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Expanded Project Alpha Theory and Chinese Word Order

by

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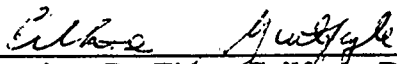
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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "Expanded Project Alpha Theory and Chinese Word Order" submitted by Wing Chiu Chan in partial fulfillment of the requirements for the degree of Master of Arts.



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ABSTRACT

Within an expanded version of Speas' (1990) Project Alpha Theory, we propose an analysis of Chinese word order which addresses two long-disputed issues in the syntax of Chinese: the distribution of a class of postverbal adjuncts (frequency, duration, result, and state expressions), and the head-final character of noun phrases. It is argued that the three proposed parameters, the theta-marking, theta-identification, and predicate-linking directionality parameters, can correctly capture these controversial patterns. Specifically, the occurrences of postverbal adjuncts are seen to follow from the right-to-left predicate-linking parameter, and the head-final behavior of noun phrases from the right-to-left theta-identification parameter. Contrary to Huang (1982) and Li (1990), this study, through a detailed analysis of the thematic properties of lexical items, concludes that Chinese lexical categories are consistently head-initial.

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LIST OF ABBREVIATIONS

CL	classifier
DE	modification marker
DUR	durative aspect
EXP	experiential aspect
OM	object marker
PER	perfective aspect
RM	result/state marker
SM	subject marker

CHAPTER 1

INTRODUCTION

1.0 Introduction

This thesis is an investigation of Chinese word order facts within Chomsky's principles-and-parameters framework. We propose that an expanded version of Speas' (1990) Project Alpha (PA) theory can account for a number of Chinese patterns previously considered recalcitrant in the literature, and aim at offering a principled explanation for the observed complications. We examine a number of phenomena that have hitherto been regarded as unrelated to one another, and show how they fall together naturally under the theory we adopt. We also suggest a new way of looking at the longstanding controversy as to whether Chinese is head-initial or head-final.

As the present study is undertaken within the principles-and-parameters framework, we provide a general overview of this framework, describing those specific concepts and principles that are relevant to the issues under consideration in section 1.1. In section 1.2, we first introduce several word order patterns in Chinese, drawing particular attention to the problems created by the distribution of a class of postverbal adjuncts (frequency, duration, result, state expressions) and by the head-final character of noun phrases. We then review three approaches to Chinese word order previously proposed by Huang (1982), Travis (1984), and Li (1990). It is demonstrated that none of these approaches can sufficiently capture the Chinese word order facts in question, suggesting that a more adequate account, i.e. one based on PA theory, is necessary. Finally, in section 1.3, we provide a brief overview of this thesis, describing how we will go about motivating such a theory, and applying it to solve the Chinese word order problems at issue.

1.1 Theoretical Framework

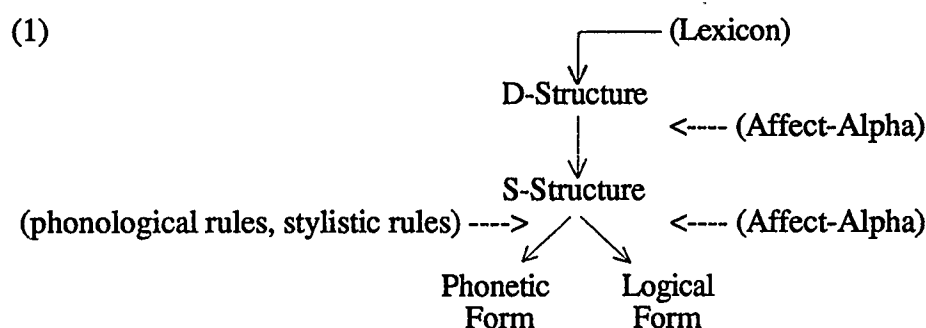
The principles-and-parameters theory developed in Chomsky (1981, 1986a,b, 1988) proposes that the mapping between form and meaning involves four levels of representation (section 1.1.1.1) which are constrained by a general principle called the Projection Principle (section 1.1.1.2), and a number of other principles (section 1.1.2).

Below, we illustrate how these subparts interact with one another in what has come to be known as the 'modular' approach to grammar.

1.1.1 The Levels of Representation and the Projection Principle

1.1.1.1 The Levels of Representation

Within the principles-and-parameters theory, the grammar consists of three fundamental levels of representation: D-Structure (DS), Phonetic Form (PF), and Logical Form (LF), and these levels are related to each other through the mediation of S-Structure (SS). These levels of representation, and the relationships among them, are shown in (1):



The lexicon, being the input to DS, consists of a set of entries which lists the idiosyncratic properties of lexical items. In particular, the lexicon specifies what theta roles (i.e. Agent, Patient, Source, etc.) a given lexical item can s(emantically)-select, and what syntactic categories it can c(ategorially)-select (i.e. subcategorize for). By the Projection Principle (see below) and the principles of X'-theory (see section 1.1.2.1), the s-selected (and equivalently the c-selected) categories are projected from the lexicon to become constituents at all syntactic levels, including DS. DS is thus the level of representation at which the thematic properties of lexical items are structurally encoded in terms of phrase markers, and it is mapped onto SS which in turn serves as an input level to both PF and LF (see section 1.1.2). SS can be said to reflect the thematic properties of lexical items only 'indirectly' through the presence of 'traces' (see below). PF is the level at which syntactic strings (derived by SS) are phonologically realized, and LF is one at which information relevant to semantic interpretation of sentences is encoded. In particular, such matters as quantifier scope and the scope of question-words are represented in hierarchical terms at LF. In this

sense, LF can be thought of as yet another syntactic level, in much the same way that DS and SS are. It is worth noting that any aspects of DS or SS that are deemed to be relevant to LF are simply carried over from one level to another as a part of the mapping process. Thus for example, in the case of control structures (see section 1.1.2.5), referential indices may be assigned at DS, and then the NPs in question will simply appear at LF with the relevant indices assigned.

1.1.1.2 The Projection Principle

The fundamental principle of grammar which ensures that the syntactic levels (i.e. DS, SS, and LF) are properly related to one another is known as the Projection Principle which is defined as follows:

(2) *The Projection Principle*

Representations at each syntactic level are projected from the lexicon in that they observe the selectional properties of lexical items categorially.

(Adapted from Chomsky 1981)

To illustrate its content, consider the transitive verb *hit*. As we saw earlier, part of the information encoded in the lexical entry of this verb is its s-selectional properties. Thus the verb s-selects a Patient (and c-selects a NP) as its complement, and the Projection Principle requires that this complement be structurally represented not only at DS, but at all subsequent syntactic levels as well. This principle thus determines much of how DS is constructed from lexical items. Moreover, it also follows that if the complement of *hit* is moved from its DS position to some other position at SS (as in the case of indirect questions like (3)), it must leave a coindexed trace (i.e. a phonetically null copy) in that position in order to satisfy the requirements as expressed the Projection Principle:¹

(3) I wonder [who_i [John hit [NP e_i]]].

Here, the antecedent (i.e. the moved element) and its trace are said to form a 'chain', (represented as <who_i, e_i>) which is understood as a sort of algorithm encoding the history

¹ Due also to the Projection Principle, when the same element is moved at LF, it will also leave behind a trace in its original DS position; however, such an LF representation will be exactly the same as (3) because LF Affect-Alpha involves processes which are very similar (perhaps identical) to those which operate in the mapping between DS and SS.

of movement. DS can be reconstructed from SS via the chain algorithm, and it is in this sense that SS is said to reflect the thematic properties of lexical items only 'indirectly'.

1.1.2 The Subsystems of Principles

The mappings between DS and SS on the one hand, and between SS and LF on the other are accomplished by the generalized transformation Affect-Alpha (cf. (1)) which moves, adds, or deletes virtually any category in a phrase marker.^{2, 3} This unrestricted operation will overgenerate, but the unacceptable sequences can be ruled out through the interplay of different subsystems of principles which function like general well-formedness conditions on the representations at each level. A sentence is grammatical only if it is assigned four well-formed representations. Since our aim here is to introduce a reference point for concepts to be used in our later discussion, only those subsystems which bear directly on the issues under investigation will be mentioned and discussed. They include X'-theory, Theta theory, Case theory, Predication theory, and Control theory.

1.1.2.1 X'-Theory

X'-theory restricts the class of possible well-formed phrase markers to those which conform to the X'-schema exemplified in (4), whose requirements hold at DS:

(4) *The X'-Schema*

- a. $X'' \rightarrow YP^* X'$
- b. $X' \rightarrow X ZP^*$ (Adapted from Chomsky 1986a)

X, i.e. the head, is a variable which ranges over all category types which include lexical categories (N, V, etc.), i.e. those which are defined in terms of the categorial features [$\pm N$] and [$\pm V$], and functional categories (COMP, INFL, etc.). YP and ZP denote the Spec(ifier)⁴ position and complement position, respectively. On the one hand, the asterisk

² SS is related to PF by the application of phonological and stylistic rules which are distinct in nature from the principles which govern the syntactic component of the grammar.

³ In the following chapters, we will restrict our attention mainly to DS and SS representations, and the mapping between them. As a result, LF Affect-Alpha, and the phonological and stylistic rules, which intervene in the mapping from SS to PF will not play an important role in this thesis. However, there will be a few occasions on which we will refer to the latter.

⁴ In what follows, the term 'Spec' will be used to refer to a syntactic position, and the term 'specifier' to a class of items which occupy that position.

on ZP in (4b) means that any number of the phrases so marked can appear. However, the number of complements a particular head can take is independently constrained by the selectional properties specified in its lexical entry.⁵ Also, the linear order of the head in relation to its complements is subject to cross-linguistic variation. On the other hand, because Spec refers to 'any' sister of X' (e.g. subjects, quantifiers, and all kinds of modifiers; cf. Chomsky 1981, 1986a,b), the YP in (4a) can be freely generated.⁶ Note that what is crucial about the specifier and the complement in (4) is that they must be maximal projections, and that they must be on the either side of the head (linear order parametrized).

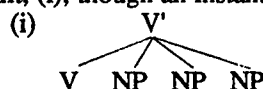
The X'-schema in (4) can be restated in terms of a list of well-formedness conditions, which includes the following:

- (5) a. Every phrase is endocentric.
- b. There are three bar levels: X'', X' and X.
- c. The head term is one bar-level lower than the immediately dominating phrasal node. (Speas 1990:37)

Taken as a whole, the three conditions in (5) can be said to impose the most schematic of constraints on possible phrase structures: They require that the value of the variable X be constant across the three 'bar levels' in the projection of a phrasal category (cf. (5a,b)),⁷ and (as *n*-ary branching is assumed) there is only one node for each bar level (i.e. no bar levels can iterate) (cf. (5c)).

X'-theory defines the notions of 'dominance', and of 'maximal projection' (i.e. XP), which are then used to define a fundamental relationship in hierarchical structure,

⁵ Thus, while the verb *give* c-selects two NP complements, there are none which c-select three. As a result, (i), though an instantiation of (4b), is not a possible structure:



⁶ We will assume this notion of 'Spec' for the time being; however, under Speas' (1990) Project Alpha theory, the term will be reinterpreted as the 'unique' sister of X', based on the assumption there is yet another selectional relation between the head and the specifier, mediated by the X' node, which is defined in terms of agreement (see section 2.3.3.2 for elaboration).

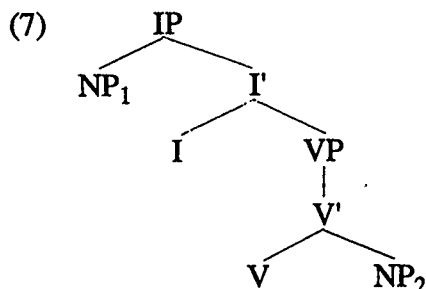
⁷ In particular, (5b) is a major point of controversy in the literature. As argued by Speas (1990), Hoekstra (1991) Ernst (1993), among others, 'bar levels' should not be considered as primitives of the grammar; rather, they should be 'defined' relative to a particular projection. We will return to this issue when we introduce the core of Speas' Project Alpha theory (see sections 2.3.1 and 2.3.2 for details).

namely the notion of 'c-command'. The notion of c-command, which expresses an intuitive relation "higher in the tree than", can be formalized as follows:

(6) *C-command*

A c-commands B if and only if every 'maximal projection' dominating A also dominates B. (Adapted from Aoun and Sportiche (1983))⁸

The definition in (6) makes explicit the idea that a c-commanding element must be in a position which is higher than or (as c-command can be mutual) at least at the same level as the elements it c-commands, where 'level' is understood in terms of a maximal projection. It can be illustrated in the following example:



In this example, NP₁ c-commands VP, V, and NP₂. VP c-commands NP₁. V and NP₂ c-command each other. Crucially, V does not c-command NP₁ since there is a maximal projection VP which dominates V, but it does not dominates NP₁.

This configurational notion will also play a central role in other subsystems of UG like Predication theory (see section 1.1.2.4), and Control theory (see section 1.1.2.5).

⁸ It should be noted that there are two formulations in the literature regarding the term 'c-command'. Another version (see e.g. Reinhart 1976) defines this term with reference to 'branching nodes' and it is said that A c-commands B if and only if every branching node dominating A also dominates B. The differences between the two formulations are not significant for our purposes, because in all instances we discuss later where the term is involved, the first branching node will always correspond to a maximal projection. However, since we are working within Speas' (1990) framework in which principles of grammar make reference to maximal projections, rather than to branching nodes, we have theoretical reason for preferring the 'maximal projection' definition. The reader is referred to Aoun and Sportiche (1983) for discussion of some empirical cases where their definition makes the correct predictions, whereas the 'branching node' definition does not.

1.1.2.2 Theta Theory

Theta theory is the subsystem of principles which is responsible for determining the structural representation of thematic relations between arguments (i.e. constituents assigned a theta role). It has been standardly assumed that theta roles are assigned at DS either by a lexical head to its complement positions as defined by X-bar theory, or compositionally by the head and its complements to a subject position (i.e. Spec of IP or Spec of NP). The former are called internal theta roles, and the latter external theta roles (cf. Williams 1981).⁹ The fundamental principle of Theta theory is the Theta Criterion which can be defined as in (8):

(8) *The Theta Criterion*

Each argument is assigned its theta role in exactly one position (namely, at DS), and each assignable theta role must be assigned to an argument. (Chomsky 1986a:184)

Essentially, the Theta Criterion establishes a biunique correspondence between arguments and theta positions. To illustrate with concrete examples, consider the following:

- (9) a. *I hit.
 b. *I hit a dog a cat.
 c. I hit a dog.
 d. I hit a dog last night.

The transitive verb *hit* has two theta roles to assign, one to its external argument and one to its internal argument. In (9a), the argument *I* is associated with two theta roles, while in (9b), two arguments, *a dog* and *a cat*, are associated with one single theta role, both leading to a violation of the biunique condition imposed by the Theta Criterion (cf. (9c)). In contrast, the grammaticality of (9d) indicates that *last night*, in being not required to be associated with a theta position, is not subject to the Theta Criterion. Such a constituent is called an adjunct.

⁹ Accordingly, the argument bearing the external theta role is called the external argument, and the arguments bearing the internal theta roles are called the internal arguments. It should be noted that in the sense of Williams (1981), the terms 'external' and 'internal' are understood in relation to the maximal projection of a verb (using verb as the canonical example of a lexical head), i.e. external/internal to a VP. However, under the assumptions of the VP-Internal Subject hypothesis (i.e. the hypothesis that subjects are base-generated in Spec of VP), these terms are in need of revision (see section 2.1.5 for more discussion).

The Projection Principle guarantees that the Theta Criterion applies to all levels of syntactic representation, with the result that every argument of a lexical head must be associated with a unique theta position at all those levels. However, the Theta Criterion properly applies to LF, the level at which thematic/semantic relations are checked. In cases where Affect-Alpha has applied to move an argument in the syntax (cf. (3), repeated here as (10)), it can be thought of as applying to the whole argument chain, checking the antecedent/trace pair for thematic coherence once the movement is complete:

(10) I wonder [who_i [John hit [$NP\ e_i$]]].

Here, the moved argument *who* is related to its theta position (i.e. its DS position) via the chain algorithm as mentioned before. Hence, the resulting argument chain $\langle who_i, e_i \rangle$ is associated with only one theta position, as required.¹⁰

1.1.2.3 Case Theory

Case theory is essentially an account of the distribution of lexical NPs in terms of the requirement that they have (abstract) Case. In Rouveret and Vergnaud (1980), this requirement is formulated in terms of a filter which applies at the SS level:

(11) *Case Filter*
 *NP if NP has phonetic content and has no Case.

