumed that adjunction is possible only to a maximal projection (i.e., XP). However, there is also some discussion of adjunction to X', such as in Fiengo and Higginbotham (1981), who argue for QR-adjunction to N'. The point here is that the possibility of adjunction to the string ***wuguan*** 'have-not-relation' may indicate that it is not a lexical category. If this is correct, the fact that the PP precedes the string ***wuguan*** 'have-no-relation' follows from the generalization that the linear order is head-final at the phrasal level or that PP precedes VP or V'. Thus, the example actually poses no problem for either of the formulations of the LP

(72) a. X < H[¬SUBCAT]

b. H[SUBCAT, ¬N] < X

Given the discussion above, it seems clear that though an ECPO ID/LP grammar is possible for Chinese, one can hardly say that the LP rules stated in (71) have captured the relevant generalizations in a most straightforward and natural way, even though they are technically consistent with the definitions of LP statements given in GKPS. This indicates that something has to be given up. One can either insist on the ECPO property in the formulation of an ID/LP grammar by invoking more syntactic features and LP rules, or accept the notion of Head in the formulation of an ID/LP grammar without worrying about the ECPO property.

If the analysis above is correct, it seems to favor the latter approach. Certain cases from other languages also seem to have the same implication. One of the well-discussed cases is the word order phenomena in German. According to Uszkoreit (1987), the word order in German requires that LP rules be organized disjunctively. Each appropriate pair of daughter categories in a given constituent structure is LP well-formed if the order among them satisfies one of the LP rules. Thus, one LP rule may override another. This virtually gives up the ECPO property in the formulation of an ID/LP grammar for German. The point is that an adequate grammatical theory for a natural language should be not only formally restrictive but also linguistically well-motivated. In short, while ID/LP theory provides a powerful tool for expressing linear order generalizations, for languages such as Chi-

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rules so far discussed. It should be noted here that if a subcategorized constituent may not be a sister to the lexical head, i.e., the verb, this will pose potential problems for the GKPS treatment of subcategorization. I will not discuss this topic in this dissertation. See examples about *bǎ*-constructions in chapter 2 and footnote 103 in chapter 5 for related issues.

nese which rely heavily on word order to convey syntactic information, the insistence on an ECPO property in the formulation of an ID/LP grammar could be as inefficient and unintuitive as a PS approach to languages with various degrees of linear order freedom.

Chapter V

A PHRASE STRUCTURE ANALYSIS OF CHINESE ANTECEDENT-GAP DEPENDENCIES

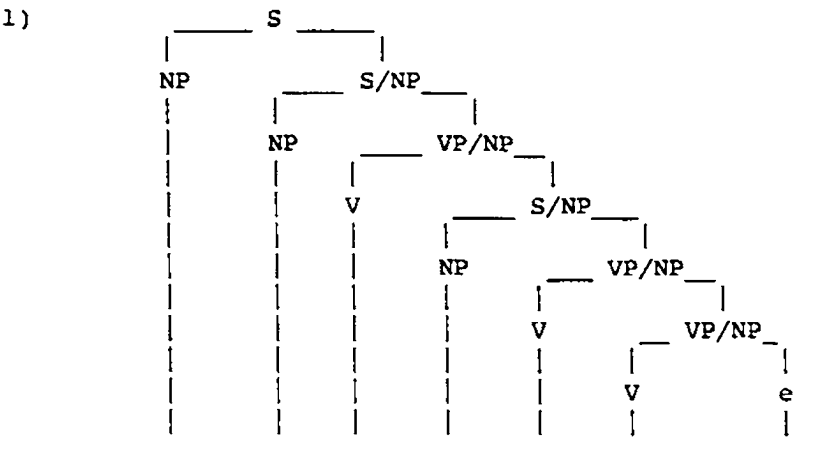
In the preceding chapter, I briefly reviewed the current framework of GPSG, and discussed fundamental issues in view of the basic facts of Chinese antecedent-gap dependencies. The discussion suggests, inter alia, that SLASH is a foot feature but not a head feature in Chinese, and the Slash termination metarules apply to verbally-headed ID rules in this language (instead of lexically-headed ID rules as in English). This chapter demonstrates how the ideas presented so far operate in the representation of a phrase structure analysis of antecedent-gap dependencies in Chinese. Earlier in this dissertation I noted that extraction phenomena in Chinese involve two independent notions, that is, the extraction position and extraction domain. Empty categories may occur only in those positions which are closely related to the head of the construction in question, and empty categories may be extracted only out of certain structural domains largely depending on language-specific properties. In the following, I will show that these generalizations can be conveniently expressed in the framework of GPSG, where the Foot Feature Principle, Slash Termination Metarule and Feature Cooccurrence Restrictions play crucial roles, jointly determining the distribution of empty categories. I argue that in cases of Chinese topicalization, extraction is possible if and only if

the structure satisfies the Foot Feature Principle and the restriction on Slash termination that the STM applies only to verbal ID rules, in addition to other principles and rules of the grammar. Accordingly, a Chinese empty category must be not only properly associated with its antecedent but also closely connected with the head of the construction in question. It will also be shown that the application of the Slash Termination Metarules needs to be further constrained. The analysis proposes that the difference between complex NPs containing relative clauses and those containing NP complement clauses in terms of extraction is attributable to a universal principle, i.e., the Proper Inclusion Principle.

5.1 Sentential Complements and Sentential Subjects.

The simplest case of topicalization involves a simple sentence in which the NP that is subcategorized by the verb as the object occurs in the topic position. The well-formedness of such sentences in GPSG is straightforward, and similar to the simplest cases of English unbounded dependency constructions, and thus needs no further comment. An NP can also be topicalized from the object position of an embedded complement clause. The situation for these cases is also quite straightforward. Consider the structure in (1) below.

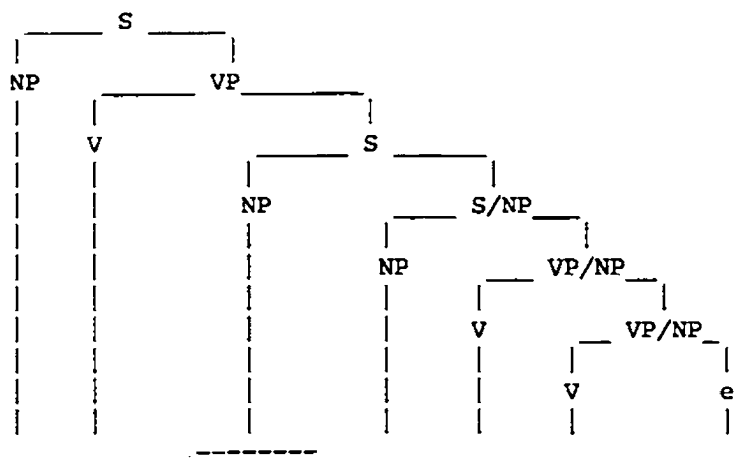
(1)



Neiben shu, wo renwei Lisi buhui xihuan t.
that book I think Lisi won't like
'That book, I think that Lisi won't like ____ .'

Parallel to the structure for a simple sentence involving topicalization, the feature SLASH in the topmost and the bottommost local trees is inherited from the relevant ID rules (i.e., the unbounded dependency introduction rule and STM1) respectively, while SLASH in all the other local trees is instantiated. Each of the local trees in (1) satisfies the FFP, and by applying the version of STM1 proposed for Chinese, the empty category *e* at the bottom of the structure can be successfully licensed since the category is the sister of the head V (satisfying the requirement for the application of the verbally-constrained STM). Thus, the grammar correctly predicts that (1) is well-formed. It also predicts, correctly, that (2) is well-formed as well, where the topic is located at the top of the embedded clause instead of the matrix clause.

(2)



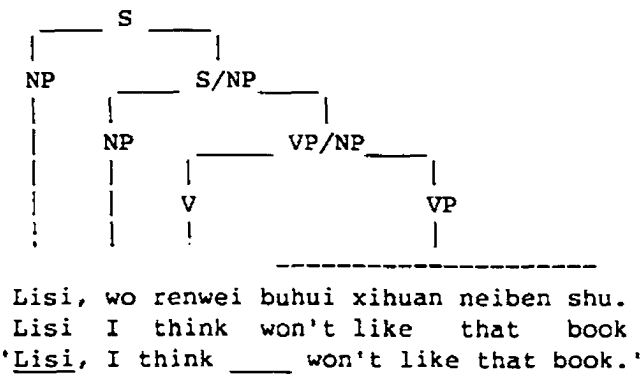
Wo renwei neiben shu, Lisi buhui xihuan t.
I think that book Lisi won't like
'I think that that book, Lisi won't like ____ .'

Now consider the cases involving a subject NP topicalized from a sentential complement clause. As mentioned earlier, Chinese in general does not use an overt lexically-filled COMP to introduce sentential complements to verbs; a subject as well as an object can be quite freely extracted out of a sentential complement clause and the extraction may cross two or more than two S nodes.

(3) Lisi$_i$, wo renwei t_i buhui xihuan neiben shu.
Lisi I think won't like that book
'Lisi, I think ____ won't like that book.'

According to the organization of GKPS, for sentences like (3), STM2 applies instead of STM1. Given STM2 with the relevant ID rules, the grammar will assign a structure like (4) for (3).

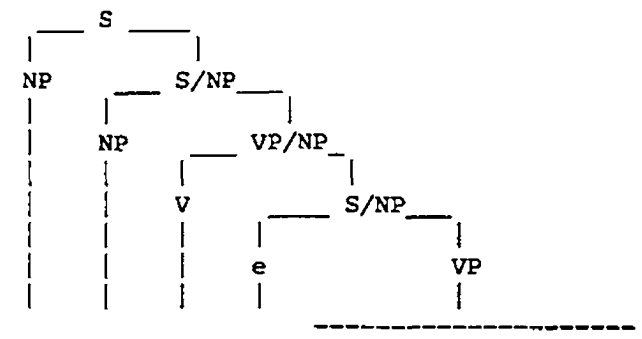
(4)



Lisi, wo renwei buhui xihuan neiben shu.
Lisi I think won't like that book
'Lisi, I think ____ won't like that book.'

Since the SLASH on the topmost VP is introduced by STM2 in the local tree in which the VP is the mother node, the FFP will not require SLASH to occur on a daughter node in that local tree. Thus, the grammar predicts correctly that sentences like (3) are grammatical. However, as indicated in previous chapters, Chinese allows subject extraction as well as object extraction not only from sentential complements but also from other sentential constructions, which may not be the sisters of a lexical head. Besides, Chinese does not seem to allow any extraction of the complement of a non-verbal head (lexical or phrasal). I have suggested that STMs apply to those ID rules which introduce verbal heads. Note that given the formulation of STM1 proposed in section 3, chapter 4, the well-formedness of sentences like (3) may also be sanctioned through application of STM1, since with respect to the relevant ID rules, a subject is the sister of a verbal head as is an object. Thus, structures like the following are licensed:

(5)



Lisi, wo renwei t buhui xihuan neiben shu.
Lisi I think won't like that book
'Lisi, I think ____ won't like that book.'

The possibility of deriving well-formed structures for sentences like (3) in two different ways is apparently a kind of redundancy which should be eliminated. With the assumption of the verbal head restriction instead of the lexical head constraint, STM1 may license gaps in subject position in addition to gaps in object position, and hence STM2 becomes unnecessary for Chinese.

Some cases in Chinese, however, seem to exhibit the *that*-trace effect, thus favoring the existence of STM2 in the grammar. There is a type of complement known as "resultative" clauses. A resultative complement occurs to the right of a verb, introduced by the element *de* as shown in (6):

(6) Zhangsan xiao de dajia mominqimiao.
Zhangsan laugh COMP everyone confused
'Zhangsan laughed so much as to make everybody confused.'

As noted in chapter 2 (footnote 17), the particle *de* may be considered as a complementizer (cf. Huang 1982). What is interesting is that exactly parallel to the situation for English, though subject extraction is possible from sentential comple-

ments in cases like (3), it is impossible from those like (6), where the COMP is lexically filled as shown by (7):

(7) *Dajia$_i$, Zhangsan xiao [$_S$' de [$_S$ t_i mominqimiao]]
everybody Zhangsan laugh COMP confused
'Zhangsan laughed so much as to make everybody confused.'

Such a distinction seems to be a standard case of the ***that***-trace effect. Assuming the relevance of STM2 to Chinese, the grammatical contrast between sentences like (3) and those like (7) follows from the fact that the element ***de*** blocks the application of STM2 since it is not a verbal head with respect to the relevant ID rule.

But there are reasons to believe that assuming the relevance of STM2 to Chinese is not optimal and that it should be eliminated from the grammar. First, the cases involving sentential complements introduced by lexical elements are very limited in Chinese, as mentioned earlier. It is not clear that such elements should be treated as complementizers. For instance, the element ***de*** has also been considered as a verbal particle affixed to the verb preceding it. If so, ***de*** will not be able to block the application of STM2 and some other device is still needed to block subject extraction from sentential complements preceded by lexical items (named complementizers or whatever). As has been mentioned, the lexical items which may be considered as complementizers are largely prepositions. Assuming that all the elements that may be considered as complementizers are prepositions, the impossibility of subject extraction from a sentential complement introduced by a lexical item follows from the FCR: PP $\supset$ ¬[SLASH], which is independently required in the grammar, as shown in section 2, chapter 4.

In fact, extraction of constituents in positions other than subject position from a lexically-introduced sentential complement is not possible either. As indicated before, for instance, VP extraction is possible if there is an overt AUX category in the sentence in question as shown by the example repeated below:

(8) [Zuo zhezhong shi]$_i$, wo bu gan [$_{VP}$ t_i].
do this-type thing I not dare
'Do this type of things, I don't dare ____.'

The same is also true with respect to an embedded clause, as shown in the following example:

(9) [Zuo zhezhong shi]$_i$, Zhangsan zhidao wo bu gan [$_{VP}$ t_i].
do this-type thing Zhangsan know I not dare
'Do this type of things, Zhangsan knows I don't dare ____.'

But this is not true if the extraction is from a lexically introduced sentential complement, while the corresponding sentence without extraction is acceptable:

(10)a. Zhangsan ma de wo bu gan zai zuo zhezhong shi.
Zhangsan scold COMP I not dare again do this-type things
'Zhangsan scolded me so that I don't dare do this type of things again.'

b. *Zuo zhezhong shi$_i$, Zhangsan ma de wo bu gan [$_{VP}$ t_i].
do this-type thing Zhangsan scold COMP I not dare
*'Do this type of things, Zhangsan scolded me so that I don't dare ____.'

These examples seem to indicate that the impossibility of subject extraction from a lexically-introduced sentential complement is simply a subcase showing the island property of constituents introduced by a preposition (i.e., a PP or a S introduced by a P), rather than a case showing the *that*-trace effect. Since Chinese usually does

not use overt lexical items to introduce sentential complements and the presence of such a lexical item does not show an asymmetry of subject position versus other positions in terms of extraction, there is no compelling evidence for the relevance of the *that*-trace effect to this language.

Furthermore, it seems uncontroversial that the *that*-trace effect is not a universal property of languages. For instance, Icelandic and Norwegian do not exhibit the *that*-trace effect, as mentioned in chapter 4, although each of these languages does use overt complementizers to introduce sentential complements. In this sense, it should not be surprising that STM1 is more general than STM2 from a cross-linguistic point of view. In the framework of Head-driven Phrase Structure Grammar (HPSG), Pollard (1985) proposes the Gap Introducing Principle as a universal principle.[97] This principle says basically that a subcategorization requirement can be satisfied by finding an empty category as well as a complement of the right category type. If it is an empty category, it is necessary to encode on the mother node the information of what type of empty category it is by passing up a SLASH feature specification. The Gap Introduction Principle allows empty categories to be freely introduced in place of any subcategorized-for complement. Thus, the application of the Gap Introduction Principle achieves the same effect as the application of STM1 without assuming the Lexical Head Constraint of GPSG, since subjects are treated as subcategorized elements in HPSG and hence are complements. For those languages that prohibit empty categories in subject positions, an

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97 According to Pollard (1985), the Gap Introducing Principle is one of the universal principles that tells the rules how to build the mother from daughters. The Gap Introducing Principle is stated as below (cf. Pollard 1985, p. 256):

Remove symbols from the front of the SUBCAT list one by one. Place the symbol on the head daughter's SLASH list.

extra condition, called the Subject Gap Principle, is required in the grammar, which simply rules out the possibility of applying the Gap Introduction Principle with respect to subject position. Thus, the Gap Introduction Principle is relevant to both English-type languages and Icelandic-type languages; the difference is merely that subject position is not a possible application domain of the former type of languages. Thus, in some sense, STM1 states the generalization quite generally that an empty category must always be sister to the head of the construction in question, with the variations that, for instance, in English an empty category must always be sister to a lexical head; in Chinese an empty category must always be sister to a verbal head.

Now consider the constructions with sentential subjects. As discussed above, Chinese in general allows subjects as well as objects to be extracted out of a sentential subject. After the discussion in the previous sections, it should be straightforward to see that the grammaticality of sentences with such extractions is to be expected. Consider the example in (11), with the relevant structure roughly like:[98]

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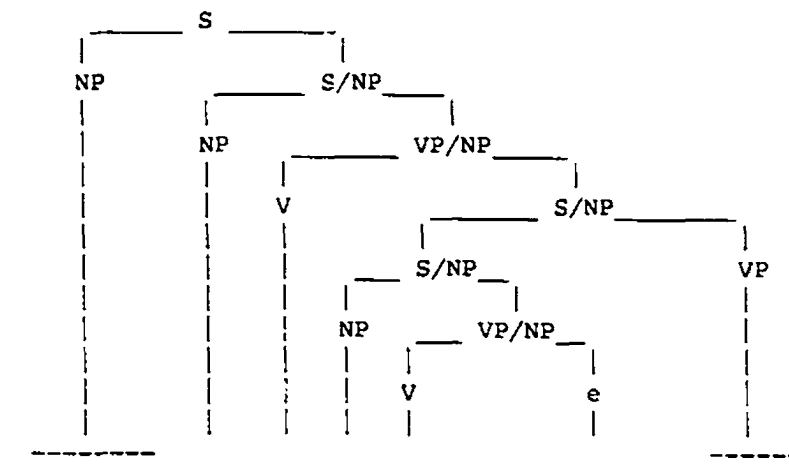
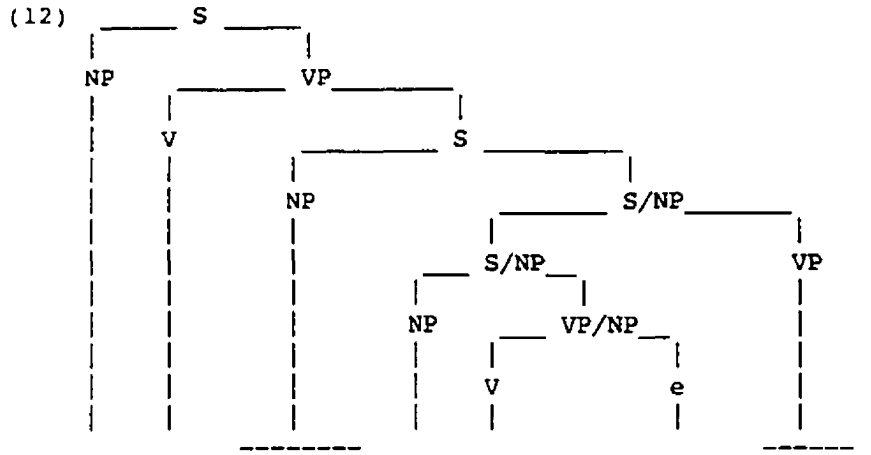
98 It might be more appropriate to assume that the sentential subject has an NP dominated structure. I am not going to discuss the relevant issues and possible consequences since they are not essential to the present discussion.

(11)



Assuming that SLASH is a foot feature but not a head feature, as discussed in chapter 4, SLASH may occur on a non-head node without also occurring on a head node in a local tree. This sanctions extraction from subject clauses without SLASH on the VP (which counts as the head of S in GPSG). Clearly, the structure satisfies both the FFP and the restriction on Slash termination. The grammar also permits sentences like the following (taken from Xu and Langendoen 1985).

(12)



wo juede zhexie shi, ta shuo t bu heshi
I think these thing he say not proper
*'I think that these things, that he says ____ is not proper.'

Assuming that in Chinese STM1 applies to verbally-headed ID rules (lexical or phrasal), as discussed in the last chapter, the situation of subject extraction from sentential subjects is parallel to that of object extraction, and thus should need no further comment.

5.2 Relative Clauses and NP Complement Clauses

Extraction from relative clauses and NP complement clauses has long remained vexing and has been the central issue in the previous analyses concerning the formal properties of Chinese empty categories. Let me start the discussion by considering the relevant ID rules for Chinese complex NPs.[99]

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99 An earlier version of part of this section was presented in Xue (1989), where the relevant ID rules for relative clauses and NP complement clauses are slightly different from those presented below.

It was indicated in chapter 2 that there is a closer relation between relative clauses and NP complement clauses in Chinese than in English. In Chinese, the head of a complex NP (containing either a relative clause or an NP complement clause) is a phrasal category and an NP complement clause behaves more like a modifier than a complement. In view of these facts, I propose that Chinese relative clauses and NP complement clauses are introduced by a general rule like (13), which in turn is expanded by a rule like (14) introducing the modifier marker *de*.[100]

(13) NP --> S[+DE], NP

(14) S[+DE] --> V^2[-DE], DE

Here, DE is used as a feature as well as an independent category. Intuitively, the specification S[+DE] labels a sentential constituent containing a relative clause (or an NP complement clause) and a DE element, while V^2[-DE] labels a constituent less the DE element.[101] Note that the category V^2 in (14) is unspecified in the feature specification SUBJ, according to GKPS, it may denote either a S or a VP (i.e.,

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100 Traditionally, Chinese relativization is analyzed as a result of head-raising movement (cf. Huang 1982). In Chinese, an NP head can be modified by two or more relative clauses. In fact, there is no upper limit to the potential number of such clauses. For this situation, the derivation of head raising processes will be quite cumbersome though it is not totally impossible. By contrast, a recursive application of the general rule in (13) directly predicts the possibility of multiple relative clauses. This may be an evidence in favour of a phrase structure treatment of Chinese relativization.

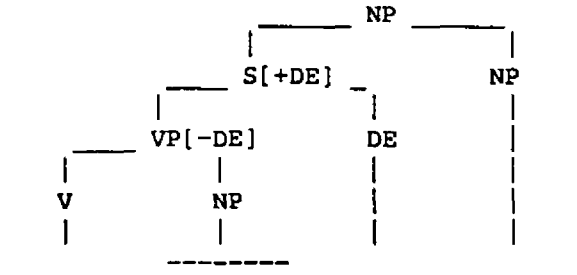
101 Note that any category containing a DE specification (either [+DE] or [-DE]) is special in the sense that it labels a constituent functioning as a modifier. Thus, the rules in (13), (14), and (15) are responsible for introducing the set of the structures in which the feature DE is obliged to be present, and the default specification will not be invoked in these cases. As discussed in section 4, chapter 4. the default spcification for DE for a category is to carry no DE specification. I leave open the proper analysis of the linear order between DE and other categories.