The role of this filter is to rule out sentences which contain one or more noun phrases which are phonetically realized, but lack Case. Case¹¹ is assigned by the following [-N] categories to a particular syntactic position:

¹⁰ Given the Theta Criterion, it follows that movement is possible only to a non-theta-position. This is because movement to a theta position will necessarily create an argument chain with two theta positions, in violation of the Theta Criterion.

¹¹ The 'Case' referred to here should be more precisely referred to as structural Case which is independent of theta-marking, to be distinguished from inherent Case which is assigned at DS, and is tied to theta-marking. Throughout this thesis, we will ignore this distinction, and will use Case in the sense of structural Case unless otherwise specified.

- (12) a. INFL assigns NOM(inative) to [NP, IP].¹²
 b. V assigns ACC(usative) to [NP, VP].
 c. P assigns ACC to [NP, PP].

Note that Case-assigning properties are a function of various features. INFL only assigns Case when it has the feature [+Tense]. For Verbs and Prepositions, Case-assignment depends largely on lexical specifications: transitive Verbs and Prepositions have an ACC feature; ditransitive Verbs, we may assume, have two ACC features; intransitive Verbs have no Case feature.

Further efforts have been made in the literature to reduce the Case filter to Theta theory by incorporating the condition of 'visibility' into Theta theory (cf. Aoun 1979; Chomsky 1981, 1986a) which can be stated roughly as follows:

(13) *The Visibility Condition*

A noun phrase argument is visible for theta-marking only if it has Case.

In other words, this condition makes the process of theta-role assignment to an NP dependent on its having Case. We have noted above that the Theta Criterion is a condition of adequacy at LF. Thus, in order to be assigned a theta role, and hence satisfy the Theta Criterion, an argument must be Case-marked to become visible at LF. This visibility requirement is then projected to other syntactic levels by the Projection Principle, and as a result, the argument is eligible to be assigned a theta role at DS, the level at which theta assignment takes place. In contrast, a Caseless argument will not be visible at LF, and hence will not be assigned a theta role, in violation of the Theta Criterion.

1.1.2.4 Predication Theory

Predication theory is partly related to Theta theory. It requires that 'predicates' be linked to a structural 'subject', via coindexation, the assumption being that the predicate and its subject are licensed in terms of this relation (cf. Williams 1980, Rothstein 1983, and Chomsky 1986a). The paradigm case of predication occurs in main clauses where a VP

¹² Here, the structural notation [NP, XP] means that an NP is internal to the maximal projection of a particular head category.

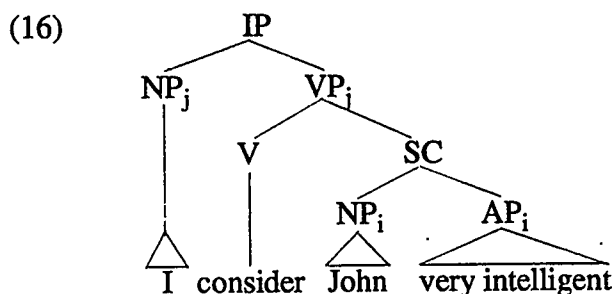
predicate is linked to (and hence predicated of) an NP subject, instances of which are known as 'primary predication':

(14) [_{IP} [_{NP_i} John] [_{VP_i} saw Mary]].

According to Rothstein's (1983) theory, maximal projections fall into two types, those which are argument XPs, whose distribution is governed by the Theta Criterion, and those which are predicate XPs, whose distribution is governed by a condition on predication which complements the Theta Criterion. In addition, it is argued that VPs, APs, and PPs must always be predicates which are identified as monadic (i.e. one-place) syntactic functions which require closure, or saturation, and saturation is achieved by linking each predicate XP to an argument XP, its syntactic subject, under the condition stated in (15):

(15) *Condition on Predication, or Rule of Predicate-Linking*
 Every predicate must be linked at SS to an argument which it c-commands and which c-commands it.
 (Adapted from Rothstein 1983:11)

The predicate-linking rule in (15) has two major advantages. First, the "extended" part of the Extended Projection Principle (cf. Chomsky 1981) which requires that clauses must always have subjects is now subsumed as a special case of predicate-linking. Second, (15) is intended to account for the distribution of predicate XPs not only in main clauses (cf. 14), but in small clauses (SC) as well, examples of which are called 'secondary predication'. To illustrate, consider the structural representation in (16):¹³



¹³ The precise internal structure of the SC need not concern us here. For ease of exposition, we will assume in what follows with Chomsky (1986b) that SCs are maximal projections of the head category functioning as the predicate of the SC, and within the SC itself, both the predicate and the overall SC have the same categorial label of XP. The reader is referred to Radford (1988:518-20) for some discussion of the strengths and weaknesses of this analysis.

On the one hand, the predicate VP *consider John very intelligent* is linked to the [NP, IP], *I*. NP and VP, being syntactic sisters, c-command each other, thus instantiating the relation of primary predication. On the other hand, the predicate AP *very intelligent* is linked to the [NP, AP], *John*. Both categories c-command each other for the same reason, and this is an instantiation of secondary predication. Thus, we can see that it is the second advantage of the predicate-linking rule that it can capture the structural properties of both types of predication relations in a single rule.

There is one final point about Predication theory which is worthy of note: predication is a purely syntactic relation defined in configurational terms at SS in which all predicate XPs must participate (cf. Rothstein 1983), and for this reason, the rule of predicate-linking is a general well-formedness condition on SS representations (and LF representations as well), but not on DS representations. To illustrate how the predication requirement can be fulfilled at SS, consider the following DS representations:

- (17) a. [IP e [VP arrived John]].
 b. [IP e [VP was eaten the apple]].

(17a) contains an unaccusative verb *arrived* which is standardly analyzed as inherently taking only one thematic argument, realized in [NP, VP] position at DS (cf. Perlmutter 1978, Burzio 1986). (17b) is an instantiation of a passive construction, where the passive morphology prevents the verb *ate* from assigning an external theta role to the [NP, IP] position at DS (cf. Chomsky 1981, Jaeggli 1986). In either case, the DS subject position will be generated empty, and there will be an unlinkable VP, in violation of the predication requirement. It is in these instances that the rule of Move-Alpha (an instance of Affect-Alpha) applies, moving the [NP, VP] to [NP, IP] position so that the VP can be linked to it at SS:

- (18) a. [IP [NP_i John] [VP_i arrived t_i]].
 b. [IP [NP_i The apple] [VP_i was eaten t_i]].

As (18) shows, after the movement of the NP, the predicate-linking rule can be satisfied and the resulting SS representation is thus perfectly well-formed:¹⁴

1.1.2.5 Control Theory

Control theory is also important for our later discussion. This subsystem determines the interpretation of PRO in control structures. The empty category PRO stands for a phonetically null pronominal which functions as the thematic and structural subject of the infinitival clause. It is assumed that PRO is generated at DS and is assigned a possible antecedent at LF by a rule of PRO Construal (see Manzini 1983, and Chomsky 1986a). To illustrate how this works, consider the following:

- (19) a. John_i tried [PRO_i to leave].
 b. [PRO to leave] would be nice.

In (19a), PRO must be interpreted as controlled by *John*. This control relation is indicated by coindexing, which means that *John* and PRO are instances of the same variable. In (19b), PRO is not controlled at all, and hence it has an 'arbitrary' or 'generic' interpretation, which can be highlighted by a paraphrase like "It would be nice for anyone to leave".

Technically, (19a) is referred to as an instance of obligatory control, and (19b) as an instance of optional control. As argued by Williams (1980), there is a configurational constraint in the case of obligatory control where the controller must c-command the controlled element, and we can verify that *John* in (19a) does c-command PRO (cf. section 1.1.2.1 for a definition of c-command). In the case of optional control, no such constraint applies; as we can see in (19b), there is no possible controller in the sentence, and if there is one, it need not c-command PRO:

- (19) b'. [PRO_i to leave] would be nice for John_i.

¹⁴ Notice that the subject NP will already be indexed after the application of Move-Alpha; still, it is available for the predicate-linking rule given that a particular category, whether or not it bears an index, can be coindexed.

According to van Riemsdijk and Williams (1986), the most striking diagnostic for (obligatory) control structures is that they do not obey the Theta Criterion, i.e. they involve a relation between two theta positions. As we noted in section 1.1.2.2 above, given the Theta Criterion, movement is possible only to non-theta-positions; if movement operations create a relation between two theta positions, the biunique requirement between arguments and theta positions imposed by the Theta Criterion will be violated. In (19a), however, both the matrix verb *tried* and the infinitive *to leave* assign independent theta roles to their subjects, *John* and PRO, respectively. These two elements are then related by the rule of PRO Construal which determines that the c-commanding NP *John* is the controller of PRO in this case. Accordingly, we can then identify cases of (obligatory) control as the cases where the Theta Criterion fails to hold, that is, as the cases in which a relation between two independent theta positions is involved.

It should be pointed out that a fully articulated theory of Control is yet to be developed. At this stage of the theory, there are numerous questions which still remain to be answered (see Horrocks 1987:131-6 for some relevant discussion).

This completes our review of the major assumptions and concepts of the principles-and-parameters theory relevant for this thesis. Other principles of grammar crucial to our ensuing discussion will also be introduced as we proceed. We now turn to some aspects of Chinese word order facts that are directly related to the issues discussed in the thesis.

1.2 Chinese Word Order Facts

Chinese word order facts have been of great interest to researchers working in the principles-and-parameters framework since the 1980s. This is because Chinese exhibits characteristics which challenge the theory's central claim that the specific word order properties of languages can be captured by the interaction among the subsystems of Universal Grammar (UG) plus a small set of parameter values for a particular language. Below, we will outline some basic word order patterns in Chinese, illustrating how certain exceptional cases pose problems for the otherwise straightforward description of Chinese word order.

In Chinese, the basic word order of a sentence is Subject-Verb-Object (SVO), and heads usually precede their subcategorized complements. For instance, complements of verbs¹⁵ occur postverbally if no movement takes place. This is demonstrated in the following sentences:¹⁶

- (20) a. Zhang1san1 xi3huan [Li3si4].
 ZS like LS
 'Zhangsan likes Lisi.'
- b. Zhang1san1 zhi1dao [Li3si4 bu4 cong1ming].
 ZS know LS not clever
 'Zhangsan knows that Lisi is not clever.'
- c. Zhang1san1 gei3 [Li3si4] [na1 yi1-ben3 shu1].
 ZS give LS that one-CL book
 'Zhangsan gave Lisi that book.'

Likewise, complements of prepositions follow their heads, as (21) shows:

- (21) a. Zhang1san1 zhu4 zai4 [Mei3guo2].
 ZS live at America
 'Zhangsan lives in the U.S.'
- b. you3 yi1-ben3 shu1 zai4 [zhuo1zi-shang3].¹⁷
 have one-CL book at table-top
 'There is a book on the table.'

¹⁵ The categorial distinction of adjectives and verbs in Chinese is not clear-cut. For present purposes, it suffices to say that adjectives, like verbs in Chinese, can take complement NPs directly (cf. i), and they can independently constitute the main predicate of a sentence without a copula (cf. ii):

- (i) wo3 hen3 gao1xing4 talde biao3xian4.
 I very happy his performance
 'I am very happy about his performance.'
- (ii) jin1tian1 hen3 re4.
 today very hot
 'Today is very hot.'

However, since these similarities between verbs and adjectives in Chinese do not have a direct bearing on the main argument of this thesis. We will, in what follows, continue to treat the two categories as separate classes in Chinese (see also chapter 3, fn. 19 for a similar discussion).

¹⁶ Throughout this study, tones will be transcribed in terms of tone numbers, placed after an associated syllable. Thus, the numbers 1, 2, 3, and 4 represent a high level tone, a high rising tone, a falling-rising tone, and a high falling tone, respectively.

¹⁷ It should be noted that Chinese has only prepositions and no postpositions, and the so-called postpositions in Chinese, such as *shang* 'top', *xia* 'bottom', and *li* 'inside' are actually localizing suffixes, turning a common noun into a place noun, rather than changing an NP into a postpositional phrase (cf. Li 1990).

The only case in which a complement precedes the head is within NPs as in (22) below:

- (22) a. [yu3yan2xue2]-de yan2jiu1
 linguistics DE study
 'the study of linguistics'
- b. [cheng2shi4]-de hui3mie4
 city DE destruction
 'the destruction of the city'

Moreover, Chinese 'modifiers'¹⁸ generally precede the modifyees, but not vice versa:

- (23) a. [zuo2tian1 mai3]-de shu1
 yesterday buy DE book
 'the book that was bought yesterday'
- b. [xin1]-de yi1fu
 new DE clothes
 'new clothes'
- c. [man4man4]-de zou3
 slow DE walk
 'to walk slowly'
- d. [fei1chang2]-de gao1
 very DE tall
 'very tall'

In (23a-d) above, each head is preceded by its modifying relative clause, AP, AdvP, and degree adverb, respectively. A reverse ordering of the examples in (23) will result in ungrammaticality, as indicated in (24) below:¹⁹

- (24) a. *shu1 [zuo2tian1 mai3]-de
 book yesterday buy DE
- b. *yi1fu [xin1]-de
 clothes new DE
- c. *zou3 [man4man4]-de
 walk slow DE

¹⁸ Throughout the thesis, we use 'modifiers' with single quotation marks as a cover term for both adjuncts of VPs and modifiers of NPs.

¹⁹ Cases like (24a-b) are well-formed if given an appropriate context. However, they are clausal topic-comment constructions, not noun phrases.

- d. *gao1 [fei1chang2]-de
tall very DE

However, in contrast to what has been observed in (23) and (24), there are four other types of 'modifiers' which must follow the head. They are frequency, duration, result, and state expressions (FDRS elements for short):²⁰

- (25) a. Zhang1san1 pao3-le [san1 ci4]. (Frequency Expression)
ZS run-PER three time
'Zhangsan has run for three times.'

- a'. *Zhang1san1 [san1 ci4] pao3-le.
ZS three time run-PER

- b. Zhang1san1 pao3-le [san1 xiao3shi2]. (Duration Expression)
ZS run-PER three hour
'Zhangsan has run for three hours.'

- b'. *Zhang1san1 [san1 xiao3shi2] pao3-le.
ZS three hour run-PER

- c. Zhang1san1 pao3-de [hen3 lei2]. (Result Expression)
ZS run-RM²¹ very tired
'Zhangsan ran and got very tired.'

- c'. *Zhang1san1 [hen3 lei2] pao-de.
ZS very tired run-RM

- d. Zhang1san1 pao3-de [hen3 kuai4]. (State Expression)
ZS run-RM very fast
'Zhangsan runs very fast./Zhangsan is a very fast runner.'

- d'. *Zhang1san1 [hen3 kuai4] pao3-de.
ZS very fast run-RM

The examples in (25) clearly demonstrate that the modifying FDRS expressions must not precede their modifiees, as opposed to relative clauses, APs, and AdvPs and degree adverbs.

²⁰ Strictly speaking, the so-called frequency expression does not express frequency for a given time period, but indicates the number of incidences of a described event. Also, what is termed a state expression here denotes some kind of generic action, which is similar in effect to the 'habitual' present of English (cf. Ross 1984).

²¹ The *de* morpheme preceding an R/S expression will be glossed simply as RM, to be distinguished from the DE used in preverbal/prenominal modification.

Given the above-mentioned basic patterns of Chinese, there appear to be two questions that any satisfactory approach to Chinese word order facts must answer. First, why are most heads followed by their complements, while nouns exhibits the opposite order? Second, why do 'modifiers' always precede modifiees except in the case of FDRS expressions? There are of course many other syntactic patterns in Chinese and many other questions remain to be answered. For our purposes, the discussion so far is sufficient to show the inadequacy of previous accounts of Chinese word order within the framework of principles-and-parameters theory, a topic that we will turn to in the following section.

1.2.1 Previous Approaches to Chinese Word Order

Recently, much research has been done to explain word order facts in Chinese, and most of them have followed Stowell's (1981) program in eliminating, or reducing to a minimum, phrase structure rules as traditionally conceived.²² Among them, for instance, Huang (1982), Travis (1984), and Li (1990) all provide different ways to approach the issue under consideration. Huang takes up the topic from the viewpoint of X'-theory, Travis from that of Theta theory, and Li from that of Case theory. In what follows, we give a critical review of all these three accounts, suggesting that none of them succeed in capturing the word order facts of Chinese under investigation.