V^2[+SUBJ] vs. V^2[−SUBJ]). The rule in (14) then is expanded by the three rules in (15).[102]

(15) a. VP[-DE] --> V, NP
b. S[-DE] --> NP, VP/NP
c. S[-DE] --> NP, VP

These three rules will be responsible for introducing complex NPs like those as shown in (16).

(16) a.



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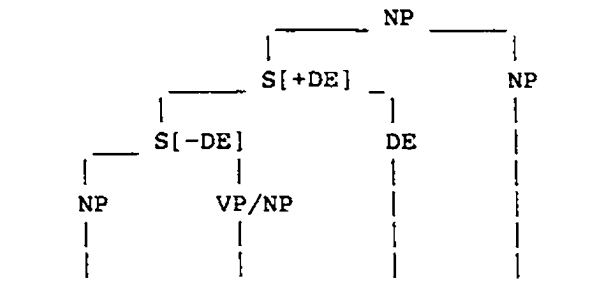
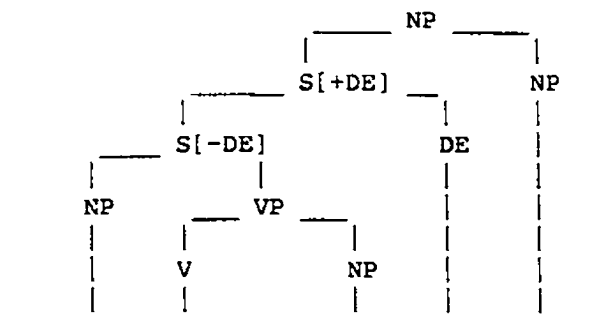
102 For NP complement clauses, there is variation. The modifier marker ***de*** sometimes doesn't occur between the head and the complement clause, but in general it does occur. Further, for the NP complement clauses without ***de***, it is almost always possible to insert ***de***; but it is impossible to omit ***de*** for those which usually have it. From these facts, I assume that (15c) is the basic relevant ID rule for NP complement clauses.

(16) b.



xuesheng xihuan t de neiben shu
student like MO that book
'the book that students like'

(16) c.



renmin xunqiu heping de fang'an
people seek peace MO plan
'the plan that people seek peace'

(15a) is responsible for introducing subject-gapped relative clauses as in (16a); (15b) licenses nonsubject-gapped relative clauses as in (16b); (15c) licenses NP complement clauses like that in (16c).[103]

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103 As indicated earlier in this dissertation, in Chinese as in English, only a small set of nouns are allowed to combine with complement clauses. Note that the nouns which can take complement clauses can almost always take relative clauses (though not vice versa), as shown by the English sentences in the following.

(ii) I have the belief that everybody here has a degree.
(iii) I have the belief that everybody here has.

Note that there is one difference between the ID rules proposed here for Chinese relative clauses and those for their English counterparts proposed in GKPS. In GKPS, the following rule will serve to introduce relative clauses.

(17) N' --> H, S[+R]

The sentential category on the right side of the rule is expanded by the two most common rules for expanding S:

(18) a. S --> XP, H[-SUBJ]
     b. S --> XP, H/XP

Thus, relative clauses expand just like any other S, but the FFP ensures that a relative ([+R]) pronoun is contained somewhere within this S. Assuming the ID rules in (15), Chinese relative clauses do not expand like other Ss and they require special expansion rules. This seems to be unfortunate. But in view of the characteristics of Chinese complex NPs discussed before, it should be expected that relative clauses in Chinese will be licensed by rules different from ordinary S expansion rules. The reasons are simple. In an English relative clause, the relative pronoun not only functions to associate the relative clause and the head that the relative clause modifies, but also acts as an NP, substituting for either the missing subject or the missing object. In Chinese, the modifier marker (or whatever one calls it) ***de*** does

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Assuming the rules in (13)-(15), nothing in the grammar will ensure that only one of those NPs which may combine with NP complement clauses occurs as the head of the complex NP containing an NP complement clause. Without further research, here I simply assume that cooccurence of nouns and sentential complements is largely a matter of semantics in Chinese since the meaning of the noun involved crucially determines the possibility of such cooccurence. I leave it open how this should be actually implemented in the theory. An alternative approach is to treat this case in syntax by invoking the notion of subcategorization as it is in GKPS, but this would require certain drastic departure from some basic assumptions of GKPS.

not serve as the subject or the object of the relative clause. It simply signals a modifying relation of the sentence preceding it to the NP following it. Consequently, the subject or object is phonetically absent in a Chinese relative clause, though it is usually not allowed for a sentence to have an argument absent. Thus, relative clauses and normal sentences cannot be licensed by the same ID rules.

Now consider the relevant extraction cases in Chinese. As mentioned in chapter 3, it is generally possible to topicalize either the subject or the object of the relative clause out of the complex NP which is located in subject position, but it is not possible to topicalize an element out of a complex NP which is located in object position. The relevant examples are repeated below:[104]

(19) Zheben shu$_i$, wo renwei [$_{NP}$ [$_{VP}$ du guo t_i] de ren] bu duo.
this book I think read ASP MO man not many
*'This book, I think there are not many people who have read _____ .'

(20) Zhexie ren$_i$, wo renwei [$_{NP}$ [$_S$ t_i fangwen guo] de difang] bu duo.
these people I think visit ASP MO place not many
*'These people, I think that there are not many places that ____ have ever visited.'

(21) *Zhangsan$_i$, wo renshi [$_{NP}$ [$_{VP}$ xihuan t_i] de neiwei xuesheng.
Zhangsan I know like MO that student
*'Zhangsan, I know that student who likes ____.'

(22) *Zhangsan$_i$, wo mai-le xie [$_{NP}$ [$_S$ t_i xihuan] de] shu].
Zhangsan I buy ASP some like MO book
*'Zhangsan, I bought some books that ____ likes.'

Furthermore, the situation concerning complex NPs containing NP complement clauses is different. Neither subject extraction nor object extraction is possible from NP complement clauses located in object position, but when a complex NP

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104 Sentences in (19) and (21) involve subject-gapped relative clauses, which are thus VP-type relative clauses as assumed in (15a) above.

containing a NP complement clause is located in subject position, object extraction is impossible from the NP complement clause, while subject extraction from the NP complement clause may be acceptable or at least much better than the corresponding object extraction. The relevant examples are repeated as the following:

(23) *Heping$_i$, Lisi xiangxin [$_{NP}$ [$_S$ xuesheng xunqiu t_i] de fang'an.]
peace Lisi believe student seek MO plan
hui yingde guangfan de zhichi.
will win wide MO support
*'Peace, Lisi believes that the plan that student seek ____
will win wide support.'

(24) ?Xuesheng$_i$, Lisi renwei [$_{NP}$ [$_S$ t_i xunqiu heping] de fang'an]
student Lisi think seek peace MO plan
hui yingde guangfan de zhichi.
will win wide MO support
*'student, Lisi thinks that the plan that ____ seek peace
will win wide support.'

(25) *Heping$_i$, zhe shi [$_{NP}$ [$_S$ xuesheng xunqiu t_i] de fang'an.]
peace this is student seek MO plan
*'Peace, this is the plan that student seek ____ .'

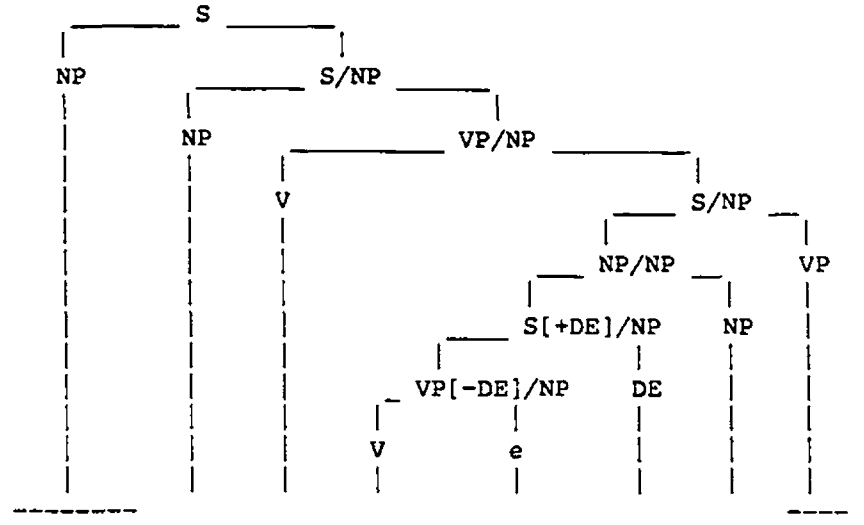
(26) *Xuesheng$_i$, zhe shi [$_{NP}$ [$_S$ t_i xunqiu heping] de fang'an.]
student this is seek peace MO plan
*'student, this is the plan that ____ seek peace.'

Thus the questions to be answered are: what accounts for the difference between subject-located complex NPs and object-located complex NPs, and why there should be such a discrepancy between relative clauses and NP complement clauses.

Let me ignore the cases involving object-located complex NPs for a moment and concentrate on the question of the extraction discrepancy between relative clauses and NP complement clauses, which shows crucially in the cases of subject-located complex NPs. Assuming the ID rules given in (15), repeated in (27), the grammar will assign trees (28) and (29) below for (19) and (20) respectively.

(27) a. VP[-DE] --> V, NP
b. S[-DE] --> NP, VP/NP
c. S[-DE] --> NP, VP

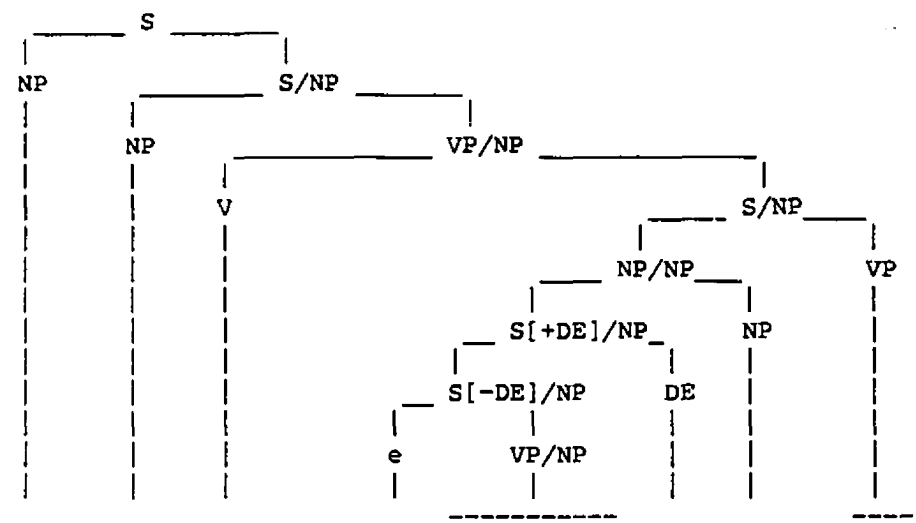
(28)



Zheben shu, wo renwei du-guo t de ren bu duo.
this book I think read ASP MO man not many
*'This book, I think there are not many people who have read ____ .'

In the light of the ID rules in (27), it is clear that object extraction in (28) is possible in a GPSG analysis, in that with respect to each of the local trees in the structure, the Slash category which is instantiated on a daughter node is also instantiated on the mother node. Furthermore, in the bottommost local tree containing the empty category, i.e., the bottommost VP, is generated from a verbally-headed ID rule and the empty category **e** is the sister to a verbal head. Thus, the structure satisfies both the FFP and the requirement for the application of the STM.