1.2.1.1 Huang's (1982) X'-Theoretic Account

In order to capture the various aspects of word order in Chinese, Huang (1982) proposes a structural constraint expressible in terms of the general principles of X'-theory. Explicit in his analysis is the idea that the notions 'head-initial' and 'head-final' can be parametrized across 'levels of projections' and 'types of categories'. This means that while some languages may be head-initial or head-final for all bar levels and categories, others may be head-initial for certain bar levels and categories, but head-final for others.

With this variation in the head-initial/final specification available in the projection system, Huang posits the following X'-Structural Constraint to be assigned to Chinese:

²² These are the category-specific phrase structure rewriting rules of earlier theories (cf. Chomsky 1957, 1965) which can be understood as recursive definitions defining a set of syntactically well-formed strings for a specific language.

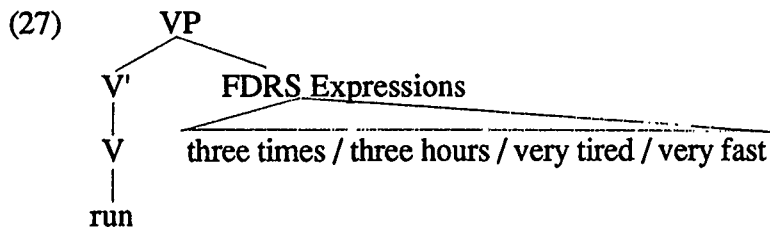
(26) *The X'-Structural Constraint of Chinese*

- a. $[X^n X^{n-1} YP^*]$ iff $n = 1$ and $X \neq N$
 b. $[X^n YP^* X^{n-1}]$ otherwise (Huang 1982:41)

According to Huang, (26) is taken as a SS constraint, and therefore applicable at the level of PF. (26a) has the effect of requiring every single-bar projection to be head-initial except in the case of N. (26b), on the other hand, requires every double-bar projection as well as the single-bar projection of N to be head-final.

Empirically, the constraints in (26) can capture various word order patterns in Chinese. For one thing, they correctly predict that only complements of N may precede their head, because only N is not subject to (26a). For another, under the assumption that 'modifiers' are any constituent dominated by an XP node (cf. Stowell 1981; Chomsky 1986a), it follows from (26b) that 'modifiers' such as APs, relative clauses, AdvPs and degree adverbs all precede their modifiees. In combination, (26a) and (26b) claim that Chinese is basically head-final, and heads may appear in initial position only in the single-bar level of categories other than N.

However, Huang notes that (26) cannot apply straightforwardly to explain the postverbal occurrences of FDRS expressions (cf. 25a-d). In particular, such expressions, being 'modifiers' (i.e. nonsubcategorized elements) by definition, are supposed to appear only preverbally. To accommodate these facts, Huang proposes that (26a) should be interpreted as meaning that the lowest branching node, instead of the designated X'-level, can be head-initial. Under this revision of interpretation, examples (25a-d) are then acceptable because, in each case, the V' combines with an FDRS expression to form the lowest branching node which is allowed to be head-initial:



(Adapted from Li 1990:7)

While Huang's X'-theoretic approach can explain most of the basic patterns in Chinese, there are several problems inherent in his analysis. Below, we highlight two such problems, one conceptual, and one empirical.²³

Conceptually, it should be clear that Huang's X'-Structural Constraint for Chinese is tantamount to an ad hoc stipulation for a particular language; and as such it does not explain why the category N in Chinese behaves differently from other categories in having prehead complements, and why the single-bar level in Chinese behaves differently from the double-bar level with respect to the general head-final pattern. Therefore, it is not clear in such an approach what the relation is between word order and different bar level/category combinations.

Empirically, there are true counterexamples to the X'-Structural Constraint. Recall that to account for the occurrences of FDRS expressions to the right of the verb, Huang has to relax the constraint in (26a), and say that the lowest branch node counts, instead of the X'-level. But this weakening of the requirements on possible Chinese X'-structures is not empirically adequate when more data are tested. Specifically, revising the interpretation of (26a) amounts to saying that a sentence should always be acceptable as long as there is only one constituent following the verb. However, this is not true, as shown below:

(28) a. *zhe4 jian4 shi4, ta1 shuo1-le [dui4 wo3].
 this CL matter he say-PER to me

b. zhe4 jian4 shi4, ta1 [dui4 wo3] shuo1-le.
 this CL matter he to me say-PER
 'This matter, he has said to me.'

(29) a. *ta1 jie4-le [xiang4 wo3].
 he borrow-PER from me

b. ta1 [xiang4 wo3] jie4-le.
 he from me borrow-PER
 'He borrowed (it) from me.'

(Adapted from Li 1990:8)

²³ The arguments presented below against Huang's proposal are based on Ernst (1986), and Li (1990). The reader is referred to these works for more detailed criticism.

Examples (28a) and (29a) have only one PP in postverbal position and therefore obey the X'-Structural Constraint in (26). However, they are not acceptable. As (28b) and (29b) demonstrate, the PPs must occur preverbally in order for the sentences to be acceptable.

Thus, in spite of its intuitive attractiveness, Huang's X'-theoretic approach does not gain much ground in capturing the wide-ranging word order variations across languages. Logically, the alternative is to reconsider the factors that may play a role in determining word order, and claim that Chinese word order phenomenon is a result of the intervention of some other factors.

1.2.1.2 Travis' (1984) Theta-Theoretic Account

In the preceding section, we presented Huang's (1982) account of word order facts in Chinese, which appeals to both hierarchical structure as well as linear order as defined by his X'-Structural Constraint. However, it should be pointed out that since Stowell (1981), it is generally assumed within the principles-and-parameters theory that the two types of relationships encoded by phrase structures, i.e. dominance relations and precedence relations, should be teased apart, with the former handled by X'-theory, and the latter by independently needed subsystems of UG. This theoretical position thus gives rise to the so-called parametric word order theory (cf. Koopman 1984; Travis 1984) which proposes that, besides the more general head-initial/final parameter (or simply head parameter; cf. Chomsky 1981), which is based on X'-theory, the directionality of theta-role and Case assignment can also be parametrized in order to account for word order generalizations across languages.

In Travis (1984), it is proposed that the three parameter values in (30) should be assigned to Chinese, which account for the basic linear order of the VP shown in (31), where PP₁ stands for prepositional complement and PP₂ for prepositional adjunct:

- (30) a. Theta roles assigned to the right
 b. Case (redundantly) assigned to the right
 c. Head-final

(31) PP₂ V NP PP₁

The essence of Travis' system is that the three directionality parameters interact. Of the three directionality parameters, she argues, only one needs to be set in a specific language.²⁴ If it is the general head parameter, the two more specific parameters follow.²⁵ If it is one of the more specific parameters that is set, however, the head parameter is fixed by default in such a way that all those elements which are not covered by the already specified parameter will be on the opposite side of the head. In Chinese, then, theta-role assignment is to the right (cf. 30a), and this is the only parameter that needs to be specified, as Case assignment (30b) is redundantly set to match (30a), and this accounts for the placement of arguments to the right of the verb. Consequently, there is a default specification that Chinese is head-final (cf. 30c) to account for the placement of adjuncts (i.e. those elements which are not assigned theta roles) to the left of the verb. Seen this way, as Travis argues, the DS of Chinese will have the same order as its SS. This is because elements theta-marked by the verb will be generated at DS to the right of the verb, and as Case is assigned also to the right at SS, those Case-needing elements (i.e. argument NPs) can remain in their base-generated position in order to be Case-marked at SS.

Moreover, Travis also argues that since nouns do not assign theta roles to their complements (following Rappaport 1983, Higginbotham 1983, and Anderson 1983-1984), the parameter settings in (30) automatically predict that the head noun of an NP will be final within the phrase. This is because in such cases, the theta-directionality parameter does not take effect, and the head-final parameter operates freely to place all elements (regardless of their status of argumenthood) to the left.

Theoretically, Travis' theta-theoretic account is an advance on Huang's X'-Structural Constraint, which is purely descriptive in function, and a step toward explaining the word order facts of Chinese by incorporating a concept of directionality into the three interacting subsystems of UG -- X'-theory, Theta theory, and Case theory. Empirically, however, there are two flaws in her approach. In the first place, it does not address the postverbal occurrences of FDRS expressions. These elements, not being subcategorized

²⁴ The motivation of this stipulation is to restrict the generative power of her proposed parameters so as not to allow for those word order patterns that have not been attested in human languages. The details of her analysis, however, need not concern us here.

²⁵ For example, in the case of English, all we need is to specify the head parameter as 'head-initial', and everything (theta-marked elements, Case-marked elements and adjuncts) will fall automatically on the same side, i.e. to the right, with respect to the head. Neither theta-directionality nor Case-directionality parameter is required to be specified.

for by the verbs, are not sensitive to theta-role assignment; hence, by her schema, they should occur in preverbal position. In the second place, in view of the recent claim that some nouns²⁶ do assign theta roles to their complements (cf. Zubizarreta 1987, and Grimshaw 1990), Travis' account would have been more convincing if she had provided some empirical evidence (preferably specific to Chinese) for her claim that the head-final character of Chinese NPs is due to the lack of theta-assigning ability of Chinese nouns.²⁷ However, no such evidence is provided.

1.2.1.3 Li's (1990) Case-Theoretic Account

In the spirit of Travis (1984), Li (1990) proposes that the word order of Chinese can be properly derived by incorporating a directionality requirement on Case assignment into the interacting modules of X'-theory, the head parameter, and Case theory. In conjunction with her attempt to arrive at a grammar that has as few language-specific statements as possible, she formulates a head-final constraint for Chinese along the lines of (32):

(32) *The Chinese Word Order Constraint*

- a. Chinese is head-final except under the requirement of Case assignment.
- b. Case is assigned from left to right in Chinese. (Adapted from Li 1990:11)

Li states that two levels of representation must be recognized. At DS, all categories are head-final.²⁸ NPs are subject to the Case Filter; Case is assigned at SS and in Chinese it is assigned to the right. As a result, at SS, Chinese is still head-final, except that NP-complements of Vs and Ps must move to the right of their Case-assigning heads in order to be Case-marked. Thus, in the former case, the movement can be charted schematically as follows:

²⁶ These are the so-called 'process nominals', as opposed to the so-called 'result nominals' which do not assign theta roles to their complements. This process/result distinction of nominals will be discussed in detail in chapter 4 when it is applied to the situation in Chinese.

²⁷ In chapter 4, we will take up this issue and provide some language-internal evidence to justify this claim.

²⁸ Implicit in this statement is the claim that theta-role assignment is to the left in Chinese, although for reasons we do not understand, she does not spell this out.

However, despite its theoretical appeal, Li's Case-theoretic account raises more questions than it answers. Below, we present some problems for Li's claim, both conceptual and empirical. First, consider the Case position at the right-hand side of the verb in (33b), which the NP complement moves into. As Goodall (1990) remarks, movement for Case reasons is generally structure preserving: an NP moves into an existing Spec position, marked for Case but unmarked thematically (cf. the discussion of (17b) and (18b) above). This position is used by the grammar independent of its role as a landing site for Case-motivated movement. On the other hand, it is unclear what kind of position is involved in (33b).³⁰ Of course, we may posit such a position in order to allow movement to occur, or we may say that the movement involved here is adjunction, even though this is not the ordinary mechanism for Case-motivated movement. Neither of these possibilities is *prima facie* very convincing, in that they both involve saying something *ad hoc* about the type of movement needed in (33b).

Second, Li's Case approach predicts that Chinese is head-final at DS and whenever some element occurs in post-head position, it is there for Case reasons. This means that those elements that do not need Case should not appear in postverbal position but rather must occur preverbally. This prediction is not borne out since, as we saw earlier, all verbal complements, regardless of their categorial status, appear postverbally, including subcategorized clauses (i.e. CPs) and PPs. According to Stowell's (1981) Case-Resistance Principle, the former category cannot occur in Case-marked positions at SS, while the latter do not need Case.³¹ To account for postverbal clausal complements, Li is therefore forced to claim that all subcategorized clauses need Case. To allow for postverbal PPs, Li holds that in a [V PP] construction, the PP in question is not a real PP. The structure is actually [[_V V P] NP], where P is reanalyzed with V to form a complex verb. NP is assigned Case by the complex verb, and hence the head-final constraint is not violated. With respect to her claim that subcategorized clauses need Case in Chinese, Li has not addressed the reasons why Stowell's Case-Resistance Principle, which in principle should be applicable to Chinese, is an incorrect generalization for the language. Without

³⁰ Indeed, Li does not even raise the question as to the status of this Case position at all.

³¹ The Case-Resistance Principle is formulated as in (i):

(i) Case may not be assigned to a category bearing a Case-assigning feature. (Stowell 1981:146)

Thus, the [-N] feature of PPs and the [+Tense] feature of CPs count as Case-assigning features, and by virtue of (i), the two categories are inherently insensitive to the Case Filter. In the case of subcategorized clauses, Stowell argues that they are extraposed to a peripheral Caseless position, thus preventing them from being Case-marked by the verbs.

such empirical support, her claim amounts to nothing more than a language-specific stipulation. In proposing that postverbal prepositions are subject to reanalysis in Chinese, Li has sidestepped the real issue, viz. the question of why such PPs appear in postverbal position in the first place, in order to trigger the process of reanalysis. If they do not need Case, there is no reason for them to leave their preverbal DS position and move to the position following the verb. Thus, this sounds like a terminological way of dodging the real issue. Furthermore, as pointed out by Tang (1990b), the above-mentioned reanalysis process is actually not available to the postverbal PPs. Consider the following:

- (35) a. Zhang1san1 zhu4 zai4 Mei3guo2.
 ZS live at America
 'Zhangsan lives in the U.S.'
- b. Zhang1san1 [pp zai4 Mei3guo2] zhu4.
 ZS at America live
 'Zhangsan is living in the U.S.'

If it is true that in (35a), the V-P sequence is reanalyzed as a complex verb, cases like (35b), with a preposed PP,³² should be ill-formed since it is well-known that only full constituents can move. The well-formedness of (35b), on the other hand, clearly indicates that the constituent structure involved in (35a) is [V PP], instead of [[v V P] NP]. Hence, contrary to Li's claim, there are indeed real postverbal PPs in Chinese.

Third, we mentioned above that Li maintains that D/F expressions, being categorially NPs, need to be Case-marked by the verb, despite the fact that the latter does not subcategorize for them. Moreover, as D/F expressions occur quite commonly after intransitive verbs (cf. (25a,b)), repeated below as (36)), she is obliged to stipulate that all verbs in Chinese, transitive as well as intransitive, are Case-assigners:

- (36) a. Zhang1san1 pao3-le [NP san1 ci4]. (Frequency Expression)
 ZS run-PER three time
 'Zhangsan has run for three times.'
- b. Zhang1san1 pao3-le [NP san1 xiao3shi2]. (Duration Expression)
 ZS run-PER three hour
 'Zhangsan has run for three hours.'

³² However, it should be noted that a different positioning of the same PP relative to a verb will always result in a difference in interpretation, an issue that we will deal with at length in chapter 3.

Although this stipulation can explain the postverbal distribution of F/D expressions, it raises the question of why time-point adverbials like *zuotian* 'yesterday', *jintian* 'today', and *mingtian* 'tomorrow', which refer to points in time rather than to duration, cannot appear postverbally:

- (37) a. Zhang1san1 [NP jin1tian1] lai2-le.
 ZS today come-PER
 'Zhangsan came today.'
- b. *Zhang1san1 lai2-le [NP jin1tian1]
 ZS come-PER today

As shown, these time-point adverbials, like F/D expressions, also appear in bare NP forms. This means that they too need to be Case-marked in postverbal position. Yet, they can only occur preverbally. Thus, it appears that there is much more to say than just that D/F expressions need Case, and hence eventually surface postverbally. It is hard to see how an account based on Case can do justice to the phenomenon in (37).³³

Lastly, as noted above, Li resorts to a reanalysis strategy at PF in order to account for the postverbal placement of R/S expressions. That is, as APs, R/S expressions need no Case, but they can occur to the right of Vs by being reinterpreted as the main predicate of the relevant sentences. Although it is imaginable that certain reanalysis mechanisms take effect once the R/S expressions occupy the postverbal position, it remains unclear, as in the case of postverbal PPs, why these expressions get there in the first place. As they do not need Case, there is no reason for them to move to the postverbal position from its DS position preceding the verb.

Summarizing, then, it has been pointed out above that word order facts in Chinese cannot be sufficiently accounted for by the interaction among X'-theory, the head parameter, and Case theory with the directionality requirement on Case assignment. Finally, it is ironic that Li, aiming at a grammar with as few language-specific statements as possible, should arrive at a number of conclusions that are highly language specific, for example, that subcategorized clauses need Case, that postverbal PPs are subject to reanalysis, and that intransitive verbs assign Case as much as transitive verbs do.

³³ As we will see in chapter 3, this phenomenon falls out naturally under a word order account based on Expanded Project Alpha theory.

1.2.1.4 Summary

In spite of their initial appeal, none of the previous approaches offer an adequate explanation of the Chinese word order facts presented so far. Thus, the problems which motivate Huang's descriptive X'-Structural Constraint still remain: first, why NPs are strictly head-final, while other categories are head-initial; and second, why FDRS expressions must appear postverbally while other adjuncts appear preverbally.

1.2.1.5 Conclusion: Towards a More Adequate Account

To a greater or lesser degree, we noted above that each of the approaches under review has its own limitations. Logically, there are two ways to accommodate the Chinese word order facts in question: either to save a particular approach from its flaws or to find a more adequate approach to replace the three altogether. Considering the first option, if we discard Huang's stipulative X'-Structural Constraint, there are two with explanatory value to choose between, namely Travis' theta-theoretic approach, and Li's Case-theoretic approach.

Our preceding discussion suggests at first pass that Travis' account would run into fewer complications than Li's account. Apart from the fact that there is no V'-internal movement involved, the postverbal occurrences of subcategorized clauses and PPs also follow unproblematically, since these complements are indeed theta-marked whether or not, according to standard assumptions, they need Case. However, despite these advantages, we have to admit that Travis' account fails to capture the postverbal occurrences of FDRS expressions. Thus, it would seem, at this point, that if we can come up with an additional parameter to predict the distribution of such postverbal adjuncts, and incorporate it into the structural mechanisms of Travis' approach, the Chinese word order problems at issue may then be settled. However, despite its superficial adequacy, her approach is problematic when dealing with other cross-linguistic word order phenomena, as shown below.

As pointed out by Mulder and Sybesma (1992), the problem with Travis' approach is that it lacks the generality advocated by Stowell (1981). Her statement about the interaction of the theta-directionality parameter, Case-directionality parameter and head parameter (they either point in the same direction or in different directions (cf. section

1.2.1.2 for discussion) does not extend to the majority of languages which can have adjuncts on either side of the verb. Take English for example; Travis argues that all we need is to specify that the language is head-initial since every constituent, whether it is assigned a theta role or Case or none at all, falls on the same side, i.e. to the right, with respect to the verb. This is not true in view of the adjunct distribution facts shown below:³⁴

- (38) a. John (quickly) opened the box (quickly).
 b. John (clumsily) dropped his cup of coffee (clumsily).

Needless to say, Travis' system simply collapses at this point.³⁵ Although for the language it is designed for, Chinese, it manages to make the correct word order generalizations. Its effects, however, come down to nothing more than that of a phrase structure stipulation. Thus, along with Mulder and Sybesma (1992), we propose that Travis' approach should be discarded in accounting for Chinese word order facts, and be replaced by a more adequate word order theory.

In the following chapters, we will motivate another parametric word order theory -- Expanded Project Alpha theory -- and apply it to solve the Chinese word order problems under investigation. It will be shown that this theory is not only explanatorily adequate in accounting for the Chinese word order facts presented so far but also free from the conceptual and empirical problems inherent in the previous approaches discussed above.

1.3 Organization of the Thesis

The organization of this thesis is as follows. Chapter 2 sets the stage by discussing a number of theoretical issues which bear directly on Speas' (1990) Project Alpha (PA) theory, including, among others, the theories of lexical conceptual structure (LCS) and theta grids (as developed by Higginbotham 1985, 1987), and the principles which constrain the mapping from lexical representations to DSs, i.e. the licensing condition, the

³⁴ For illustrative purposes, we restrict our attention to the so-called predicate-modifying adverbials which have scope over VPs (or semantically describe something about the events denoted by the verbs). See section 3.1.1.1 for a principled account of (38) offered by Expanded Project Alpha theory.

³⁵ In fairness to Travis, we feel obliged to note that more recently, Travis (1988) proposes a theory of adjunct licensing which can explain the adjunct distribution facts in (38). However, as far as her parametric word order theory (Travis 1984) is concerned, such facts are indeed unaccounted for.

Uniformity of Theta Assignment Hypothesis (UTAH), the Theta Criterion, and the Projection Principle. We show how syntactic structure is projected under Speas' PA theory where bar levels are not primitives of the grammar, but are rather defined relative to a particular projection, and more importantly how her 'licensing theta conditions', i.e. theta-marking, theta-identification, and theta-binding, are directly involved in constructing well-formed DSs.

Chapter 3 expands Speas' PA theory into a theory of word order parameters by incorporating a concept of directionality into its licensing mechanisms. Moreover, we argue that an additional parameter, i.e. the predicate-linking parameter, is required, and that our Expanded Project Alpha (EPA) theory, as a parametric word order theory, is more empirically adequate than Travis' (1984) approach. Thereafter, we set up three working parameters, namely the theta-marking, theta-identification, and predicate-linking directionality parameters, to solve the word order problems in Chinese inflectional phrases. First, we argue that the frequency and duration expressions are predicative rather than modifying in function, and that they are predicated of a sentential subject (cf. Teng 1975, and Ernst 1987). Second, we argue that result and state expressions are associated with the phenomenon of obligatory control (following Huang 1992) which can be considered as a special case of predication (following Williams 1980). Taken together, the postverbal occurrences of FDRS expressions are expected under the predicate-linking parameter. Finally, given the assumption that the interpretation of adjuncts is dependent on the available licensing mechanisms (cf. Rapoport 1991, 1993), we argue that our directionality parameters are well motivated empirically. The evidence in favor of this claim turns on the fact that certain adjuncts can appear either preverbally or postverbally, with a difference in interpretation depending on the position relative to the verb. Specifically, it will be demonstrated that theta-identification is the licensing mechanism available for the interpretation of preverbal adjuncts, while predicate-linking is the one available for the interpretation of postverbal adjuncts.

Chapter 4 is divided heuristically into two parts. The first part deals with the controversy surrounding the analyses of Chinese noun phrase structure. We first present Tang's (1990a,b) DP hypothesis, providing counterevidence to her claims, and then offer an alternative NP analysis of Chinese noun phrases, based on an assumption made by Huang (1982). We show that the NP analysis can accommodate a number of empirical

problems which the DP analysis encounters. The second part of this chapter relates the proposed NP structure to the three working directionality parameters within EPA theory. Here, we argue that although Chinese has the process/result distinction of deverbal nominals (cf. Lebeaux 1986; Zubizarreta 1987), its process nominals have a theta-grid structure which differs crucially from that of their English counterparts. Specifically, based on Grimshaw's (1990) proposal of argument suppression, we argue that besides the '1' position corresponding to the external argument, the '2' position corresponding to the internal argument is suppressed in Chinese process nominals. Under this analysis, the head-final character of Chinese noun phrases is expected as a result of the fact that theta identification is the only licensing theta relation available in that domain. Based on this result, we further argue (contra Huang 1982, and Li 1990) that Chinese lexical categories are consistently head-initial, and that the head-final character of noun phrases is explained as a necessary consequence of nominalization.

In chapter 5, we summarize the major research results of this thesis. To make our proposed analysis more in line with the current research programs within the principles-and-parameters theory, we also discuss some broader implications of EPA theory, suggesting that directionality parameters may plausibly be considered to be universal.

CHAPTER 2

PROJECT ALPHA THEORY

2.0 Introduction

In the previous chapter, we noted that none of the earlier accounts of Chinese word order are sufficient to capture the distribution of postverbal adjuncts (i.e. frequency, duration, result, state expressions) and the head-final character of Chinese noun phrases, suggesting that a more adequate account is necessary. In this chapter, we will introduce such an account, i.e. one based on Speas' (1990) Project Alpha (PA) theory, and in the following chapters we will expand it to solve the Chinese word order problems at issue. The organization of this chapter is as follows. Section 2.1 outlines certain basic assumptions of this theory, including the theories of lexical conceptual structure and predicate argument structure, and the mapping between lexical representations and syntactic structures. In section 2.2, we discuss the four general principles that Speas adopts to constrain this mapping, i.e. the licensing condition, the Uniformity of Theta Assignment Hypothesis (UTAH), the Theta Criterion, and the Projection Principle. Section 2.3 articulates Speas' theory of syntactic projection, consisting of two main proposals, PA theory (section 2.3.1) and the licensing conditions for nonheads (section 2.3.2), based on Higginbotham's (1985, 1987) modes of theta discharge and Fukui and Speas' (1986) discharge of 'Kase' features. We show how syntactic structure is projected under Speas' PA theory in which bar levels are not primitives of the grammar, but are rather defined relative to a particular projection, and more importantly how her three 'licensing theta conditions', i.e. theta-marking, theta-identification, and theta-binding, play an important role in building up well-formed DSs. Finally, in section 2.4, we conclude this chapter with the suggestion that PA theory can be expanded into a theory of word order parameters in order that the range of Chinese word order facts can be accounted for, thus paving the way for a full discussion of its theoretical and empirical motivations in the following chapter, where it is applied to handling Chinese word order in the domain of inflection phrases.

2.1 Preliminaries

Phrase structure theory in the principles-and-parameters framework has generally followed the program of Stowell (1981), rejecting the category-specific phrase structure rules which are articulated fully in the so-called "Aspects" model (Chomsky 1965). It is usually assumed that the only residue of such rules is the X'-schema (cf. section 1.1.2.1).

In part, such a theoretical perspective comes about as a direct result of the investigations of properties of lexical items. As Chomsky (1981) notes, there is an undesirable redundancy between the lexicon and the phrase structure component, with both specifying the range of possible complement structures in a language. The elimination of this redundancy is permitted by the introduction of the Projection Principle (cf. section 1.1.1.2), which requires that each level of syntactic representation be a projection of lexical representation in observing the subcategorization properties of lexical items. The phrase structure rules need not duplicate information contained in subcategorization frames and can then be reduced to the principles of X'-theory.

In the spirit of Stowell (1981), Speas (1990) proposes to go further, deriving even the X'-schema from deeper principles and thus reducing its role to a minimum. Her basic idea is that there is no need for assuming 'bar level' as a primitive of syntactic theory, since the relevant information about projection at DS can be read off the lexical entry of a given head, most notably, the semantic properties of a lexical item. Thus, she proposes that X'-theory should be dispensed with and replaced by PA theory.

To lay the groundwork for our later discussion, we outline a number of basic assumptions which bear directly on the premises of PA theory. We begin with a discussion of the properties of DS (section 2.1.1), onto which a lexical representation is mapped. We then describe the subparts of a lexical entry which are relevant for our purposes, namely the lexical conceptual structure (section 2.1.2.1), and the predicate argument structure (section 2.1.2.2). In section 2.1.3, we discuss the need for a predicate argument structure in addition to a lexical conceptual structure, showing that it is the former which regulates the mapping from lexical representations to DSs. In section 2.1.4, we describe the role of the Thematic Hierarchy, suggesting that it is this hierarchy which imposes order on the arguments in a predicate argument structure. Finally, section 2.1.5

outlines a particular approach to underlying sentence structure that Speas assumes, viz. the VP-Internal Subject hypothesis.

2.1.1 The Nature of DS

DS is defined as a pure representation of GF[Grammatical Function]-theta.¹ More informally, what it means is that DS is a pure structural instantiation of the thematic properties of lexical items. Thus for example, a lexical item like *hit* will always take a Theme argument at DS in the GF direct object position, although at SS, this Theme argument can raise to the GF subject position for Case reasons (as in the case of passive sentences). Apart from this semantic condition, DS is also subject to a formal condition, i.e. the principles of X'-theory. Thus, when the lexical item *hit* is projected into syntax, X'-theory will mandate that it be projected into a structure in which there is a head with the same categorial status. These conditions are definitional of the mapping from the lexicon to DS: the permissible DSs are all and only those which obey these conditions.

2.1.2 The Properties of a Lexical Entry

We mentioned in section 1.1.1.1 that contained in the lexicon is a list of lexical entries, each of which specifies the idiosyncratic properties of a particular lexical item. Since PA theory is concerned with the way in which thematic relations are mapped into syntactic relations at DS, the focus here is on the semantic properties assigned by a lexical item. These semantic properties are encoded in terms of two subparts: the lexical conceptual structures, and the predicate argument structures. The former can be thought of as the 'lexical' part of a lexical item's meaning, and the latter as the 'structural' part of a lexical item's meaning.

2.1.2.1 Lexical Conceptual Structure

The lexical conceptual structure (LCS) of a lexical item is akin to a semantic definition. It represents the particular action, or state named by the lexical item, and has

¹ Grammatical functions such as subject or direct object are, for a language such as English, configurationally defined, and the configurations in which the c-selected (or equivalently s-selected) categories mentioned in a lexical entry may occur at DS are determined by the principles of X'-theory (cf. section 1.1.2.2 for discussion).

variables in it representing the arguments of the lexical item. For example, the LCS of *put* takes the form in (1):

- (1) PUT: x cause y
 come to
 be at z (Levin and Rappaport 1988:24)

The definition in (1) is intended to capture the fact that *put* is a triadic verb, denoting an event in which three participants are minimally involved. The three distinct variables here describe the fact that an Agent (the 'x' variable) brings about a change in the location of a Theme (the 'y' variable), with the Goal of this change of location being indicated by the 'z' variable.

2.1.2.2 Predicate Argument Structure

The variables in an LCS are mapped onto syntactic positions at DS bearing the GFs of a lexical item. This mapping between LCSs and DSs is mediated by a Predicate Argument Structure (PAS)² which contains variables corresponding to the arguments of a predicate. The PAS indicates how many arguments a predicate must take in syntax (i.e. a predicate's adicity), and how these arguments are assigned their theta roles. An illustration of our conception of PASs is provided by the following PAS for *put*:

- (2) PUT: x < y, P_{loc} z >³ (Adapted from Zubizarreta 1987:16)

The notation in (2) tells us two pieces of information. First, the annotated variables show that *put* is a three-place predicate, taking three arguments in syntax. Second, (2) specifies the manner of theta-role assignment of *put* to each of its arguments. The variables inside the brackets represent the 'internal' arguments and are associated with NPs internal to the verb's maximal projection. One internal argument (corresponding to the underlined

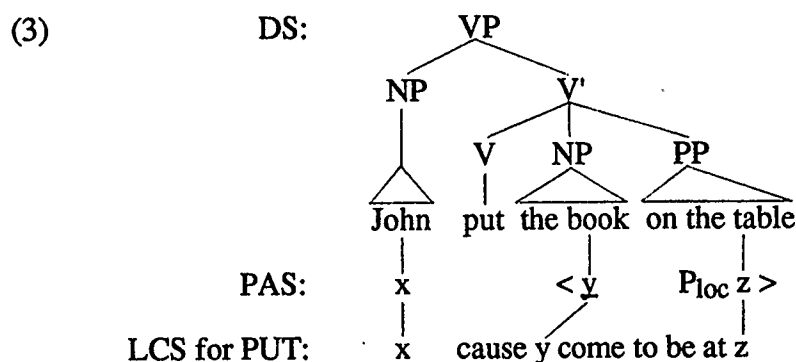
² The PAS is similar to the type of theta grid suggested by Higginbotham (1985, 1987), which uses numbers rather than variables. The conception of theta grids will be elaborated in section 2.3.3.1.0.

³ In adopting the PAS in (2) which lacks information about the syntactic category of the argument, we assume with Grimshaw (1979, 1981) that thematic information involves s(ematic)-selection, and that for each s-selected argument, there is a Canonical Structural Realization indicating what syntactic category it will be realized by.

variable) is a 'direct' argument assigned its theta role directly by the verb, and the other is an 'indirect' argument (cf. Marantz 1984) assigned its theta role by a locative preposition (represented in (2) as P_{loc}). The variable outside the brackets represents the 'external' argument (cf. Williams 1981), which is associated with an NP external to the maximal projection of the verb, and assigned its theta role compositionally by a VP.

2.1.3 The Projection from the Lexicon to DS

As suggested by Levin and Rappaport (1988), the PAS acts as an indispensable link in the mapping between lexical representations and DSs. There are two reasons for this. First, while the LCS does exhibit hierarchical organization, this is not the same as the hierarchical organization of syntax. Second, nothing in the LCS indicates whether or not a variable must be syntactically instantiated; in contrast, the PAS states which arguments are obligatory and gives the information necessary to assign them the appropriate syntactic positions. Thus, in the case of *put*, the mapping between its LCS and the syntax can be shown as follows:



In (3), each syntactic category in the structure is a syntactic instantiation of an argument in the PAS, and each argument in the PAS is linked to a variable in the LCS. Notice that in this theory, a syntactic position is assigned a theta role if it is a projection of a PAS position which is linked to a variable in a predicate's LCS. Thus for example, the information that the NP *the book* in (3) is assigned the Theme theta role is indirect. This NP position, which is one of the two complement positions within the V', is a projection of a particular argument position in the PAS which is in turn associated with a particular variable in the LCS.