(29)



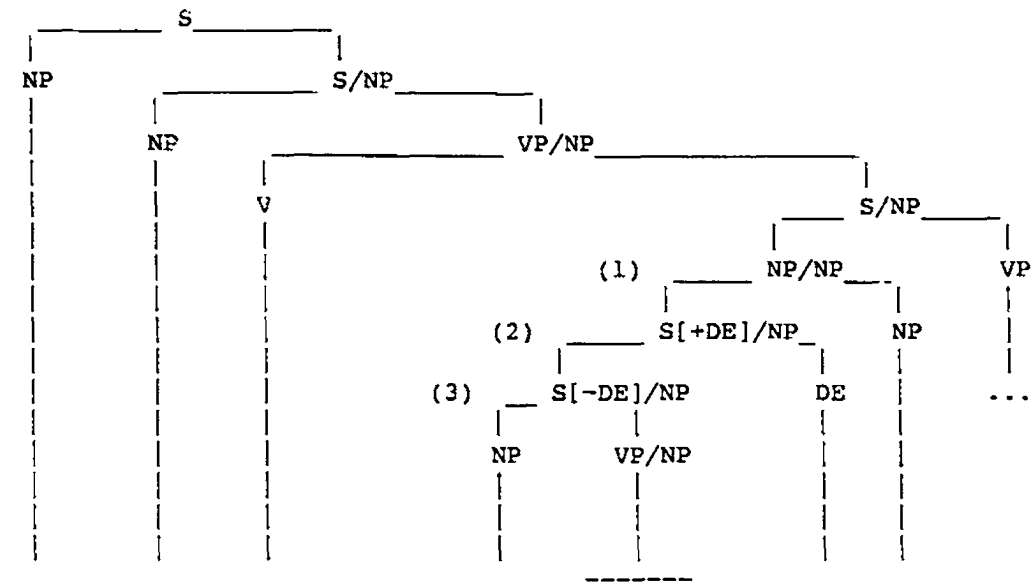
Zhangsan$_i$, wo renwei [$_{NP}$ [$_S$ t_i fangwen guo t] de difang] bu duo.
Zhangsan I think visit ASP MO place not many
*'Zhangsan, I think that there are not many places that
____ has ever visited.'

The well-formedness of (29) can be accounted for in a similar way. There are two points relevant to the analysis. First, the empty category in the subject position can be successfully licensed, because it is the sister to a verbal head. Secondly, since this case involves a nonsubject-gapped relative clause, the relevant ID rule for the relative clause is: S[-DE] --> NP, VP/NP (cf. (27b) above). Applying STM1 to this ID rule results in an ID rule S[-DE]/NP --> e, VP/NP. In this case, SLASH on both the daughter VP node and on the mother S node in the corresponding local tree are inherited from the ID rule. Thus, the FFP is irrelevant here and nothing is illicit in the bottommost S[-DE] local tree in the structure. But, the FFP is relevant to other local trees and requires instantiated SLASH to percolate along the tree. For instance, though it is inherited in the bottommost S[-DE] local

tree, SLASH on the daughter S[-DE] node is instantiated in the local tree corresponding to the ID rule S[+DE] --> S[-DE], DE, and SLASH is also instantiated on mother S[+DE] node in this local tree in accordance with the FFP. It can be shown that each of the local trees in the structure satisfies the FFP.

Consider extraction from NP complement clauses. Given the ID rules stated in (27), the grammar will assign the following structure for (23).

(30)



*Heping$_j$. Lisi renwei [$_{NP}$ [$_S$ xuesheng xunqiu t_i] de fang'an]
peace Lisi think student seek DE plan
hui yingde guangfan de zhichi.
will win wide MO support
*'Peace, Lisi thinks that the plan that students seek ____
will win wide support.'

A sentence like (30) seems to be a counterexample to the present analysis, since the structure appears to satisfy both the FFP and the requirement for Slash termination. Then what should account for the ill-formedness apparently caused by the

extraction from the NP complement clause? The relevant intuition is that when an NP, especially an object NP, is extracted from a NP complement clause, the most natural interpretation is one in which the empty category left behind, i.e., the gap, would be associated with the head NP of the complex NP rather than with the extracted NP (i.e., the topic). In other words, if the object NP of a NP complement clause is missing, the clause will be automatically interpreted as a relative clause, with the extracted NP stranded. This implies that extraction from a NP complement clause would bring about a "reconstruction" on the part of the speaker (or hearer). The structural relations after the reconstruction could be expressed as in (31)-(32).

(31) *Heping, Lisi renwei [$_{NP}$ [$_{S}$ xuesheng xunqiu t_i] de fang'an$_i$]
peace Lisi think student seek MO plan
hui yingde guangfan de zhichi.
will win wide MO support

(32) *Heping, zhe shi [$_{NP}$ [$_{S}$ renmin xunqiu t_i] de fang'an$_i$.
peace this is people seek MO plan

The reason for this "reconstruction" is attributable to the effect of the parallel ID rule for relative clauses. This effect disturbs the proper identification of the gap in an NP complement clause with its antecedent, i.e., the topic. Structurally, although the relevant ID rule for NP complement clauses is: S[-DE] --> NP, VP (i.e., (27c)), when a SLASH[NP] occurs on the daughter VP node in local tree (3) in a structure like (30), the grammar will treat it as inherited, not instantiated, since there is a ID rule: S[-DE] --> NP, VP/NP (i.e., (27b)) in the grammar. In other words, for the cases in which both rule (27b) and rule (27c) may apply, rule (27b) takes precedence in application.

In fact, the precedence of (27b) over (27c) when they are competing for application, and thus the analysis of extraction from an NP complement clause like (30), can be accommodated by a universal principle, namely, the Proper Inclusion Principle (PIP), which reads roughly as follows (cf. Sanders 1974, Pullum 1979):

> For any representation that satisfies the structural descriptions of both rule A and rule B, A applies instead of the application of B if and only if the structural description of A properly includes the structural description of B.

Here the term "the structural description" of a rule is referred to as the structural information specified in the rule, and a proper inclusion relation holds between the structural descriptions of two rules if and only if the structural information specified in one rule contains all the structural information specified in the other, but not conversely. Referring to the present case, the PIP has the effect that when two rules A and B seem to license a local tree, rule A applies instead of B if the structural description of A properly includes that of B. Thus, when SLASH occurs in a local tree, which then satisfies the structural descriptions of both the ID rule for relative clauses (i.e., (27b)) and the ID rule for NP complement clauses (i.e., (27c)), the ID rule for relative clauses will apply instead of the corresponding rule for NP complement clauses, since the structural description of (27b) properly includes that of (27c) plus an additional Slash feature specification. As a result, in the local tree (3) in (30), the SLASH on the daughter VP node will be treated as inherited, while the SLASH on the mother S[-DE] node is instantiated. Thus, this local tree has an apparent violation of the FFP. Note that instantiated SLASH on the mother S[-DE]

node cannot be instantiated on the daughter VP/NP node, because such instantiation would create a multiple Slash specification like VP/NP/NP, which is prohibited by the grammar. As mentioned earlier in chapter 4, a category in GKPS is defined as a (partial) function from the set of features to the set of values, which does not allow the unification of two categories that disagree on the value of some feature. The unification of a set of categories, if it exists, is the smallest category which includes every feature specification in any member of that set of categories. A set containing two distinct SLASH specifications does not constitute a function from features to feature-values and therefore violates the definition of a category.[105] Given this restriction in the tree construction, the local tree (3) in structures like (30) can never meet the FFP.

The situation of subject-extraction from NP complement clauses is somewhat different. Consider the structure in (33) for sentences like (24)

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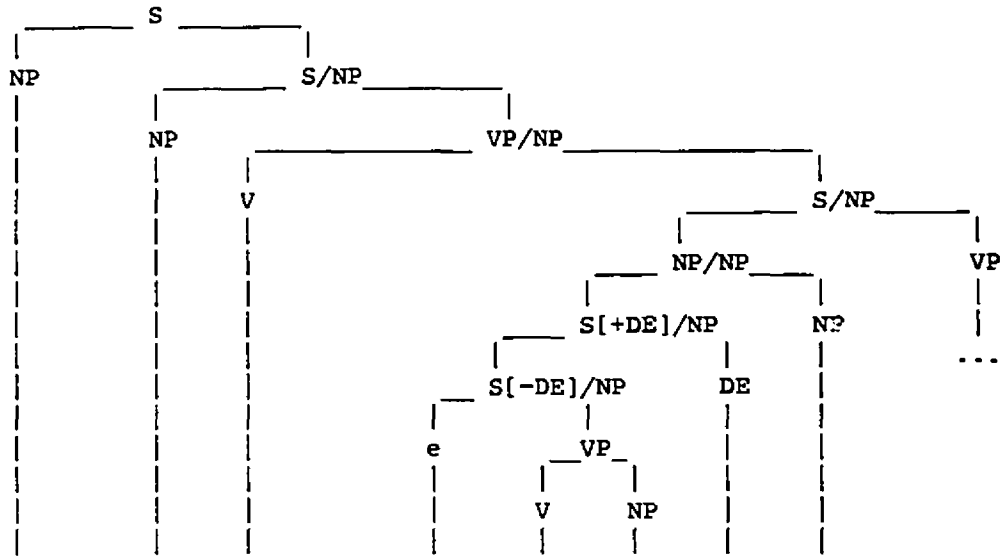
105 In section 5.3, I will discuss certain cases in Chinese which may serve as empirical evidence for the prohibition of multiple Slash categories in the grammar.

(33)



?Xuesheng$_i$, Lisi renwei [$_{NP}$ [$_S$ t_i xunqiu heping] de fang'an]
student Lisi think seek peace MO plan
hui yingde guangfan de zhichi.
will win wide MO support
*'student, Lisi thinks that the plan that ____ seek peace
will win wide support.'

In the local tree corresponding to the rule (i.e., S[-DE] --> NP, VP), SLASH on the mother S[-DE] node is inherited, resulting from the application of STM1. Thus, the FFP is irrelevant here. In the local tree where S[-DE] is a daughter node, SLASH is instantiated on the mother node as well as the daughter node in accordance with the FFP, and the same is true of other local trees. Furthermore, none of the local trees in this structure satisfies the structural descriptions of more than one rule in the grammar and thus they involve no rules competing for application. The PIP is therefore irrelevant in this case.[106]

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106 As indicated by the question mark in front of (24), however, sentences involving subject-extraction from subject-located NP complement clauses show a certain degree of unnaturalness. This raises a question for the present analysis, since there seem to be no structural defects in view of the

It is uncontroversial that the PIP generalization is one of fundamental properties of languages. What the PIP states is:

> '...when a special case and a more general case are tested for applicability, the general case should be considered to be applicable only if the special case is not. This merely guarantees that the special case will be relevant in some instance. If the general case always took precedence, there would be no instances at all in which the special case was applicable' (Pullum 1979, p. 82).

In Chinese, the case of relative clauses is a special case relative to NP complement clauses. If object extraction from a NP complement clause is allowed, there would be no place for relative clauses, because the interpretation for a relative clause couldn't be properly identified. It seems to me that this is a correct generalization for Chinese.[107]

Now turn to the second question: what should account for the difference in terms of extraction between subject-located complex NPs and object-located complex NPs. Compare their structural properties in the light of the following structure which includes complex NPs in both the subject position and the object

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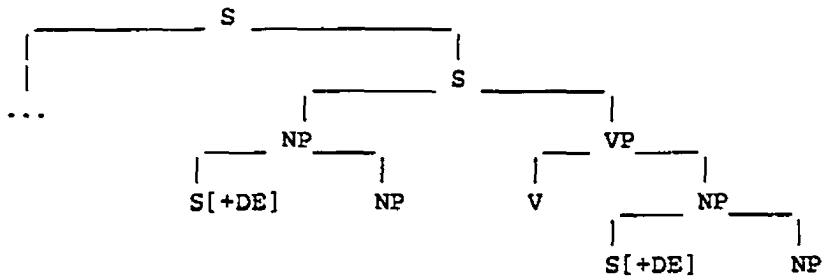
analysis presented above. It might be due to the fact that there is another way to derive a possible structure for a subject-gapped NP complement clause, namely through the rule VP[-DE] --> V, NP, which gives rise to a subject-gapped relative clause. Thus, when the subject of a NP complement clause is extracted, the clause is ambiguous. It may be interpreted either as a gapped NP complement clause with the gap linked to the topic, or as a subject-gapped relative clause with the topic stranded. Thus sentences like (24) are difficult to interpret. As a result, such sentences may be unacceptable for some -- but crucially, not all -- speakers.