2.1.4 The Place of the Thematic Hierarchy

While the precise linking between LCS variables and PAS positions for each predicate is idiosyncratic in nature and must be stipulated in the lexical entry, the association between PAS positions and syntactic positions is far more regular, and does not need to be stipulated. Following Carrier-Duncan (1985) and Belletti and Rizzi (1988), Speas claims that such 'linking regularities' between thematic relations and syntactic relations are due to the Thematic Hierarchy in (4):

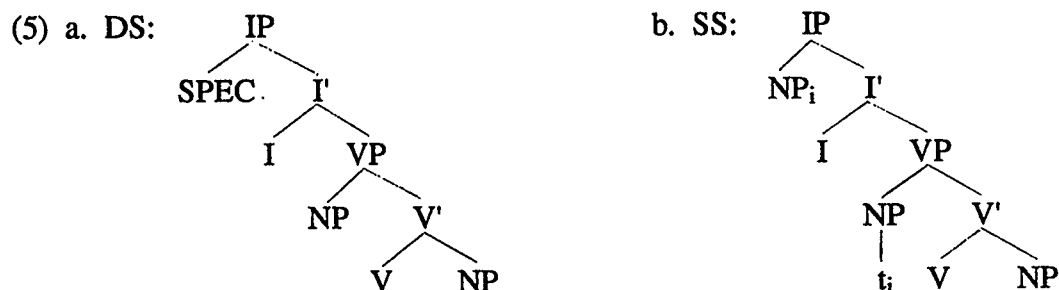
- (4) AGENT < EXPERIENCER < THEME
< GOAL/SOURCE/LOCATION < MANNER/TIME

The idea is that the arguments in a PAS are arranged according to (4), and as a result, when a given PAS is projected into syntax, (4) will ensure that for a certain number of arguments in the PAS, the one bearing the highest role on the hierarchy is projected to the highest structural position, the one bearing the next highest role to the next highest position, and so on. Ultimately, it is the fact that the arguments in the PAS are so ordered that accounts for the particular syntactic position an argument is associated with.

2.1.5 The VP-Internal Subject Hypothesis

Speas adopts a version of sentence structure that is argued for extensively in the literature, namely the VP-Internal Subject hypothesis (see Fukui and Speas (1986), Kuroda (1988), Koopman and Sportiche (1991), among others, for discussion of different motivations for (and consequences of) this proposal). Under this hypothesis, the subject of a sentence is base-generated in the [Spec, VP] position, i.e. the external argument⁴ position of the verb, receiving a theta role in that position. In a language like English, the subject then raises into the [Spec, IP] position at SS, in order to receive nominative Case from INFL:

⁴ It should be noted that under PA theory, the terms 'external' and 'internal' are understood in relation to the X'-projection of a head category (for a different opinion based on Williams 1981, cf. chapter 1, fn. 9).



In terms of PA theory, the claim of the VP-Internal hypothesis is essentially that at DS, all arguments in the PAS of a predicate are projected to syntactic positions which are dominated by a projection of the predicate. As such, the hypothesis is consistent with the assumption of PA theory that DS is a 'pure' structural instantiation of the thematic properties of lexical items.

2.2 The Mapping from the Lexicon to DS

As established above, the projection of phrase structure from the lexicon involves a mapping between PASs and DSs. Speas proposes four general principles that regulate this mapping, as follows:

- (6) a. the Licensing Condition
- b. Baker's (1988) Uniformity of Theta Assignment Hypothesis (UTAH)
- c. Higginbotham's (1985) version of the Theta Criterion
- d. a revised version of the Projection Principle

We will clarify the precise content of each of these principles in turn.

2.2.1 The Licensing Condition

The concept of licensing discussed in Chomsky (1986a) requires that "every element that appears in a well-formed structure must be licensed in one of a small number of ways" (p. 93). Along similar lines, Speas formulates the following licensing condition as a principle of grammar:

- (7) *The Licensing Condition*
Every element in a structure must be licensed.

In essence, this condition states that in order for a syntactic element to be legitimized in some position, it must fall within the domain of at least one of a limited set of recognized and defined syntactic principles, often taken as well-formedness conditions on phrase structure. Since PA theory is concerned with the principles which are directly involved in building up DSs, our focus is on the licensing conditions which hold at DS. Moreover, in keeping with her claim that DS is a 'pure' structural instantiation of the thematic properties of lexical items (cf. section 2.1.1), Speas proposes that DS includes all and only those phrases that are licensed by Theta theory (more precisely, Higginbotham's (1985, 1987) version of Theta theory (see section 2.2.3).

2.2.2 The Uniformity of Theta Assignment Hypothesis (UTAH)

The general guiding principle that DS configurations reflect lexical information is stated by Baker (1988) as the Uniformity of Theta Assignment Hypothesis (UTAH):

(8) *UTAH*

Identical thematic relationships between items are represented by identical structural relationships between those items at the level of DS. (Baker 1988:46)

The essential content of this condition is that if a lexical item has a given combination of theta roles to assign, then all surface manifestations of that thematic relation must arise from identical DSs. Thus, for example, the UTAH requires that a dative construction like (9a) and its double object counterpart like (9b) have the same DS since the thematic relations involved in both cases are identical:

- (9) a. John gave a book to Mary.
b. John gave Mary a book.

For the purposes of PA theory, Speas argues that the UTAH can be interpreted as a constraint which ensures that DS will be a structural representation which adheres to the ordering of the Thematic Hierarchy in (4).

2.2.3 The Theta Criterion

Speas adopts Higginbotham's (1985) version of the Theta Criterion which is defined in terms of 'discharge' of positions in the PAS, (cf. section 1.1.2.2 for a standard version of the Theta Criterion which is formulated in terms of a correspondence between arguments and theta positions):

(10) *Higginbotham's Theta Criterion*

- a. Every thematic position is discharged.
- b. If X discharges a thematic role in Y then it discharges only one.
(Higginbotham 1985:561)

In our terminology, the Theta Criterion in (10) says that a lexical head has a PAS whose positions must be discharged to arguments in syntax, and that it must occur in structures in which there are arguments which can saturate the positions in its PAS (for the definition of 'saturate', see section 2.3.3.1.0).

2.2.4 The Projection Principle

The Projection Principle mandates that all arguments in the PAS be syntactically represented. Informal versions of this principle state that all properties of a lexical item must be projected at DS and be maintained at every subsequent level of syntactic representation as well. Under PA theory, Speas suggests that this principle can be substantially simplified; it only requires that the UTAH and the Theta Criterion hold at all syntactic levels.

(11) *Projection Principle*

UTAH and Theta Criterion hold at all syntactic levels.

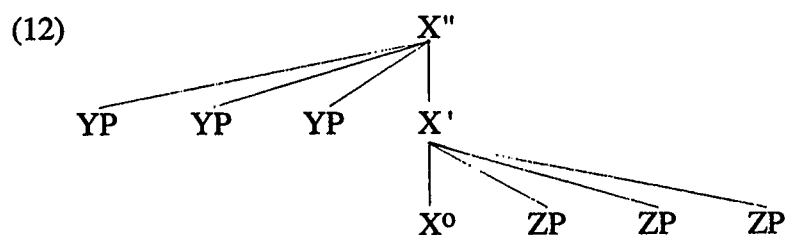
Having discussed the basic assumptions and the general conditions constraining the mapping from PAS to syntactic structure at DS, we now turn to Speas' theory of syntactic projection.

2.3 Speas' Theory of Syntactic Projection

In this section, we examine Speas' theory of syntactic projection, which is made up of two main proposals: PA theory, and the licensing conditions for nonheads. In section 2.3.1, we begin with a discussion of the formal version of the X'-schema as given by Chomsky (1986b), suggesting that bar levels are not primitives of the grammar. Section 2.3.2 outlines the concept of PA theory which Speas proposes to capture the correct generalizations about phrase structure. In section 2.3.3 we introduce Speas' explicit licensing conditions for nonheads which are based on Higginbotham's (1985, 1987) theory of theta grids, and Fukui and Speas' (1986) discharge of 'Kase' features. Finally, we summarize this section by showing how her two proposals work together (section 2.3.4).

2.3.1 Remarks on the Formal X'-Schema

The X'-schema as represented in (12) constrains the spellout of lexical properties at DS. In particular, it specifies that cross-categorially, projected structures uniformly have three and only three bar levels, namely X^0 , X' , and X'' :



(Adapted from Chomsky 1986b:3)

Speas takes issue with (12), arguing that bar levels are unnecessary in phrase structure. Nonheads (i.e. complements, modifiers, adjuncts, and specifiers) can be placed correctly in a phrase without reference to the X' -level or X'' -level. Thus, for example, complements are restricted to the lowest level, closest to heads, by virtue of Travis' (1984:76) Domain Adjacency Condition (DAC), by which all theta-role receivers must be closer to the head than items not bearing a theta role. Modifiers and adjuncts, such as APs and AdvPs, will then adjoin to the stack and combine compositionally with the constituent they adjoin to.

By resorting to the DAC, we can explain the ungrammaticality of sentences like (13) without invoking the bar-level distinction. In these examples, then, the ordering follows from conditions on theta-role assignment, and bar levels do not add any restrictions:

- (13) a. *John saw yesterday a UFO.
 b. *the student with long hair of Physics

Speas points out that the redundancy of bar levels is further supported by the fact that no principles of grammar ever make any crucial use of the intermediate level. Thus, we find principles like government, which make crucial reference to X^0 -level, and the notion of Barrierhood, for which X^{\max} is crucially relevant, but the X' -level has a different status, behaving simply as a sort of 'elsewhere case' to which principles of grammar do not specifically refer. Along the lines of this reasoning, she proposes that each phrase should have only a maximal projection and an X^0 , and any amount of structure in between the two. In the following section, we see how her PA theory can achieve this effect.

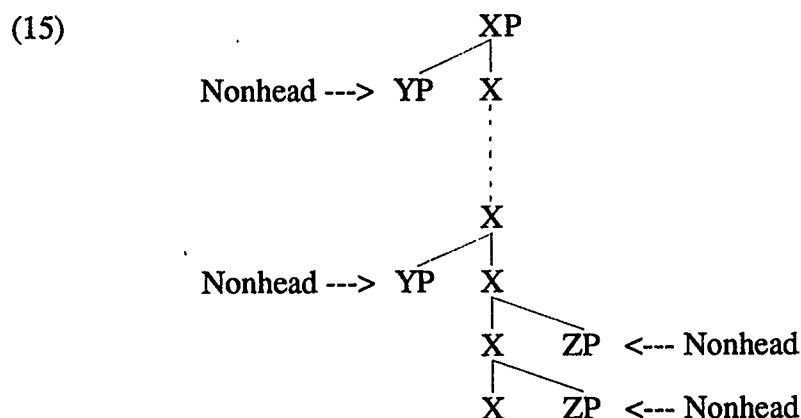
2.3.2 Project Alpha (PA) Theory

Speas proposes that X' -theory should be replaced by PA theory in which bar levels are eliminated as primitives of the grammar: 'maximal projection' and 'minimal projection' are rather defined relative to a particular projection, and 'intermediate projections' are simply the elsewhere case:

- (14) Project Alpha
 A word of syntactic category X is dominated by an uninterrupted sequence of X nodes. (p.43)

From a lexical item X, PA theory creates a vertical series of identical X nodes. The structure will project indefinitely upward, as far as is necessary to accommodate all nonheads, and there is no differentiation with respect to levels, except for defining 'maximal projection' and 'minimal projection': the latter corresponds to the familiar X^0 (i.e. a node dominating a lexical item), and the former to the top of the stack of projected nodes,

sister to an X^0 head of a different category.⁵ Accordingly, under PA theory, phrases have the schematic structure in (15):



N.B. linear order parametrized; binary branching assumed

In a sense, PA theory, Speas' first proposal, is a version of X'-theory in which much of the X'-schema has been eliminated as a primitive: the only X'-theoretic conditions imposed by it are that sentences have hierarchical structure, and that all structure is projected from a head.

2.3.3 Licensing Conditions for Nonheads

With reference to (15), the head and the higher nodes which project from it are licensed by PA theory itself, and the distribution of nonhead daughters is to be constrained by some other principles of the grammar. Speas' second proposal is for explicit licensing conditions for nonheads. In particular, complements, adjuncts, and modifiers are licensed by entering into particular grid relations (versions of Higginbotham's (1985, 1987) modes of theta discharge) with their sisters; and specifiers (at least for functional categories) are licensed by entering into a biunique 'Kase' relationship with their heads (cf. Fukui and Speas 1986). Section 2.3.3.1 below considers the licensing conditions for complements, adjuncts, and modifiers, and section 2.3.3.2 below discusses the licensing conditions for specifiers.

⁵ Speas (1990:44) technically defines X^{\max} as follows: $X = X^{\max}$ iff for all G which dominate X, $G \neq X$.

2.3.3.1 Licensing Grid Relations

2.3.3.1.0 Introduction

Speas adopts Higginbotham's (1985, 1987) theory of theta grids which makes no reference to theta-role labels like Agent, Theme, Location, etc. Thus, theta grids are purely syntactic in nature, and arguments of a verb are represented by means of the numeric notation (similar to Zubizarreta's (1987) type of PAS which uses annotated variables as discussed in section 2.1.2.2). Also following Higginbotham, Speas generalizes the concept of theta grids to other lexical items so that not only verbs but all lexical categories (N, V, A, P) have a theta grid as part of their lexical entries:⁶

- | | | | |
|----------------|---------|-------------|-----|
| (16) a. V: hit | <1 2 e> | b. A: happy | <1> |
| c. N: book | <1> | d. P: in | <1> |

Higginbotham refers to the numbers (and the *e*, to be discussed below) as 'positions' in the grid. Thus, in his terminology, we say that in (16a), for example, the verb *hit* has three grid positions. The grid position '1' represents the external argument (following Williams 1981), and the grid position '2' the internal argument. The other one, labeled *e*, designates an (non-thematic) 'event' place or a spatiotemporal location denoted by the verb *hit* itself, following an original suggestion of Davidson's (1967) that verbs of change or action have such an event position.⁷

The set of licensing grid relations serving to license the occurrence of nonheads at DS is closely tied to the nature of theta grids and the relations which may hold between the constituents bearing them; and a sentence like *John hit Bill cruelly* will best illustrate how these licensing grid relations work. Under PA theory, in order for this sentence to be

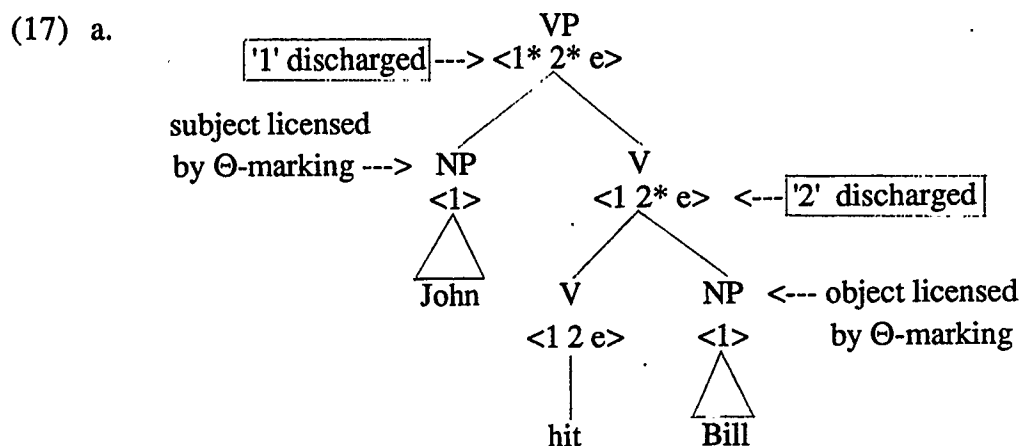
⁶ In this thesis, we are only interested in the theta grids of Ns and Vs, and we will make reference to the theta grids of other lexical categories only when necessary. Also, for the time being, we assume that a concrete noun like *book* has a grid position, '1', which in some sense corresponds to the noun itself. However, in chapter 4, we will make considerable extension to this analysis when we examine the theta grids of Chinese deverbal nominals.

⁷ The arguments for the existence of this e(vent) position are purely semantic. And by including it in the theta grid of the verb, we can express certain formalizations with respect to the modification and binding of an event. Thus, in a sentence like *John hit Mary in the bedroom*, the locative PP modifies not the verb *hit* but the event of hitting perpetrated by *John* on *Mary*, and this event is existentially bound in the sense that *John hit Mary in the bedroom* is true if and only if there is an event of *John's* hitting *Mary* in the bedroom.

grammatical, two conditions must be satisfied. First, every position in the theta grid of the verb *hit* must be discharged (or to put it another way, the theta grid of *hit* must be saturated⁸) in syntax under the configuration of sisterhood. In this respect, 'discharge' is defined as the elimination of open grid positions in the verb's theta grid (see (17a) and (17c) below for illustration). Second, all nonheads (i.e. the complement *Bill*, the VP-internal subject *John*, and the adjunct *cruelly*) must be licensed by bearing a particular type of grid relation with their sisters (i.e. the sequence of V nodes).

2.3.3.1.1 Theta-Marking

Theta-marking is the relation between a verb and its arguments, both internal and external. This type of grid relation is illustrated in (17a), where a starred number represents a discharged grid position, and an unstarred number an open grid position (assuming, following Higginbotham, that theta grids percolate up the tree from the heads):⁹



From bottom up, we have notated the fact that the verb *hit* discharges its '2' and '1' grid positions to the object position and subject position, respectively, by placing a star next to the appropriate position. As a result, the nonheads *Bill* and *John* are licensed by entering into a grid relation of theta-marking with a V node (note that in terms of PA theory, (17a)

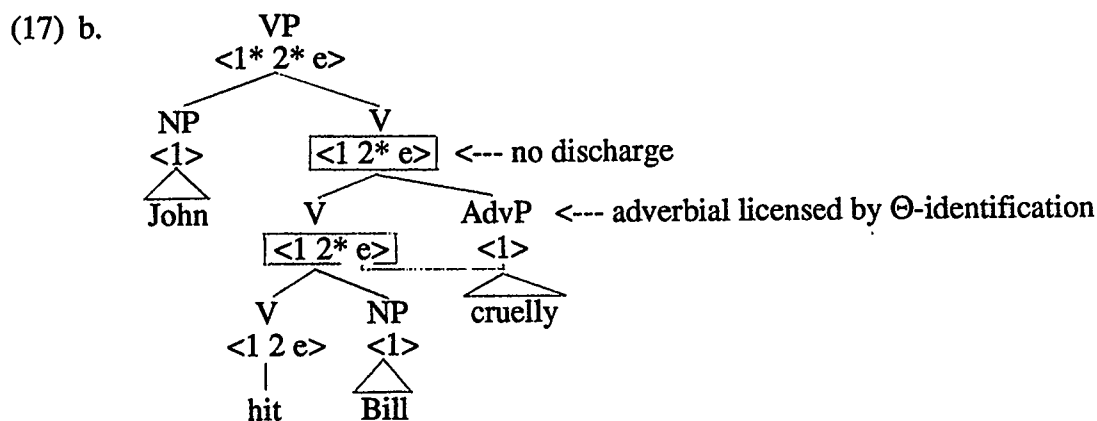
⁸ The term 'saturate' is used here in the following sense: a grid X is saturated iff every position in X is discharged (cf. Fukui and Speas 1986).

⁹ Notice that the three examples in (17) should belong together as the syntactic representation of *John hit Bill cruelly*. We have disassembled the entire structure into three parts in order to make explicit the working of the three types of licensing grid relations.

is yet to be well-formed since there is an open e position at the VP level remaining to be discharged).

2.3.3.1.2 Theta-Identification

Theta-identification is the relation which occurs in adjectival and adverbial modification. Our example sentence provides a case of the latter situation, as illustrated in (17b), where the nonhead adjunct *cruelly* is licensed because the open position in its theta grid is theta-identified or merged with the e position in the verb's theta grid. Following Higginbotham, we indicate this relation by drawing a line linking the two positions:¹⁰



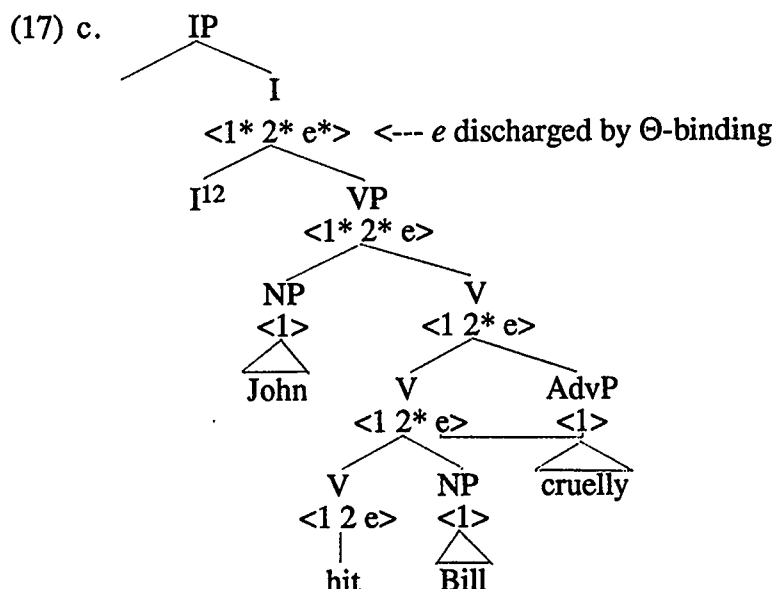
Notice that theta-identification does not bring about the discharge of any of the verb's grid positions. This is shown by the higher boxed theta grid in (17b), which contains an open (merged) e position which still needs to be discharged, and this position is now related to both a V node and its sister (i.e. the AdvP). Theta-identification, then, is the merger of two undischarged grid positions (once again, this structure is still ill-formed).

2.3.3.1.3 Theta-Binding

Theta-binding can be exemplified by the relation between determiners or measure words and their nominals, as in *the dog*, and by the relation between INFL and the e

¹⁰ For ease of representation, we will not represent the theta-grid structure of nonhead daughters in full. Instead, we will consistently attribute a '1' position to such items, which is necessary to saturate the theta grid of the verbal head, as in the case of theta-marking; and to be linked to the e position therein, as in the case of theta-identification.

position in the VP. In our case, we say that INFL theta-binds the *e* position in the theta grid of the verb *hit* insofar as it restricts the event to a particular reference point in time. Semantically speaking, past tense restricts the event of *John's* hitting *Bill* cruelly to being an event in the past which must have occurred before the time of utterance of the sentence. In terms of PA theory, the *e* grid position of *hit* is finally discharged, and the entire structure becomes well-formed at this stage:¹¹



For now, we have given sufficient information on the set of grid relations; specifically, theta-marking is responsible for licensing arguments (both internal and external), and theta-identification for licensing modifiers and adjuncts. These licensing relations will play an important role as our discussion proceeds. Now we turn to a discussion of the licensing conditions for a different type of nonhead, namely the specifiers.

¹¹ In (17c), we see that PA theory allows a structure to be projected in the absence of an overt nonhead daughter, so the landing site for the VP-internal subject (i.e. the [Spec, IP] position) can be projected as shown.

¹² Following Higginbotham (1985, 1987), Speas asserts that theta-binders like INFL do not have theta grids, but instead have Kase grids which include only features assigned to their specifiers (see section 2.3.3.2 for more details).

2.3.3.2 'Kase' Features

PA theory also has some interesting implications for specifiers. In particular, if there is no X'-node, the Spec position can no longer be identified as the sister of this node. In Speas' system, Spec is reinterpreted as the unique adjacent sister to a functional head, licensed by a biunique 'Kase'¹³ relation between Spec and head (lexical heads have no Spec in this system). Specifically, Speas (following Fukui and Speas 1986) assumes that functional heads possess Kase grids whose features are to be assigned to the occupant of the Spec position. This then forces a biunique relation between a functional head and the specifier that it agrees with (i.e. to which it assigns Kase features). Thus in English, INFL assigns a unique nominative Case, and hence there is one and only one subject. Similarly, DET and COMP assign a unique genitive Case and a unique +WH feature, and hence there is one and only one genitive NP and *wh*-phrase, respectively.¹⁴

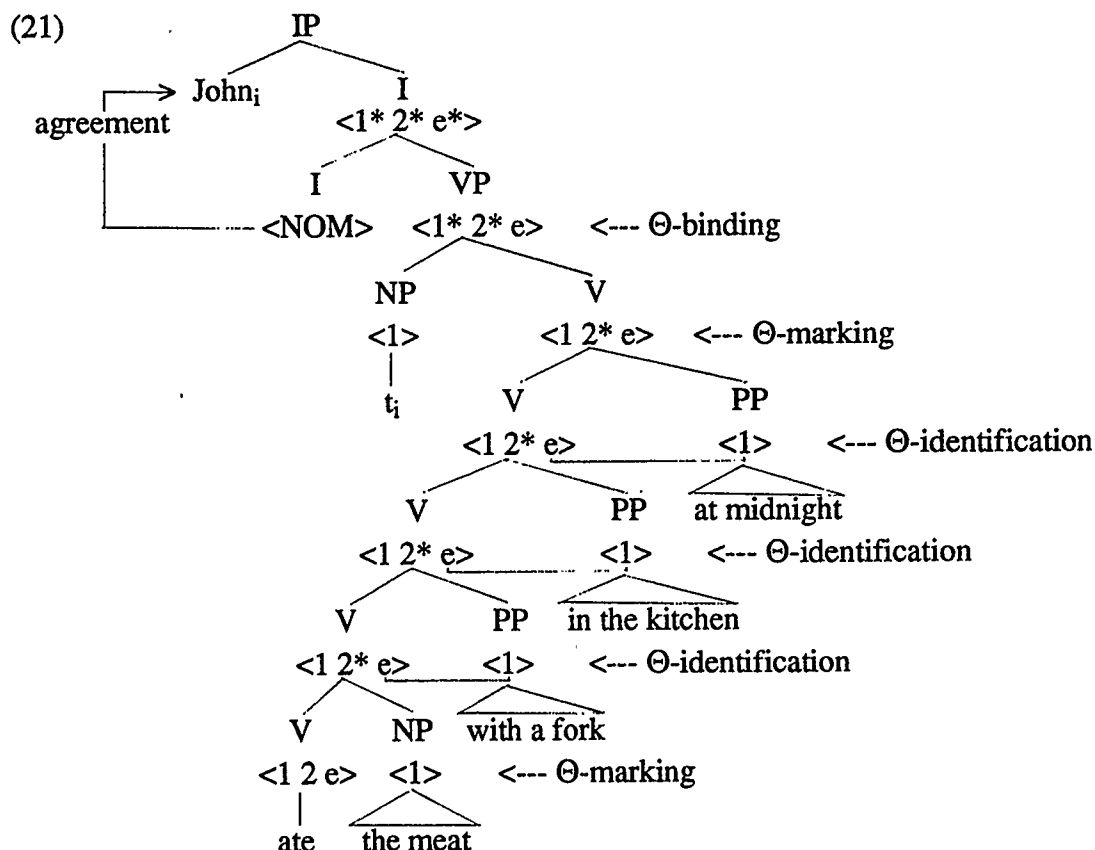
Restricting ourselves to the first case above, under PA theory (in conjunction with the VP-Internal Subject hypothesis (cf. section 2.1.5)), the clause subject is generated at DS in a base-generated 'adjoined' position within a verb's own projection. And then later in the derivation, it gets moved by syntactic Move-Alpha into the [Spec, IP] position in order to satisfy the Saturation Principle in (19):

- (19) *The Saturation Principle*
 All positions in a grid must be discharged. (Fukui and Speas 1986:139)

Here, 'grids' include not only theta grids of lexical categories, but also Kase grids of functional categories (and also lexical categories cf. fn. 13). The Saturation Principle states specifically that if an element has a Kase to discharge, it must be discharged. To illustrate its content, consider a clausal structure like *John hit Bill*, which has the derivation in (20):

¹³ 'Kase' (a notion attributed to Ken Hale; cf. Szabolcsi 1986; Fukui 1986) refers both to the inflectional features assigned by functional heads, and to Case features assigned by lexical and functional heads.

¹⁴ However, there are other elements (the infinitive marker *to* in IP, the articles such as *the* and *a* in DP, and the *that*-type non-*wh* complementizer in CP) which do not assign Kase features and hence do not license a unique specifier.



First, since PA theory licenses heads and their projections, the head V, the head INFL, and all the dominating nodes which project from them are legitimized in (21); this needs no further comment. Second, let us consider the nonhead daughters. At the bottom, the complement phrase *the meat* is licensed by virtue of bearing a grid relation to its sister (in this case, theta-marking). Going up, the three layers of adjuncts are licensed because the position in the theta grid of each PP undergoes theta-identification with the *e* position in the verb's theta grid. Proceeding further upward, the VP-internal subject *John* is licensed by entering into a grid relation with its sister (once again, theta-marking), and the *e* position of VP is discharged through theta-binding by INFL. At the second highest level, *John* moves into the [Spec, IP] (at SS), motivated by the Saturation Principle in (19). As a result, the entire syntactic structure is well-formed because all the positions in the theta grid of the verb as well as all the features in the Kase grid of INFL have been discharged, and all the elements contained in the structure are explicitly accounted for in their correct positions.

2.4 Conclusion: PA theory and Chinese Word Order Problems

We mentioned in section 1.2.1 that none of the three approaches to Chinese word order within the principles-and-parameters framework under review provide an adequate explanation of the word order facts under investigation. In particular, while Huang's (1982) X'-theoretic account is clearly a language-specific stipulation, both Travis' (1984) theta-theoretic account and Li's (1990) Case-theoretic account have a number of limitations, both conceptual and empirical. In what follows, we will propose an alternative account based on PA theory as discussed above.

Although PA theory is a theory of projection from the lexicon to DS, and does not make any predictions with respect to the issue of word order, it can be expanded into a theory of word order parameters. Minimally, this entails a parametrization for directionality for the various licensing grid relations involved in the construction of DS trees, with the understanding that such relations proceed from the head (i.e. the licensing element) to nonheads (i.e. the elements to be licensed).

As discussed earlier, there is a striking word order property in Chinese in which complements generally follow the head, and 'modifiers' generally precede the head. This is illustrated in (22):

- (22) a. Zhang¹san¹ zuo²tian¹ zai⁴ chu²fang²-li hen³ shu²lian⁴-de qie¹ cai⁴.
 ZS yesterday at kitchen-inside very skillful DE cut vegetable
 'Zhangsan cut the vegetables very skillfully in the kitchen yesterday.'
- b. tian¹zhen¹-de huo²po-de ke³'ai⁴-de hai²zimen
 naive DE lively DE lovely DE children
 'the naive, lively, and lovely children'

In terms of PA theory, the distribution of complements and 'modifiers' in Chinese can easily be accounted for by a left-to-right parameter setting for theta-marking, and a right-to-left parameter setting for theta-identification. Despite these theoretical advantages, our account based on PA theory is not without its problems. First, as Chinese is a SVO language (cf. (22a)), the rightward theta-marking parameter makes a wrong prediction with respect to the distribution of subject (remember that under PA theory, both the complement and subject are licensed altogether by theta-marking). Second, the leftward theta-

identification parameter fails to capture the postverbal distribution of frequency, duration, result, state (FDRS) expressions:

- (23) a. Zhang1san1 pao3-le [san1 ci4]. (Frequency Expression)
 ZS run-PER three time
 'Zhangsan has run for three times.'
- b. Zhang1san1 pao3-le [san1 xiao3shi2]. (Duration Expression)
 ZS run-PER three hour
 'Zhangsan has run for three hours.'
- c. Zhang1san1 pao3-de [hen3 lei2]. (Result Expression)
 ZS run-RM very tired
 'Zhangsan ran and got very tired.'
- d. Zhang1san1 pao3-de [hen3 kuai4]. (State Expression)
 ZS run-RM very fast
 'Zhangsan runs very fast./Zhangsan is a very fast runner.'

In (23), the FDRS expressions, being adjuncts by definition, are predicted to occur preverbally in order to satisfy the directionality requirement of theta-identification. However, contrary to this prediction, such expressions can only appear postverbally.

In chapter 3, we will argue for an additional parameter, i.e. the predicate-linking parameter, set from right to left in Chinese. As will be elaborated there, under this parameter, not only the subject-before-predicate ordering is predicted, but the postverbal distribution of FDRS expressions is explained in a principled way. Taken together, it will be shown that the range of Chinese word order facts under investigation are deducible from the three proposed directionality parameters couched within PA theory.