107 I leave it open for further research how the PIP should be formulated in the theory of GPSG. See chapter 6 for some discussion of related issues.

position.

(34)



As has been discussed, an important difference between complex NPs located in subject positions and those in object positions is that although there is a clear discrepancy in terms of extractability between relative clauses and NP complement clauses located in subject positions, such discrepancy cannot be directly tested since nothing may be extracted out of complex NPs located in object position no matter whether the complex NP in question involves a relative clause or an NP complement clause. This suggests that something else is needed in the grammar, which blocks any extraction from complex NPs located in object position. In the theory of an earlier version of GPSG, it is certainly possible to achieve this restriction by positing a filter which says that a configuration like the following is ill-formed:[108]

(35) $*[_{VP/\alpha} \quad V^0 \quad NP/\alpha]$

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108 See e.g., Gazdar 1982 for similar filters.

While achieving a correct result, such a filter would be strongly ad hoc in GKPS' general framework. Furthermore, the fact that nothing can be extracted from an object-located complex NP is not an accidental and isolated phenomenon. I believe that the unextractability from a complex NP is not due to the property of the complex NP, but rather it is related to the relation between the subject NP (or the object NP) and the head of the construction in question. Notice that although the object NP is the sister of the verbal head as well as the subject NP is, the difference is that the object NP follows the head, while the subject NP precedes the head. This generalization can be accomplished in a LP rule:[109]

(36) NP[SLASH] < [+V, -N]

This LP statement says that any NP category containing a SLASH specification precedes a verbal category. Clearly, this predicts extraction from subject NP but not from object NP. Remember that there is a LP rule like the following in the grammar:

(37) H[SUBCAT, -N] < X

This rule requires that a NP object follow the lexical verbal head but the rule in (37) requires that an NP category containing SLASH precede a verbal category. Thus, if an object NP contains a SLASH specification, it will derive a contradiction between (36) and (37). Thus, it is impossible to have extraction from an NP located in object position.

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[109] The general theoretical implications will be further discussed in chapter 6.

What is more interesting is that while blocking extraction from object-located NPs, the LP rule in (36) allows object NPs to be gaps themselves, since categories which are gaps themselves do not carry SLASH specifications, assuming the revised version of STM1 given in the last chapter. The contrast between the impossibility of objected-located NPs containing gaps and the possibility of gaps in object position is clearly another case supporting the general distinction in the theory between categories containing gaps and categories which are gaps themselves.

5.3 Topic Constructions

Another type of construction which has interesting implications for our discussion is topic constructions.[110] As indicated in previous chapters, a topic construction refers to the grammatical configuration which consists of two parts: the topic, which occurs in the initial position, and the comment, a clause which follows the topic and says something about it. Furthermore, topic constructions may have multiple topics, particularly when they involve extraction (i.e., topicalization). By multiple topics, I mean two or more distinct topics in a sentence. What is interesting about extraction in multi-topic constructions is, as Huang (1982) notes, that in topic constructions, the gap in the lowest clause is usually construed as bound by the lowest topic, not by any higher one, as shown by the following examples:

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[110] An earlier version of this section was presented in Xue (1990).

(38) a. Shuiguo, xiangjiao$_i$ wo zui xihuan t_i.
fruit banana I most like
'As for fruit, banana, I like ____ most.'

b. *Xiangjiao$_i$, shuiguo, wo zui xihuan t_i.
banana fruit I most like
*'Banana, as for fruit, I like ____ most.'

The grammatical contrast in constructions like the above is accounted for in Huang (1982) in terms of the Subjacency Condition, with the assumption that topic constructions have a structure roughly like the following, where the COMP is dominated by S' and topics are represented by Chomsky-adjunction to S nodes occurring to the right of the COMP, as shown in chapter 3 repeated below:

(39) [$_{S'}$ COMP [$_S$ TOP [$_S$ TOP [$_S$ ... t ...]]]

Furthermore assuming that Move-α is a successive-cyclic COMP-to-COMP movement and S is a bounding node in Chinese, it is expected that the gap in the lowest clause can only be construed as bound by the lowest topic in accordance with the Subjacency condition.

However, as Liu (1987) shows, sentences with the indices indicated as in (40) and (41) are also possible in Chinese, where the gap in the lowest clause can be construed as bound by the topic in a higher position and the antecedent-gap dependency crosses two S nodes in any sense.

(40) [$_S$ Lisi$_i$, [$_S$ Zhangsan$_j$ [$_S$ ta$_j$ bu xihuan t_i]]]
Lisi Zhangsan he not like
'As for Zhangsan, Lisi, he doesn't like ____ .'

(41) [$_S$ Neige ren$_i$ [$_S$ Zhangsan shuo [$_S$ Lisi$_j$ [$_S$ ta$_j$ bu xihuan t_i]]]]
that men Zhangsan say Lisi he not like
'That man, Zhangsan says that Lisi, he doesn't like ____ .'

The grammaticality of (40) and (41) clearly shows the inadequacy of Huang's analysis. While maintaining the Subjacency point of view, Liu offers an alternative analysis, proposing that topicalization undergoes TOP-to-TOP movement instead of COMP-to-COMP movement and the TOP node is introduced by the rules in (42).

(42) a. S" --> TOP S" (or S')
b. S' --> COMP S

Thus, for multi-topic constructions, relevant structures are roughly like the one in (43), where the topic is constructed to the left of the COMP.

(43) $[_{S"1}$ TOP $[_{S"2}$ TOP $[_{S'}$ COMP $[_{S}$ ... t ...]]]

Following May (1985), Liu further assumes that $S"_1$ and $S"_2$ in (43) constitute a projection set, which counts as one category. In other words, $S"_1$ and $S"_2$ are considered simply as two segments of this category. An empty category is bound within a category of multiple segments if it is bound within a segment of the category. Thus, a deeply embedded gap can be bound by the matrix topic in sentences like (40) and (41) through the trace in an intermediate TOP node. The structure for (41), for example, looks like (44).

(44) Neige ren$_i$ [$_S$ Zhangsan shuo [$_{S"}$ t$_i$ [$_{S"}$ Lisi$_j$ [$_S$ ta$_j$ bu
that men Zhangsan say he not
xihuan t$_i$]]]]
like
'That man, Zhangsan says that Lisi, he doesn't like ____ .'

Liu's proposal does provide explanations for the grammaticality of cross-topic binding in sentences like (40) and (41); however, it leaves unexplained the fact that

in constructions like (38) the gap can only be construed as bound by the lowest topic but not by any one in a higher position, since the analysis predicts that topics are not island-creating and a deeply embedded gap can always be linked to a long-distance antecedent through the trace in an intermediate TOP node.

I argue that two types of topic constructions should be recognized, and these two types of constructions allow different patterns of structural dependencies due to the interaction of relevant phrase structure rules and general grammatical principles. Notice that there is an important difference between sentences like (38) and those like (40)-(41). In general, when a resumptive pronoun is involved in a sentence as shown in (40)-(41), cross-topic binding is possible, whereas such binding is impossible if no (resumptive) pronoun is involved, as shown in (38). In view of these facts, I propose that the difference is due to the effects of different ID rules and that the following three ID rules are responsible for Chinese topic constructions:[111]

(45) a. S --> NP, S
b. S --> NP, S/NP
c. S --> NP, S[RESUM NP]

(45a) is the general rule responsible for introducing Chinese topic constructions, such as those involving no gaps as discussed in section 6, chapter 2. (45b) is responsible for topic constructions involving long-distance dependencies (i.e., topicalization). (45c) says that a sentence can consist of a topic followed by a sentence containing a resumptive pronoun. Here RESUM is treated as a category-

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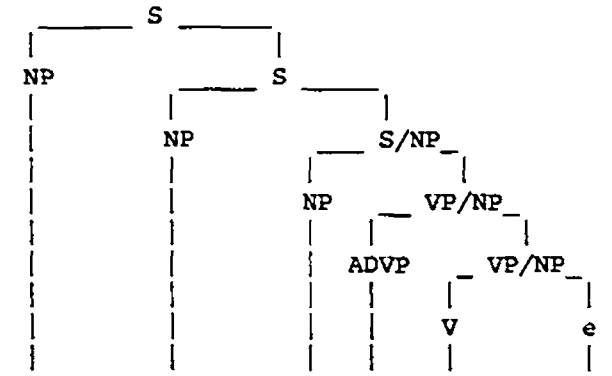
[111] As Xu and Langendoen (1985) note, all maximal projections can be topics. Thus, (45a) may be stated in a more general form like S --> XP, S. The form of (45a) is used here for simple exposition. Also the rule (45b) is simply a case of the general rule S --> XP, S/XP.

valued Foot feature.[112] The Foot Feature Principle will require RESUM to percolate to be associated with a (resumptive) pronoun which agrees with the topic in features such as person and number.

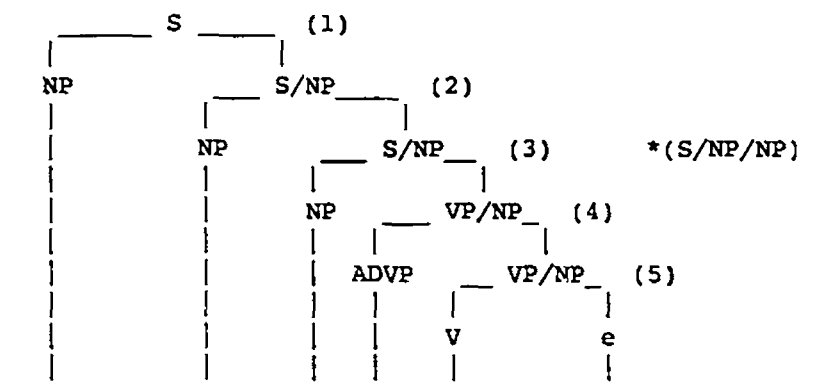
Given the rules in (45) above, (38a) and (38b) will be assigned structures respectively as in (46a) and (46b).

(46) a.



Shuiguo, xiangjiao, wo zui xihuan t .
fruit banana I most like

b.



*Xiangjiao, shuiguo, wo zui xihuan t .
banana fruit I most like

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112 See Schacter (1981) for the discussion of the feature RESUM.

The central issue here concerns (46b). Structures like (46b) are ill-formed only when the gap is associated with the first topic instead of the second. Intuitively, for sentences like (38), native speakers would structurally associate the gap with the second topic, not the first. This amounts to saying that the grammar does not allow SLASH to percolate up beyond the lowest S node and to be instantiated on a higher S node in the present case. The analysis of extraction from a topic construction like (46b) can be accommodated by the Proper Inclusion Principle, as in the case of extraction from NP complement clauses like the example in (30) discussed in section 5.2. The PIP has the effect that when two rules A and B seem to license a local tree, rule A applies instead of B if the structural description of A properly includes that of B. Thus, when SLASH occurs on the daughter node of the second local tree in (46), which then satisfies the structural descriptions of both the rule (45a) and the rule (45b), the latter applies instead of the former since the structural description of (45b) properly includes that of (45a), plus an additional Slash feature specification. Thus, the Slash category on the daughter S node in this local tree is introduced by the ID rule S --> NP, S/NP. The problem for (46b) is that if the instantiated SLASH on the mother S node in the second local tree is also instantiated on the daughter S/NP node in accordance with the FFP, a multiple Slash category like S/NP/NP would be created. Such a composition of a category is impossible because multiple Slash categories are prohibited by the grammar. Remember that a category is defined as a (partial) function from the set of features to the set of feature values, and that it is impossible to form a unification of two sets of feature specifications that disagree on the value of some feature. Thus, the structure has an apparent violation of the FFP, since in the second local tree of

(46b), SLASH on the mother node is instantiated but SLASH on the daughter node is inherited.[113]

On the other hand, multi-topic constructions involving resumptive pronouns have different structures. Given the rule in (45c), the structure for (41), for example, is like that in (47).[114]

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113 It should be noted that the present analysis merely distinguishes the following two structures: the gap can only be associated with the lowest topic but not any one in a higher position (if resumptive pronoun is not involved).

(i) $[_S$ NP $[_S$ NP_i $[_S$ NP ... $t_i]]]$

(ii) *$[_S$ NP_i $[_S$ NP $[_S$ NP ... $t_i]]]$

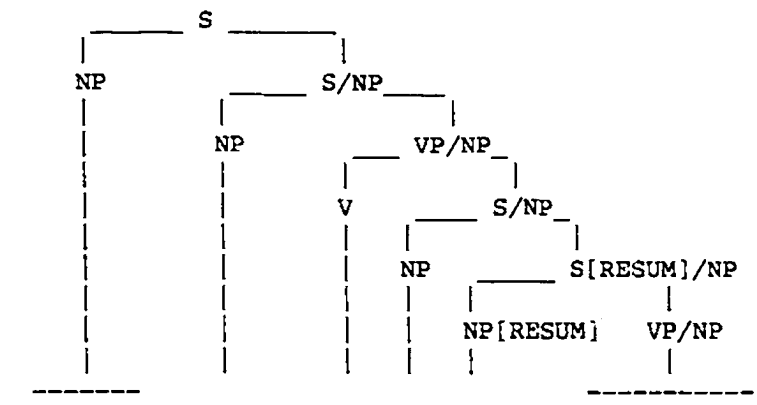
This does not imply that sentences like (iii) are possible Chinese sentences. How to rule out sentences like (iii) may not be a topic of syntax, just as a English grammar may not be able to rule out a sentence like (iv).

(iii) *Xiangjiao, shuiguo$_i$, wo zui xihuan t $_i$.
banana fruit I most like
*As for bananas, fruit, I like most ____.

(iv) *As for bananas, fruit, I like most ____.

114 A proper analysis of resumptive pronouns and their relation to empty categories is a topic for further research. See a brief discussion of some related issues below. See Sells (1984) for discussion of the related properties of resumptive pronouns.

(47)



This structure satisfies the FFP, for nothing in this case prevents SLASH percolating beyond the lowest S node. The PIP is irrelevant in this case, since with respect to the two rules, (45b) and (45c), the structural description of neither one properly includes that of the other. Further, there is no corresponding ID rule in the grammar which contains an inherited SLASH on the daughter node and whose structural description properly includes that of the rule S --> NP, S[RESUM NP]. Thus, the grammar accounts for the contrast between (46a) and (46b), while allowing cross-topic binding in structures like (47).

Thus far I have simply assumed phrase structure rules for the topic constructions without showing much evidence, and I have attributed the different dependency phenomena to the effects of different phrase structure rules without much discussion. In fact, there are several pieces of evidence supporting this point of view. As mentioned above, one type of topic construction in Chinese contains no gaps. It is generally agreed in the literature that such gapless topic constructions

must be considered as "basic" since they cannot be derived from some more basic structures (cf. Teng 1974, Li and Thompson 1976, Huang 1982, Xu and Langendoen 1985, and Jiang 1989 for discussion).[115] It is plausible to assume that there is a rule like (45a) in the grammar. Thus, the following discussion will focus on the rules in (45b) and (45c).

Gazdar (1981) suggests that the foot feature SLASH can refer to resumptive pronouns as well as phonologically null categories. Maling and Zaenen (1982) propose that resumptive pronouns should be treated as being of the same syntactic type as empty categories. In languages such as the Scandinavian languages, it may be plausible to claim that there is no overwhelming reason to assume that resumptive pronouns are syntactically different from empty categories; but there are reasons for assuming that resumptive pronouns and empty categories are syntactically different in Chinese.

As has long been observed, there is a set of sentence positions in which it is impossible for empty categories to occur but possible for resumptive pronouns, as shown by the contrast between the following sentences:

(48) a. *Zhangsan$_i$, wo hen xihuan [t_i chang ge de shengyin].
Zhangsan I very like sing song MO voice
*'Zhangsan, I like very much the voice with which ____ sings.'

b. Zhangsan$_i$, wo hen xihuan [ta$_i$ chang ge de shengyin].
Zhangsan I very like he sing song MO voice
'Zhangsan$_i$, I like very much the voice with which he$_i$ sings.'

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115 One of the reasons for Xu and Langendoen (1985) to propose a rule like (45a), where the topic is a sister node of an S node dominated by another S, for Chinese topic constructions is that Chinese usually do not use lexical complementizers to introduce clauses, in contrast to the English structures proposed in Chomsky (1977):

(i) S" --> TOP S'
(ii) S' --> COMP S'

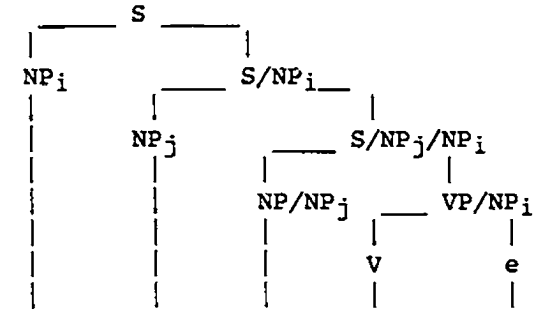
(49) a. *Zhangsan$_i$, neijian shi yu t$_i$ wugan.
Zhangsan that thing with no relation
*'Zhangsan, that has nothing to do with ____ .'

b. Zhangsan$_i$, neijian shi yu ta$_i$ wugan.
Zhangsan that thing with he no relation
*'Zhangsan$_i$, that has nothing to do with him$_i$.

No empty category is allowed in an object-located complex NP as shown by (48a), but a resumptive pronoun is allowed to occur in a corresponding position as shown by (48b). Similarly, an empty category cannot occur in the object position of a preposition but a resumptive pronoun can, as shown by the contrast between (49a) and (49b). In short, the distribution of resumptive pronouns is not the same as the distribution of empty categories.

Supposing that the foot feature SLASH is used to encode the information of both empty categories and resumptive pronouns, multiple Slash categories would have to be allowed in the structure for a sentence like (40) as shown in (50) below:

(50)



Lisi Zhangsan ta bu xihuan t
Lisi Zhangsan he not like
'As for Zhangsan, Lisi, he doesn't like ____ .'

As a result, this would predict that crossed dependencies (or nested dependencies) should be allowed in Chinese. However, there is evidence showing that crossed dependencies are ungrammatical in cases where only empty categories are involved. In general, when the antecedent-gap dependencies are arranged serially, the sentence is grammatical; but if multi-topic sentences are constructed with nested or crossed dependencies, the grammaticality of such sentences would be greatly diminished, even though they might be sometimes, as Xu and Langendoen (1985) note, not fully unacceptable. Structures with serial, nested, and crossed dependencies can be shown by the examples in (51), (52) and (53) respectively.

(51) Zhangsan$_i$, wo yiwei t_i yijing gaosu ni neiben shu$_j$ Lisi
Zhangsan I think already tell you that book Lisi
bu xihuan t_j.
not like
'Zhangsan$_i$, I thought ____$_i$ told you already that the book$_j$ Lisi
didn't like ____$_j$.'

(52) *Neiben shu$_i$, Zhangsan$_j$ wo yiwei t_j yijing gaosu ni Lisi
that book Zhangsan I think already tell you Lisi
bu xihuan t_i.
not like
*'That book$_i$, Zhangsan$_j$ I thought ____$_j$ told you already that
Lisi didn't like ____$_i$.'

(53) *Zhangsan$_i$, Neiben shu$_j$ wo yiwei t_i yijing gaosu ni Lisi
Zhangsan that book I think already tell you Lisi
bu xihuan t_j.
not like
*'Zhangsan$_i$ that book$_j$ I thought ____$_i$ told you already that Lisi
didn't like ____$_j$.'

Obviously, the structural difference between (51) and (52) or (53) is that structures with crossed dependencies (or nested dependencies) require multiple Slash cat-

egories. These examples suggest that it is generally correct to prohibit multiple Slash categories in the grammar.[116] Thus, crossed dependencies are well-formed only when dependencies involving empty categories and resumptive pronouns cross each other. This shows that resumptive pronouns and empty categories are syntactically different. One possibility of handling this situation is to distinguish Slash specifications for empty categories and those for resumptive pronouns by invoking two types of Slash features. But this, in some sense, amounts to saying that empty categories and resumptive pronouns are different.[117]

The strongest argument for a Slash-category representation of resumptive pronouns so far suggested in the literature (e.g., Maling and Zaenen 1982) comes from coordination constructions. It has been widely assumed that coordination is possible only between constituents of exactly the same syntactic type. There are data which seem to suggest that resumptive pronouns and empty categories are of the same syntactic type, as shown by the following Hebrew example (cf. Sells 1984, p. 324):

(54) ha'iš še rina baxra ___ ve ohevet oto
the-man that Rina chose ___ and loves him

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116 In Chinese, some constructions with multiple Slash categories may not be fully unacceptable to some speakers. Such constructions, I believe, are allowed in quite a limited domain and their interpretation needs strong contextual information.

117 It should be noted that the approach of treating empty categories and resumptive pronouns in two separate features is different from treating empty categories and resumptive pronouns as two types of Slash specifications, since the former will take empty categories and resumptive pronouns as two independent categories, while the latter will take them as two distinct but related categories. Thus, the two approaches may make different predictions. Here I am not going to discuss which approach is more appropriate. The point is that empty categories and resumptive pronouns must be distinguished in some way.

If resumptive pronouns are not of the same syntactic type as empty categories, then coordination between constituents containing empty categories and those containing resumptive pronouns should not be possible.

However, other coordination constructions provide equally strong evidence against a Slash-category analysis of resumptive pronouns. The following example is also from Hebrew (cf. Sells 1984, p. 324):

(55) ha'iš še rina ohevet oto ve et dani
the-man that Rina loves him and Dani

In (55), a resumptive pronoun coordinates with a lexical NP. By the same reasoning, resumptive pronouns should be of the same syntactic type as lexical NPs. It has been reported in the literature that parallel phenomena can also be observed from other languages.[118] In fact, coordination is rather complex. Though coordination has been widely used to test constituency structure, it is not difficult to find coordination between constituents of two totally different syntactic types (cf. e.g., Sag et al. 1985):

(56) a. John is at home and happy now.

b. John walked slowly and with great care.

In (56a), a PP coordinates with an AP. In (56b) an ADVP coordinates with a PP. In view of the above, the fact that resumptive pronouns may coordinate with empty categories is not sufficient to suggest that resumptive pronouns and empty cat-

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118 It is difficult to test Chinese in this regard since it is generally difficult for Chinese coordination to involve resumptive pronouns and other categories (including empty categories). Interested readers are referred to McCloskey (1979), Schachter (1981), and Sells (1984) for related data and discussion of other languages.

egories are of the same syntactic type and thus does not provide any compelling arguments for a Slash-category analysis of resumptive pronouns.