In this chapter, we have demonstrated how Speas' (1990) PA theory works, and more importantly, how the theory can be expanded into a parametric word order theory, which will be shown in the remainder of this thesis to be capable of handling the Chinese word order problems. In the following chapter, we will offer some theoretical and empirical justifications for this expanded version of Speas' PA theory, and will see how it works in predicting word order in the domain of Chinese inflection phrases.

CHAPTER 3

EXPANDED PROJECT ALPHA THEORY AND WORD ORDER IN CHINESE INFLECTION PHRASES

3.0 Introduction

In this chapter, we expand the theory of Project Alpha (PA) as elaborated in the preceding chapter into a theory of word order parameters and apply it to account for the Chinese word order phenomenon in the domain of inflection phrases (IPs). This chapter is organized as follows. Section 3.1 discusses the motivations for this expanded version of PA theory which incorporates a concept of directionality, and a specific relation of predication. In particular, we argue that Expanded Project Alpha (EPA) theory, with its theta-identification parameter, is superior to Travis' (1984) parametric word order theory in being more capable of handling the distribution of adjuncts in a cross-linguistic context. Furthermore, we provide two pieces of evidence in favor of the legitimacy of the predication relation, namely the non-thematic nature of subjects (cf. Rothstein 1992), and the difference between English and Chinese with respect to the interpretations given to the secondary-predicate constructions. Section 3.2 applies the three parameters, i.e. the theta-marking, theta-identification, and predicate-linking directionality parameters, to account for the Chinese word order facts under consideration. Specifically, after clarifying certain theoretical positions in section 3.2.1, we show how our proposed directionality parameters are involved in deriving the unmarked patterns (section 3.2.2), as well as the marked patterns involving a frequency, duration, result, or state (FDRS) expression (section 3.2.3). We argue that sentences with a frequency/duration expression are simple subject-predicate structures, and that those with a result/state expression are instantiations of secondary predication constructions. Their postverbal occurrences thus follow from the parameter of predicate-linking which stipulates a left-to-right ordering of subject and predicate in Chinese. Finally, in section 3.3, we argue that our proposed analysis is empirically motivated under the assumption that the interpretation of a particular constituent is dependent on the syntactic licensing mechanism available, i.e. the 'interpretation-licensing dependence' (cf. Rapoport 1991, 1993). Based on this assumption we show that there are interpretation differences correlating with the preverbal or postverbal placement of Chinese adjuncts that can be attributed to the different types of licensing mechanisms at

work that provide for the interpretations. In particular, we demonstrate that preverbal adjuncts in Chinese are licensed by theta-identification which, because of an *e*-position connection, produces only a temporally or spatially-bound interpretation. In contrast, postverbal adjuncts are licensed by predicate-linking which does not require an *e*-position connection, and as a result, a variety of interpretations (i.e. the resultative/sequential, stative/generic, and metaphorical interpretations) are available to them.

3.1 Expanded Project Alpha (EPA) Theory

3.1.0 Introduction

In chapter 1, we mentioned that in Chinese, the complement of the verb always follows the head, while adjuncts always precede the head. In terms of Speas' PA theory, this striking property can easily be expressed if we incorporate a concept of directionality (in the sense of Koopman 1984, and Travis 1984) into its associated licensing grid relations, with the understanding that such a directionality requirement proceeds from the head (i.e. the licensing element) to nonheads (i.e. the elements to be licensed). Accordingly, we assume that the following two parameter settings for directionality hold in Chinese:

- (1) a. Theta-marking of complements by a head proceeds uniformly from left to right.
- b. Theta-identification of 'modifiers' by a head proceeds uniformly from right to left.

The theta-marking parameter (1a) will correctly put all complements to the right of the verb, while the theta-identification parameter (1b) will correctly put all adjuncts to the left of the verb, as desired. However, (1) is inadequate as it stands. First, Chinese word order is basically SVO, and this means that a rightward parametrization for theta-marking does not work for the purposes of licensing the subject in Chinese (recall that theta-marking is the relation between a verb and its arguments, both internal and external). Second, a leftward parametrization for theta-identification cannot account for the postverbal occurrences of FDRS expressions which are by definition adjuncts. In order to solve these problems, we propose that an additional parameter, namely the predicate-linking parameter, should be incorporated into (1) as another independent licensing mechanism:

- (2) Linking of a predicate to its subject proceeds uniformly from right to left.

The predicate-linking parameter in (2) is meant to capture the subject-before-predicate ordering and the postverbal occurrences of FDRS expressions in Chinese (see section 3.2.3 for a detailed discussion). Taken together, we will argue in what follows that the three parameter settings above are empirically adequate to derive all the Chinese word order patterns under consideration.

3.1.1 EPA Theory and the Theory of Word Order Parameters

Before we look at the interaction of the three above-mentioned directionality parameters assumed under EPA theory, we will first demonstrate that EPA theory, as a parametric word order theory, is indeed theoretically well motivated. This motivation turns on two pieces of evidence. First, section 3.1.1.1 shows that the theta-identification parameter is more adequate than Travis' (1984) headedness parameter¹ in accounting for the distribution of adjuncts across languages. Second, section 3.1.1.2 shows that the predicate-linking parameter is independently justified by virtue of the non-thematic nature of subjects (cf. Rothstein 1992) and a difference between English and Chinese in the interpretations of secondary-predicate constructions. In turn, the positive evidence provided in these two sections argues for the fact that EPA theory should be adopted in accounting for word order phenomena on cross-linguistic grounds.

3.1.1.1 Theta-Identification and Directionality

Higginbotham (1985, 1987) observes that adjuncts in natural languages hold a semantic relation to a head just like arguments do, and he proposes the modes of theta discharge (the original version of Speas' licensing grid relations) whereby adjuncts require a theta-identification in order to be licensed (cf. section 2.3.3.1.2). Following Higginbotham, we can argue that the directionality parameter of theta-identification is the theoretical apparatus needed to predict the distribution of adjuncts across languages. In particular, the prediction is that languages can either have a unidirectional requirement for

¹ The term 'headedness parameter' is used by Travis (1984) to refer to the head parameter of Chomsky (1981).

theta-identification like Chinese and Japanese or no directional requirement for theta-identification like English and Dutch:

- (3) a. Zhang1san1 jin3jin3-de wo4-zhu4 gun4zi. [Chinese]
 Zhangsan tight DE grasp-hold stick
 'Zhangsan held the stick tightly'
- a'. *Zhang1san1 zhua1-zhu4 gun4zi jin3jin3-de.
 Zhangsan grasp-hold stick tight DE
- b. Taroo-ga uti-de hon-o yon-da. [Japanese]
 Taroo-SM house-in book-OM read-PAST
 'Taroo read the book at home.'
- b'. *Taroo-ga hon-o yon-da uti-de.
 Taroo-SM book-OM read-PAST house-in
- c. John (quietly) ate his dinner (quietly). [English]
- d. dat hij (in de tuin) een boek leest (in de tuin). [Dutch]
 that he in the garden a book reads in the garden

We see that Chinese and Japanese contrast with English and Dutch sharply with respect to the theta-identification directionality parameter. For the former type of languages, the parameter is set strictly in one direction whereas for the latter type of languages, it is unrestricted. Thus, the theta-identification parameter predicts that languages may be classified into two distinct types: those that have a unidirectional theta-identification requirement for adjuncts like Chinese and Japanese, and those that have no such restriction like English and Dutch:

- (4) *Theta-Identification Directionality Parameter*
 a. Unidirectional (R-L) Chinese, Japanese
 b. Unrestricted English, Dutch

With respect to (3a), Travis (1984) claims that Chinese has a default head-final parameter for non-theta-marked elements, so adjuncts occur to the left of the verb (see section 1.2.1.2 for more details). Although both the theta-identification account and the headedness account make exactly the same predictions for Chinese word order facts, the theta-identification account can be argued to have more empirical advantages. More importantly, on cross-linguistic grounds, the head-initial or head-final stipulation as a default

specification for adjunct distribution is empirically unsound because in general languages do not fall neatly under a head-initial or head-final dichotomy.² Take (3c) as an example; if we say that English has a head-initial parameter as a default setting for adjuncts, we then have no explanations for the adjunct distribution facts shown in (3c). The theta-identification mechanism, on the other hand, correctly predicts that the flexibility of adjunct distribution across languages is largely a result of the directionality requirement of theta-identification. Languages like Chinese and Japanese which require a unidirectional theta-identification will have adjuncts strictly to the one side of the verb, whereas languages like English and Dutch which have no such requirement for theta-identification will allow both head-initial and head-final adjuncts.

From the preceding discussion, it follows that as a structural mechanism, the theta-identification parameter has advantages over Travis' headedness parameter in being more empirically adequate to predict the distribution of adjuncts cross-linguistically. This in turn suggests that Travis' (1984) parametric word order theory should be discarded and replaced by EPA theory in accounting for word order facts across languages.

3.1.1.2 Predicate-Linking as a Well-Motivated Directionality Parameter

It should be noted that by proposing the licensing grid relations, Speas implicitly argues that Theta theory is the sole licensing mechanism required in the grammar. However, although there is a *prima facie* preference for using as few methods of licensing as possible, it is generally agreed in the literature that besides Theta theory, Predication theory is another necessary licensing mechanism as well. In this respect, Rothstein (1983) suggests that the domains of Theta theory and Predication theory are complementary (cf. section 1.1.2.4). If this is the case, then, maximal projections will have to be licensed either by Theta theory or Predication theory. Below, we provide two arguments to justify this claim.

² According to this reasoning, Chinese and Japanese seem to constitute a marked case where adjuncts are consistently distributed on one side (i.e. to the left) of the verb.

3.1.1.2.1 The Non-Thematic Nature of Subjects

As elaborated above, Speas assumes that theta-marking is responsible for licensing the internal and external arguments of a verb, or more generally, of a predicate. Implicit in this assumption is the idea that except for passive and unaccusative cases, subjects are licensed by receiving an external theta role from a predicate. However, this idea is refuted by Rothstein (1992), who argues that the relation between a predicate and its subject is one of purely syntactic predication and cannot be defined in theta-theoretic terms. Specifically, she points out that although in many instances, there will be a coinciding of syntactic predication and theta-role assignment, since the external theta role of a predicate is (usually) assigned to the syntactic subject of the projection of the predicate, but such a correlation is not necessary. There are crucial examples where the subject of a predicate is not theta-marked. Thus, in (5), the subject of the predicate in each case is a non-argument, i.e. the pleonastic *it* (the predicate is marked in bold):

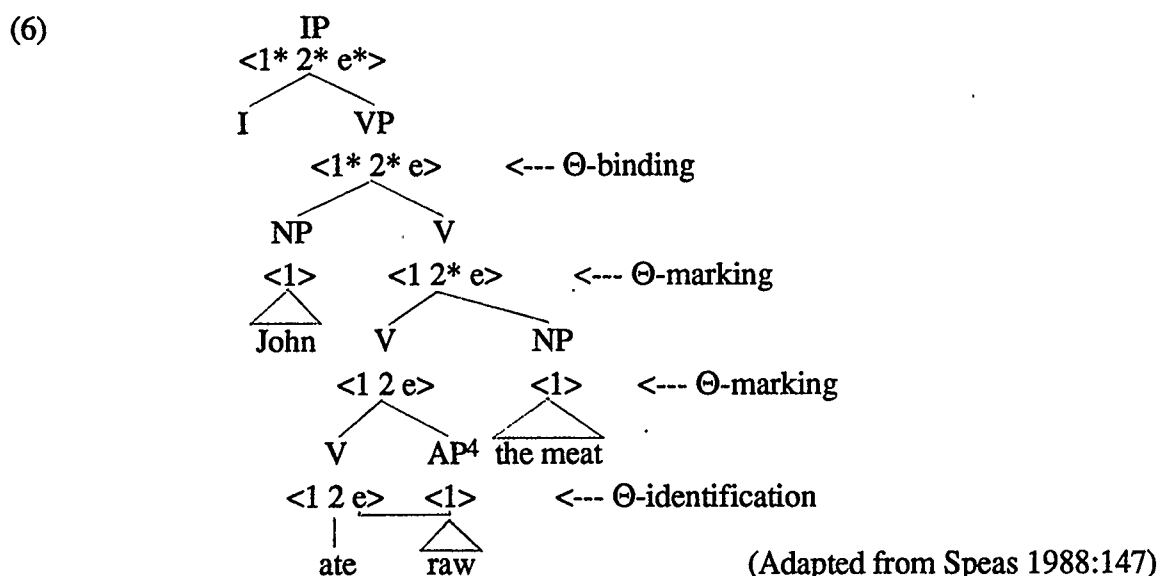
- (5) a. It **rains**.
 b. It **appears that John is foolish**.

In (5), the pleonastic subjects occur because the predicates headed by the weather verb *rains* and the raising verb *appears* require saturation. In either case, a lexical NP cannot fill the subject position because such an NP needs to be theta-marked, and because the verb does not assign an external theta role to that position. Thus, only a pleonastic with no thematic content is appropriate.

From the above discussion, it follows that a predicate must be saturated by a subject, even when there is no thematic basis for introducing one. We thus assume with Rothstein (1992) that the subject position is non-thematic, and that the relation between the predicate and its subject is one of primitive syntactic saturation. This in turn suggests that in the case of licensing the subject, the predication relation, rather than theta-marking, is the appropriate mechanism.

3.1.1.2.2 The Difference between English and Chinese in the Interpretations of Secondary Predicates

The second piece of evidence arguing for the legitimacy of Predication theory as another indispensable licensing mechanism draws on the difference between English and Chinese with respect to the interpretations they assign to the secondary-predicate constructions. As mentioned above, under PA theory, the distribution of nonheads falls within the domain of the three licensing theta relations. Secondary predicates, according to Speas, are assimilated to cases of adjuncts, and should be handled by theta-identification. Thus, a sentence like *John ate the meat raw*, which involves secondary predication, is treated on a par with a sentence like *John ate the meat slowly*, which involves manner modification. An adaptation of Speas' proposed DS representation for such secondary-predicate constructions is shown in (6):³



³ It is worth pointing out that the representation in (6) is different from the one proposed in Speas (1990). In this latter work, Speas adopts Larson's (1988) theory of 'VP-shell' and V-movement which is irrelevant for our present purposes (but see section 3.3.2.2 for an application of Larson's theory).

⁴ It should be noted that at DS, the secondary predicate *raw* takes a position which is closer to the verb *ate* than the argument *the meat*. The SS order is derived by extraposition, due to the Domain Adjacency Condition of Travis (1984), which states that no phrase can intervene in the theta-domain of a verb. Thus in (6), the interruption of the relation of theta assignment forces movement of the AP, and the surface order is derived.

Speas claims that theta-identification gives us a way of explaining why the secondary-predicate construction in (6) receives an event-related interpretation. In particular, the linking of the grid position of the adjective to the *e* position of the verb captures the fact that the property denoted by *raw* is connected in time to the event described by *ate*. As a result, the interpretation for (6) is as follows: 'There is an event, that is, the eating of the meat by John, and the meat is raw in that event'.

By contrast, in Chinese sentences of this type, i.e. secondary predicate-constructions containing a state expression (cf. section 1.2), we have a different interpretation than we find in English. In such Chinese constructions, the interpretation is not an event-related one where the property denoted by the secondary predicate must be anchored to some event. Instead, we have an interpretation in which the secondary predicate describes a characteristic property of the entity expressed by the subject:

- (7) Zhang1san1 pao3-de [hen3 kuai4].
 ZS run-RM very fast
 'Zhangsan runs very fast./Zhangsan is a very fast runner.'

In (7), the secondary predicate *hen kuai* 'very fast' cannot be construed as connected to the event described by the verb *pao* 'run'; rather, (7) conveys a meaning roughly corresponding to that expressed by the 'habitual' present in English which is irrespective of particular points in time. Accordingly, the interpretation of (7) is dispositionally oriented: 'Zhangsan is a very fast runner', or more precisely, 'Zhangsan has an attribute of running very fast' (but not 'Zhangsan ran very fast at a certain point of time').