One more thing should be mentioned concerning resumptive pronouns. Though they usually are morphologically and phonologically identical to personal pronouns, resumptive pronouns cannot refer freely. In the examples (40) and (41), repeated below, the pronouns cannot be understood as referring to some individuals in the context or some individuals previously mentioned.

(57) [S Lisi$_i$ [S Zhangsan$_j$ [S ta$_j$ bu xihuan t_i]]]
Lisi Zhangsan he not like
'As for Zhangsan, Lisi, he doesn't like ____ .'

(58) [S Neige ren$_i$ [S Zhangsan shuo [S Lisi$_j$ [S ta$_j$ bu xihuan t_i]]]]
that men Zhangsan say Lisi he not like
'That man, Zhangsan says that Lisi, he doesn't like ____ .'

In each of the two sentences, the pronoun must be understood as coindexed with the NP in a topic position.[119] This is evidence supporting the assumption that resumptive pronouns are introduced by phrase structure rules rather than freely instantiated.

Thus, the discussion shows that, assuming empty categories and resumptive pronouns are syntactically different in Chinese, the dependency phenomena in topic constructions can be accounted for by recognizing two types of phrase structures in topic constructions. If this analysis is correct, topic constructions, as a case in point, suggest the inadequacy of the notion of Subjacency, and serve as independent evidence in favor of invoking the Proper Inclusion Principle in Chinese.

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[119] In each of the two sentences, it is also possible for the resumptive pronoun to be coindexed with the initial topic, and then the empty category will be understood as being coindexed with the second topic. But it is impossible for the resumptive to be understood as being coindexed with an NP other than a topic.

5.4 A Further Constraint on the Application of the STM

Thus far, I have claimed that, concerning topicalization, extraction is possible so long as the relevant structure satisfies the FFP and the restriction on Slash termination. The restriction on Slash termination in Chinese as proposed in the previous chapter is that the Slash termination metarule applies only to verbally-headed ID rules. Despite its general success in handling the data so far covered, this claim leaves a set of structures unexplained, incorrectly predicting that the sentences in (59) and (60) are grammatical.

(59) *Lisi$_i$, Zhangsan yao t_i nuli xuexi.
Lisi Zhangsan ask hard study
'Lisi, Zhangsan asked ____ to study hard.'

(60) *Lisi$_i$, Zhangsan daying t_i nuli xuexi.
Lisi Zhangsan promise hard study
*'Lisi, Zhangsan promised ____ to study hard.'

These structures are ungrammatical regardless of the fact that the link between the topic and the empty category can be properly established without violation of the FFP and the fact that the empty category can be sucessfully licensed since it is a sister of the verbal head. The same can be observed in (61), (62) and (63), leaving aside the definiteness requirement of a topic.[120]

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120 In (62) and (63), the preposition *gei* is located between the verb and the aspectual element *le*. This phenomenon may be considered as a case of preposition incorporation (cf. Baker 1988). Like English, Chinese has two basic structures for dative verbs: $[_{VP}$ V NP_1 $[_{PP}$ P $NP_2]]$ and $[_{VP}$ V NP_2 $NP_1]$. But some Chinese dative verbs may also have a structure like $[_{VP}$ V-P NP_2 $NP_1]$. The preposition (P) may be optional or obligatory, depending on the particular dative verb involved. See Zhang (1990) for related discussion.

(61) *Yiben shu$_i$, Zhangsan song le t_i gei Lisi.
one book Zhangsan give ASP to Lisi
*'A book, Zhangsan gave ____ to Lisi.'

(62) *Lisi$_i$, Zhangsan song gei le t_i yiben shu.
Lisi Zhangsan give to ASP one book
*'Lisi, Zhangsan gave ____ a book.'

(63) *Yiben shu$_i$, Zhangsan song gei le Lisi t_i.
one book Zhangsan give to ASP Lisi
*'A book, Zhangsan gave Lisi ____ .'

Note that there is one thing in common in the structures in (59) through (63). In all these structures, the verbal head has another sister besides the empty category, in contrast to all the previous cases, where the empty category is the only sister of the verbal head in the structure in question. If this is the correct generalization, the extraction cases in Chinese call for a further constraint on the application of the STM. The idea can be stated informally as the following restriction:[121]

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[121] A sentence like (63) with a definite NP in place of the topic is grammatical, as shown by the example in (i) below. However there are no corresponding sentences like (ii), where a definite NP is in the object position, involving no extraction.

(i) Neiben shu, Zhangsan song gei le Lisi.
that book Zhangsan give to ASP Lisi
*'That book, Zhangsan gave Lisi ____ .'

(ii) *Zhangsan song gei le Lisi neiben shu.
Zhangsan give to ASP Lisi that book
'Zhangsan gave Lisi that book.'

This might suggest that sentences like (i) are generated without extraction and thus involve no SLASH in the analysis. In this sense, the reformulated STM is irrelevant to them. No matter how sentences like (i) should actually be analyzed, it seems generally correct that when the verb requires two (or more) sister constituents as complements, extraction of one of them would greatly diminish the relevant structures in terms of the grammaticality.

The Slash Termination Metarule operates on those ID rules in which the verbal head requires a single complement.

In other words, STM in Chinese may serve solely to express generalizations about the subcategorization possibility of those verbal heads which only have a single sister category. Thus, the STM for Chinese has the following form:

(64) STM

X --> H, α[BAR 2] ===> X/α[BAR 2] --> H, e

It should be noted that this STM is in substance consistent with the original proposals in GKPS and it does not constitute any change in principle; the difference is only that the Chinese STM is a special case of the general form of STM1, in the sense that the STM for Chinese is no more than those cases where H (verbal head) is the only possible value for the variable W in the general STM.[122] Thus, the grammar correctly predicts that the following structures are ungrammatical:[123]

(65) *Lisi$_i$, Zhangsan gaosu t_i Wangwu xihuan neiben shu.
Lisi Zhangsan tell Wangwu like that book
*'Lisi, Zhangsan told ____ that Wangwu likes that book.'

(66) *[Lisi xihuan neiben shu]$_i$, Zhangsan gaosu Wangwu t_i
Lisi like that book Zhangsan tell Wangwu
*'Lisi likes that book, Zhangsan told Wangwu ____ .'

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122 Various proposals have been suggested in the literature for constraining or eliminating the application of metarules (see Flickinger 1983, Pollard 1985, Shieber, Susan, Uszkoreit, and Robinson 1983, Thompson 1982 for discussions). In terms of Slash termination, an alternative to get the same effect is to employ lexical rules in the lexicon instead of metarules in syntax, as suggested in Pollard 1985.

123 It was pointed out by an anonymous reader that a sentence like (66) is acceptable to some people. But they sound quite odd to a number of native Chinese speakers I have consulted.

The grammar also correctly predicts that sentences like (67) and (68) are ungrammatical, though VP extraction is usually possible if the VP is a complement of the verbal head as mentioned in chapter 4 and shown by examples like (69):

(67) *[Nuli xuexi]$_i$, Zhangsan yao Lisi t_i.
hard study Zhangsan ask Lisi
'To study hard, Zhangsan asked Lisi ____ .'

(68) *[Nuli xuexi]$_i$, Zhangsan daying Lisi t_i.
hard study Zhangsan promise Lisi
*'To study hard, Zhangsan promised Lisi ____ .'

(69) [Shuo zhexie hua]$_i$, wo bu gan t_i.
say these word I not dare
'Say these words, I don't dare ____ .'

Thus, languages may vary somewhat in the way in which they satisfy general principles. While English allows an empty category to occur only as a sister of a lexical head, Chinese allows an empty category to occur only as the sole sister of a verbal head. The difference between Chinese and English in this respect may be expressed in terms of special cases versus general cases of STM. If this is correct, the examples in (59) through (68) are actually not counterexamples; they merely call for further constraint on the application of STM.

5.5 Other Cases

The present analysis accommodates some other cases which need special stipulations in previous analyses. Consider the following examples in (70) and (71). These examples have been mentioned several times in the discussion, but nothing specific has been said about how they could be accommodated by this analysis.

(70) *[Shuo zhexie hua]$_i$, wo nande t_i.
say these word I seldom
*'Say these words, I seldom ____ .'

(71) [Shuo zhexie hua]$_i$, wo bu gan t_i.
say these word I not dare
'Say these words, I don't dare ____ .'

Xu and Langendoen (1985) observed the grammatical contrast between (70) and (71) but did not provide clear explanations for the contrast. According to their general rule,[124] both (70) and (71) should be well-formed. Obviously, a special stipulation is needed to rule out (70) in their analysis. Note that the Subjacency Condition has nothing to say either about such cases, since the dependency relations are not across two bounding nodes in any event. Consider the relevant structures for (70) and (71) represented in (72) and (73) respectively:

(72) *[Shuo zhexie hua]$_i$, wo nande [$_{VP}$ t_i].
say these word I seldom
*'Say these words, I seldom ____ .'

(73) [Shuo zhexie hua]$_i$, wo bu [$_{VP}$ [$_V$ gan][$_{VP}$ t_i]].
say these word I not dare
'Say these words, I don't dare ____ .'

In the present analysis, the difference is simply that although both (72) and (73) satisfy the FFP, the empty category in (72) cannot be licensed since the VP is not the sister of a verbal head, in contrast to (73), which does not have such a problem. The following examples can be explained in a similar way.

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124 Their rule states an "aboutness" condition. See footnote 37 in chapter 3.

(74) *Zhangsan$_i$, wo kanjian t_i gou le.
Zhangsan I see dog ASP
*'Zhangsan, I saw ____ dog.'

(75) *Zhangsan$_i$, wo xihuan t_i de shu.
Zhangsan I like MO book
*'Zhangsan, I like ____'s book.'

(76) *Che$_i$, neige ren kai-zou le Zhangsan de t_i.
car that man drive ASP Zhangsan MO
*'Car, that man drove away Zhangsan's ____ .'

(77) *Zhangsan de$_i$, wo xihuan t_i shu.
Zhangsan MO I like book
*'Zhangsan's, I like ____ book.'

(74) is an example Huang (1982) presents to show the relevancy of the Left Branching Condition (Ross 1967). Look at the relevant structure for (74) in (78).

(78) *Zhangsan$_i$, wo kanjian [$_{NP}$ [$_{NP}$ t_i][$_{NP}$ gou]] le.
Zhangsan I see dog ASP
*'Zhangsan, I saw ____ dog.'

Here ***gou*** is a NP (or may be N'). Thus, the ungrammaticality of (78), therefore (74), is also simply due to the fact that the empty category cannot be successfully licensed. The same is true of (75). Although ***de*** might be considered as a lexical category, it is not a verbal head. Thus, (74) and (75) are two additional cases showing the distinction between categories which are sisters of the verbal heads and those which are not. While Chinese in general allows subject gaps as shown before, it does not allow non-verbal subject gaps.

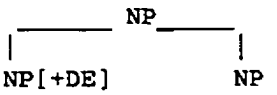
Similar to (78), the relevant structures for (76) and (77) are (79) and (80) respectively:

(79) *Che$_i$, neige ren kai-zou le[$_{NP}$ [$_{NP}$ Zhangsan de][$_{NP}$ t_i]].
car that man drive ASP Zhangsan MO
*'Car, that man drove away Zhangsan's ____ .'

(80) *Zhangsan de$_i$, wo xihuan [$_{NP}$ [$_{NP}$ t_i][$_{NP}$ shu]].
Zhangsan MO I like book
*'Zhangsan's, I like ____ book.'

To be more precise, the local tree for the relevant NP in both (79) and (80) would look like:

(81)



Clearly, neither of the daughter NPs in the tree can be extracted, because it is not possible for the empty category in either the specifier NP[+DE] position or the head NP position to be licensed, since neither of them is a verbal head. Thus, this analysis does not need the A-over-A principle, which Lu (1987) suggests, to rule out structures like (79); nor does it require the stipulation (by Xu and Langendoen 1985) that a modifier constituent cannot occur in TOP, to prevent a modifier NP from being topicalized. All these cases follow directly from the general principles assumed in the analysis.[125]

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125 The ECP (Chomsky 1981) also permits gaps to be licensed through "antecedent-government". Clearly, the notion of antecedent-government alone cannot account for the cases in (70) through (77).

Chapter VI

CONCLUSION

In this dissertation, I have discussed antecedent-gap dependencies, specifically of topicalization constructions in Chinese. I have shown that antecedent-gap dependencies in the vast majority of cases in Chinese can be characterized in terms of structural properties. Antecedent-gap dependencies in Chinese, as in other languages, involve two general notions: the structural domain beyond which antecedent-gap dependency may (or may not cross), and the position in which an empty category may occur. More precisely, antecedent-gap dependency in Chinese may not cross beyond certain (island) constructions such as prepositional phrases (or clauses introduced by prepositions) regardless of the position of the empty category within that construction, and an empty category may occur only in the position which is the sister of the verbal head of the construction in question. These notions may be considered as being compatible with the basic ideas of Subjacency and the ECP respectively in the sense that Subjacency (or the island constraints) largely restricts the structural domains beyond which antecedent-gap dependencies may not cross and the ECP mainly constrains the positions in which empty categories may occur, but Subjacency and the current formulations of the ECP cannot adequately account for antecedent-gap dependencies in Chinese. As shown in chapter 3, Chinese does not exhibit any compelling evidence for the

relevancy of the standard island constraints and thus the Subjacency Condition, though certain constructions in Chinese allow absolutely no extraction, displaying island effects. Thus, while island effects in English and other languages such as Italian may be unified under the notion of Subjacency, in this respect the difference between English and Chinese cannot be accounted for by the notion of Subjacency with parametric variations. This seems to indicate, consistent with Maling and Zaenen's (1982) suggestion, that languages may vary more freely in terms of the domain out of which extraction is (or is not) allowed and that island constraints probably should be considered a less unitary phenomenon than has been traditionally assumed.[126]

In contrast, languages seem to vary less freely in terms of the positions that allow empty categories. Though the lexical head requirement is not adequate to account for the possible positions in which empty categories may occur in Chinese, the relevant generalizations of empty categories in both Chinese and English can be stated in a general and unified form that an empty category must be "closely" connected with the head of the construction (cf. Chomsky 1986). This seems to indicate that languages meet some general principles with minimal variations, but that at the same time languages differ in the extent to which they simply elaborate certain possibilities. Thus, as Bach (1989) notes, the idea of parameters probably should not be thought of in too global a way.

In the GPSG framework, I have shown that in general extraction in Chinese is possible if the relevant structure satisfies both the FFP and the restriction on Slash termination. The FFP actually ensures that an empty category is properly identified

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126 Maling and Zaenen (1982) show that island constraints may exhibit a wide range of variations even among closely related languages such as Swedish, Norwegian, and Icelandic.

(properly linked with its antecedent through local dependencies), and the Slash termination restriction requires that an empty category must be licensed by the head of the construction. One of the examples concerns extraction from NP complement clauses. As shown in previous chapters, it is generally impossible to extract an element from an NP complement clause, though it is possible to extract an element from a relative clause in a corresponding construction.

(1) *Heping$_i$, Lisi xiangxin [$_{NP}$ [$_S$ xuesheng xunqiu t_i] de fang'an.]
peace Lisi believe student seek MO plan
hui yingde guangfan de zhichi.
will win wide MO support
*'The peace, Lisi believes that the plan that student seek ____
will win wide support.'

In chapter 5, it was suggested that the impossibility of extraction from an NP complement clause is attributable to the effect of the corresponding ID rule for relative clauses due to the Proper Inclusion Principle. As a result, the relevant structure violates the FFP and the empty category in an NP complement clause cannot be properly linked with its antecedent. In other words, the fact that an empty category is the sister of a verbal category is not sufficient for well-formedness, as shown by the structure in (1), where the empty category is in the object position and therefore the sister of a verbal head.

On the other hand, a proper linkage between an empty category and its antecedent is necessary, but not a sufficient, condition for an empty category to be legitimate. Consider one of the examples discussed before, repeated below:

(2) a. [Zuo zhexie shi]$_i$, mei ren yuanyi [$_{VP}$ t_i]
do these thing no people will
'Do these things, nobody will ____.'

b. *[Zuo zhexie shi]$_i$, mei ren [$_{VP}$ t_i]
do these thing no people
'Does these things, nobody ____.'

As indicated in the previous chapter, the grammatical contrast between (2a) and (2b) is due to the fact that the empty category in (2a) is the sister of a verbal head but its counterpart in (2b) is not, even though the empty categories in both (2a) and (2b) can be properly linked with their antecedents.

These facts indicate that a Chinese empty category must not only be properly associated with its antecedent, but also must be, in some sense, in the domain of the head of the construction. This, though not stated here in terms of Government Binding theory, suggests that a relevant condition on Chinese empty categories is something like a version of the Empty Category Principle, consistent with Kayne's (1981, 1983) proposal that an empty category requires both proper government and connection with its antecedent through some path.[127]

The asymmetry between extraction from subject-located complex NPs and extraction from object-located complex NPs has been among the peculiar and puzzling distributional facts of Chinese empty categories. In the framework of GPSG, I have shown that the relevant generalization can be expressed in an LP rule like the following:

(3) NP[SLASH] < [+V, -N]

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127 Along same lines, Engdahl (1984) proposes that for each empty category, there must be a structural governor and a projection path defined from the empty category to its antecedent. Stowell (1985) also proposes that 'an empty category requires both a head governor and an identifying element.'

While this rule seems to be stipulative, it implies an important idea that the grammatical contrast between the extraction from subject-located NPs and that from object-located NPs is not due to the property of a complex NP, but related to the relation between the NP and the head of the construction. More precisely, a constituent containing a gap must hold a certain type of relation to the head of the construction, depending on properties of the language in question such as word order. This, in some sense, conforms to the generalization reflected in Kayne's proposal (1983) that a proper path between an empty category and its antecedent in a language depends on the way of proper government in the grammar of that language. For instance, if the head (lexical or otherwise) governs its complement to the right, then extraction usually takes place from right branches.[128] Thus, the generalization expressed by the LP rule in (3) is not simply theory-internal. One more interesting implication suggested by this LP rule is that in addition to the essentiality of the position of an empty category, the relation between category containing a gap (or allowing a path) and the head of the construction is also crucial to the distribution of empty categories in a language. Accordingly, the distinction between categories containing gaps and those which are gaps themselves are essential. What is important is that an adequate grammatical theory should make provision for stating all these generalizations.

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128 Though the suggestion of the present analysis in GPSG is consistent in substance with Kayne's insight, the distribution facts of Chinese empty categories cannot be stated directly in terms of Kayne's proposal, which crucially depends on the notion of lexical government. An account of the relevant cases in Chinese such as the extraction asymmetry between subject-located complex NPs and object-located complex NPs may be possible in some extension of Kayne's theory, which, I believe, must distinguish subject position and object position on the one hand, while allowing both left-branching and right-branching paths in this language one the other hand. I am not going to pursue this topic further here.

It is well understood that various fundamental principles of language interact to determine the status of a particular structure. As has been shown, whether a structure containing empty categories is well-formed may involve not only principles about empty categories but also principles about rule interaction. In this dissertation, I attribute the extraction discrepancy between relative clauses and NP complement clauses to the Proper Inclusion Principle. Extraction is impossible from NP complement clauses due to the effect of the phrase structure of relative clauses. When an NP complement clause involves extraction, the corresponding ID rule for relative clauses applies instead of the rule for NP complement clauses, since the structural description of the former properly includes that of the latter. One relevant point here is that to determine whether one structural description properly includes another, as Pullum (1979) notes, it is necessary to have both in some standard format. Thus, a theory which allows grammatical rules to encode gaps clearly has certain advantages in capturing similarities and differences among phrase structures in a language, such as those between Chinese relative clauses and NP complement clauses. This indicates that proper representations of phrase structures can be crucial to the possibility of accounting for some central cases by invoking fundamental grammatical principles. Thus, excessive attempts to reduce the role of grammatical rules in the theory are not appropriate.

Furthermore, the analysis presented in chapter 5 indicates that grammatical rules do not apply equally and some kind of ordering among rules is needed in the theory of GPSG. Though a well-formed syntactic representation in general needs to satisfy only one ID rule, the interaction between the rule for relative clauses and that for NP complement clauses suggests that ID rules are not evenly ordered. In

fact, the idea that grammatical rules apply in some order is not new within the general framework of GPSG. As mentioned in chapter 4, Uszkoreit (1987) shows that the word order in German requires LP rules to be organized disjunctively in the theory and one LP rule may override another. Sag (1987) proposes a LP theory that allows LP rules to make reference to a grammatical hierarchy of obliqueness and the information of other types.[129] In the light of Uszkoreit (1986, 1987), Sag assumes that the LP rules for English include the following, which are disjunctively ordered:[130]

(4) a. LP2: COMPLEMENT[HEAD: [MAJ: ¬V]] « X[LEX: −]

b. LP2A: X[MAJ: ¬N] < [FOCUS: +]

LP2 says that all complements other than VPs and Ss precede more oblique phrasal categories. LP2A says that any non-nominal categories precede categories with the specification [FOCUS: +]. Thus, the grammar will correctly predict the phenomenon of "Heavy NP Shift", for the VPs in sentences like (5), will be LP-acceptable in virture of LP2A even though they contradict LP2.

(5) a. Kim [$_{VP}$ put [on the table][the book he bought in VIENNA]]

b. Sandy [$_{VP}$ gave [to Kim][the book she bought in VIENNA]]

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129 Following Keenan and Comrie (1977) and Perlmutter (1983), Sag assumes that subjects are highest, direct objects next highest, then second objects, then non-arguments, and adjuncts are lowest, in the grammatical hierarchy.

130 According to Sag, rules in forms like α « β are hierachic LP rules, which constrain the ordering of daughters with reference to their positions on the obliqueness hierarchy.

It should be noted, however, that with respect to the ordering among rules, many fundamental questions need to be answered by further research. Among these questions are the internal structure of grammatical rule systems, the nature of restrictions on possible feature specifications in formulating grammatical rules, and especially the consequences of a theory in terms of its generative power.

The Proper Inclusion Principle, though quite general, has been tested largely from phonological cases. The analysis presented in chapter 5, if correct, provides a new case from syntax for this principle. The principle is so fundamental that it should be reflected in any theory in one way or another. In the theory of GPSG, the general feature instantiation principles operate crucially with respect to the ID rule which has licensed the local tree. But two (or more) ID rules may seem to be relevant to a given local tree, as shown by the case of extraction from NP complement clauses discussed in chapter 5. It is the PIP that comes into play to determine the application of one ID rule and preclude the application of the other(s). In this sense, the PIP is a metagrammatical condition governing the interaction among ID rules. However, though this analysis assumes that the Proper Inclusion Principle is relevant to Chinese syntax, to what extent and in what circumstance it actually applies, and what features and rules are (or not) sensitive to it, are still open questions.[131] In other words, different syntactic features and rules might not behave equally with respect to this principle. One thing seems clear: as Sanders (1974) notes, all explanations of proper inclusion relations between particular rules are dependent on the particular assumptions about the representations of given constituents and on the general assumption that linguistic objects are represented

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131 For instance, it is not clear to me whether the PIP applies to the ID rules licensed through metarules in the same way as it applies to the basic ID rules.

in terms of simplex-features. Thus, there will be considerable grounds for interpretation as to whether the principle applies in a given case. It is hoped that this analysis will serve as a useful case offering suggestions for further research on Chinese syntax and thus providing implications for the theory of grammar.

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