Rapoport (1991, 1993) argues that it is the type of licensing mechanism that provides the relation for the interpretation, and as a result, secondary-predicate constructions in any two languages can be interpreted differently.⁵ Following Rapoport, we can then attribute the discrepancy between English and Chinese with respect to the interpretations of secondary-predicate constructions to the different licensing mechanism involved in each languages. In English, since theta-identification is the syntactic relation

⁵ Rapoport argues that in Warlpiri, it is Case that licenses secondary predicates, and therefore, the event-based interpretation that is found in English secondary-predicate constructions is not available. In fact, unlike English, secondary-predicate constructions in Warlpiri convey an 'inherent' or 'permanent' interpretation.

available for the semantic interpretation of secondary predicates, the only possible interpretation for them is therefore an event-related one. In Chinese, by contrast, the predication relation is what is available for semantic interpretation; it follows, then, that the event-based interpretation is not necessary, and we should find secondary-predicate constructions with a different interpretation, namely one that is habitually or dispositionally oriented. In fact, such an interpretation is consistent with the machinery of Predication theory. According to Rothstein (1983), predication (or predicate-linking) relation involves asserting that a property, expressed by a predicate, inheres in an entity (or entities), expressed by the subject. In (7), the property is *runs very fast (habitually)*, and the assertion is that *Zhangsan* has this property.⁶

Given that the licensing mechanism involved can determine the interpretation given to the secondary predicates in a particular language, the difference between English and Chinese in the interpretations of secondary-predicate constructions can be explained. This in turn suggests that the predication relation should be considered as yet another legitimate licensing mechanism (at least as far as Chinese grammar is concerned).

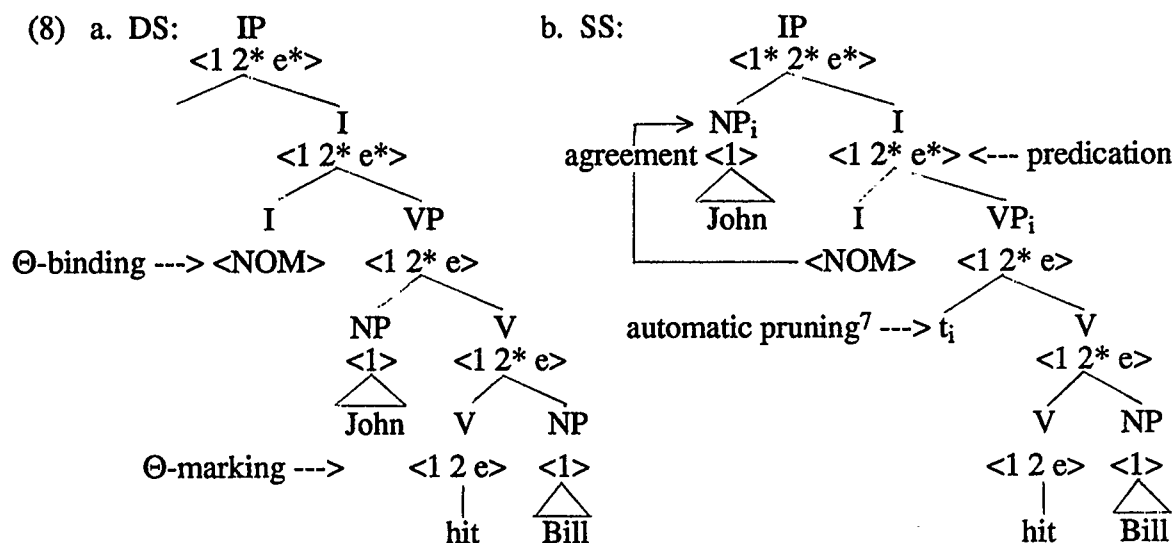
To sum up, the arguments presented in the above discussion points to the fact that EPA theory can serve as a legitimate theory of word order parameters. Below, we discuss the consequences of this theory.

3.1.2 Consequences of EPA Theory

According to Rothstein (1983), predication is a syntactic relation between a predicate and its subject which is defined in strictly structural terms at SS. The condition on predication is therefore a general condition of well-formedness on SS representations (cf. section 1.1.2.4 for a detailed discussion). Thus, if we are to incorporate predication relation into the licensing mechanisms of PA theory, the necessary outcome will be that a clausal subject will no longer be licensed at DS by theta-marking in its base-generated adjoined position within the VP. Instead, it will be licensed at SS by the predication

⁶ In Chinese, due to the active predication-licensing system, there is in fact a range of possible interpretations available to the secondary-predicate constructions in addition to the one discussed in this section (see sections 3.3.1.2, 3.3.2.2 and 3.3.2.3 for a detailed discussion on this issue).

relation, after the application of syntactic Affect-Alpha. Accordingly, the derivation of the clause *John hit Bill* will then be as follows:



In (8a), the licensing grid relations operate as usual at DS. What is noteworthy is that in (8b), our expanded version of PA theory has rendered the '1' grid position to be discharged at SS through the linking of the predicate VP to its structural subject *John* rather than at DS through theta-marking.⁸

In the preceding sections, we have provided ample evidence that EPA theory should be adopted in accounting for word order phenomena in a cross-linguistic context. In the remainder of this chapter, we will apply it specifically to the domain of Chinese IPs, and see how it can accurately capture the Chinese word order facts under consideration.

⁷ It is worth mentioning that PA theory stipulates an optional 'automatic pruning' process after the application of Affect-Alpha in order to exempt a nonlicensed nonhead node from the licensing condition.

⁸ The subject of an unaccusative verb would seem to pose problems for our EPA theory. By standard assumptions, such a subject is base-generated in the GF object position, and later in the derivation of the sentence, it becomes the derived subject:

(i) DS: [e arrived John] ==> SS: [John_i arrived t_i]

Thus, *John* in (i) will be licensed twice under EPA theory. First, it will be theta-marked at DS as the internal argument of the verb; and second, it will be linked to the predicate VP at SS in terms of the predication relation. However, it should be emphasized that according to the licensing condition outlined in section 2.2.1, it does not matter how many times an element is licensed in a structure; what is crucial is that it must be licensed at least once.

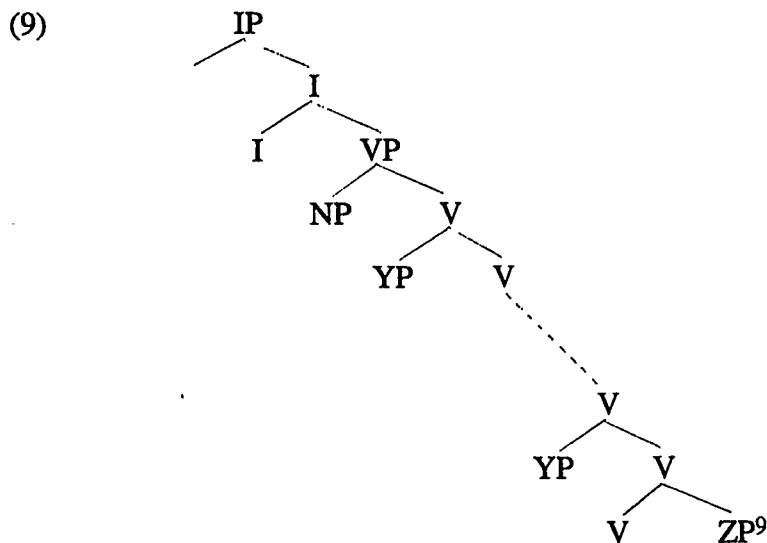
3.2 Application of EPA Theory to Chinese IPs

In the foregoing discussion, we have mentioned that there are two word order characteristics as far as Chinese IPs are concerned. First, adjuncts and complements tend to occur before and after the verb, respectively; and second, the subject-before-predicate ordering is predominant in clausal structures. Despite such regularities, however, there remains a striking discrepancy to be accounted for, namely one in which some adjunct-like elements (i.e. FDRS expressions) must appear postverbally. In this section, we will argue that the Chinese word order patterns in question can be plausibly attributed to the three directionality parameters in (10) which interact with one another to produce the unmarked as well as the marked patterns involving a FDRS expression. Before we justify this claim, it is important to outline certain basic assumptions which we will adopt throughout the discussion. These include the structure of Chinese IPs and the relationships between the three directionality parameters assumed under EPA theory.

3.2.1 Preliminaries

3.2.1.1 The Structure of Chinese IPs

We pointed out above that it is a fact of Chinese word order that complements generally follow the verb, and adjuncts generally precede the verb, and that the subject consistently precedes the predicate VP. Under PA theory, a Chinese IP will have the following schema at SS, which captures this word order generalization:



N.B. YP = Adjunct, ZP = Complement

There are several points to be borne in mind with respect to (9). First, if we restrict our attention to the lowest level of X'-projection, i.e. to the relation between an X^0 and its complement,¹⁰ we can take (9) as claiming that IPs and VPs are strictly head-initial in Chinese, with the complements VP and ZP following the heads INFL and V, respectively. Second, the claim that INFL is in the head-initial position in Chinese is supported by the fact that modal auxiliaries, which by assumption are constituents of INFL, precede VP. This is the position taken in Chinese linguistics and language textbooks, and we will simply follow the tradition throughout this thesis. Third, as to the content of INFL in Chinese, we will adopt Fukui's (1986) view that INFL in Chinese/Japanese-type languages is 'very defective', in the sense that it does not have any agreement features associated with it. One of the necessary consequences of this view is that clausal subjects in this type of languages does not raise to [Spec, IP] position in order to discharge INFL's agreement features (cf. the Saturation Principle (section 2.3.3.2)); instead, they remain in their base-generated adjoined positions within the verbal head's own projection at SS (as illustrated by the NP subject in (9)).

⁹ We will focus on clause structures with a single complement here, as a comprehensive examination of multiple-complement constructions falls outside the scope of this thesis. The reader is referred to Li (1990, chapter 4) for a detailed discussion.

¹⁰ In this chapter, we will not discuss the level of X"-expansion, i.e. the relation between the specifier and the X'-projection.

3.2.1.2 The Relationships between the Three Directionality Parameters

As discussed in Chapter 1, several proposals have been put forward to account for the word order of Chinese in terms of general principles, in particular various directionality parameters, such as the headedness parameter, the theta-directionality parameter, and the Case-directionality parameter (cf. Travis 1984; Li 1990). Furthermore, as suggested by Travis (1984), following Rothstein (1983), the linking of a predicate to its subject can also be parametrized for directionality across languages; thus, in English for example, linking is from right to left, that is, a subject precedes its predicate. Here, within the framework of EPA theory, we have posited three directionality parameters to account for the Chinese word order patterns under investigation (repeated below as (10)):

- (10) a. Theta-marking of complements by a head proceeds uniformly from left to right.
- b. Theta-identification of 'modifiers' by a head proceeds uniformly from right to left.
- c. Linking of a predicate to its subject proceeds uniformly from right to left.

Before turning to an application of these three parameters, we would like to point out that since mechanisms determining word order at DS can be undone at SS, by free application of Affect-Alpha, statements concerning the order at DS are only valuable if they are accompanied by principles determining the order at SS. In terms of PA theory, since DS is seen as containing all and only those phrases licensed by Higginbotham's version of Theta theory, the theta-marking parameter (10a) and the theta-identification parameter (10b) will affect the way in which a DS is constructed. Specifically, (10a) will put all complements on the right-hand side of the verb, while (10b) will put all adjuncts on the left-hand side of the verb. In combination with the predicate-linking parameter (10c) which operates at SS (cf. section 1.1.2.4) to constrain a left-to-right ordering of subject and predicate, the mechanisms in (10) will correctly derive the unmarked word order patterns in Chinese. Besides, with regard to Case theory which determine the SS placement of argument NPs, we will assume in what follows with Li (1990) that Case-assignment is from left to right in Chinese.¹¹ Seen in this light, as the theta-marking and theta-identification parameters on the one hand, and the predicate-linking parameter on the other are by their very nature

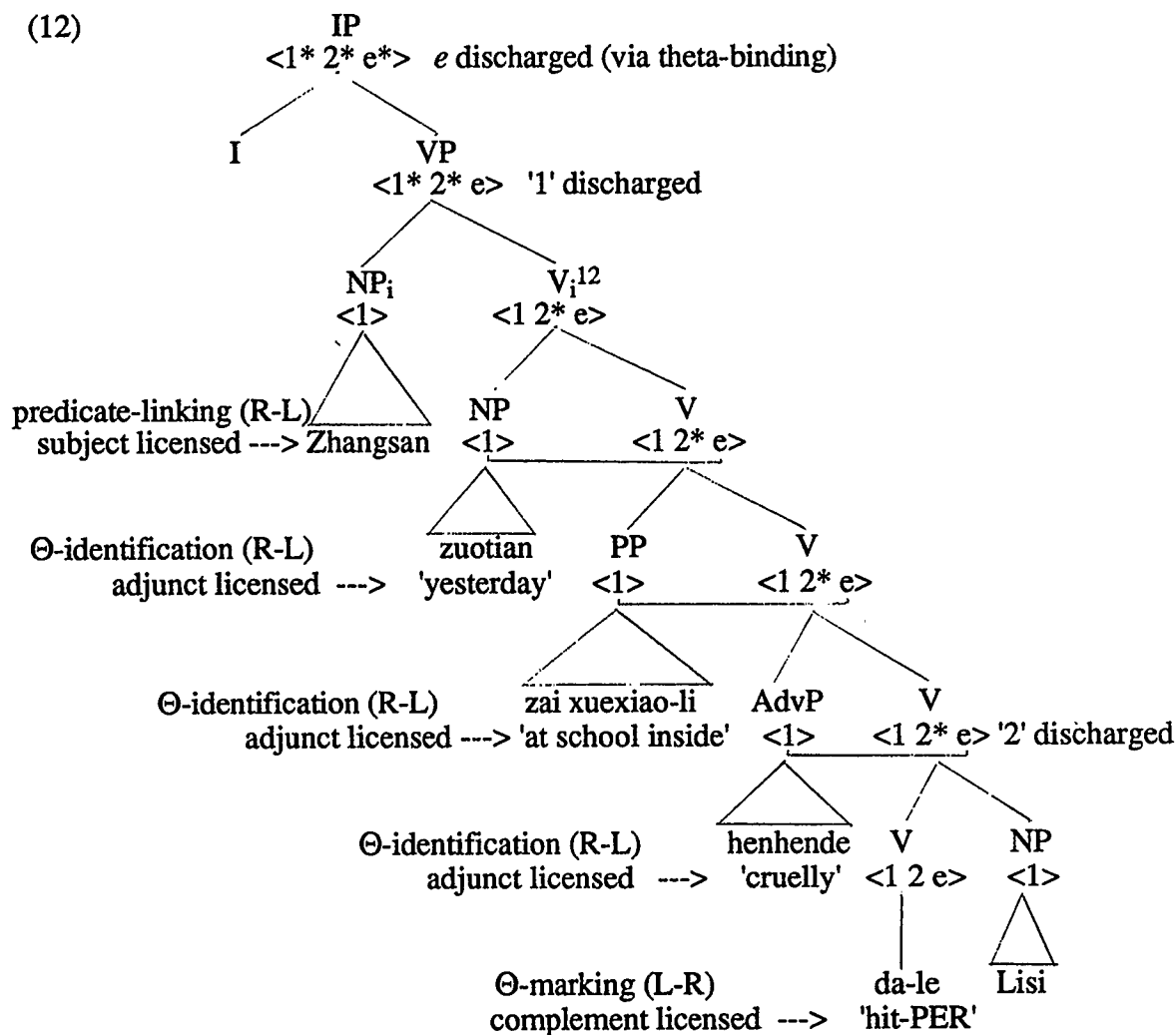
¹¹ Given that Case is assigned to the right in Chinese, the Chinese SVO order seems incompatible with Case assignment by INFL to the subject. In this respect, we will again adopt Li's (1990) position that nominative Case is a different type of Case assignment, and that in Chinese, it is assigned in terms of a predication relation via coindexing between a predicate VP and its subject NP, a position that is consistent with the directionality requirements in (10), specifically (10c).

mutually exclusive, the DS representation of Chinese will be identical (in the relevant respects) to its SS representation (cf. section 1.2.1.2).

3.2.2 Accounting for the Unmarked Patterns

In the simplest cases, the application of the parameter settings in (10) is straightforward. As an illustration, for the sentence in (11), our EPA theory will operate as in (12) to produce the correct surface word order:

- (11) Zhang1san1 zuo2tian1 zai4 xue2xiao4-li hen3hen3de da2-le Li3si4.
 ZS yesterday at school-inside cruelly hit-PER LS
 'Zhangsan hit Lisi cruelly at school yesterday.'



In the terminology of EPA theory, in order for the SS representation in (12) to be well-formed, three requirements must be met. First, all the positions contained in the theta grid of the verb 'hit' (i.e. the '1', '2', and e positions) have to be discharged by SS at the latest. Second, all the nonheads (i.e. the complement, the three adjuncts, and the VP-internal subject) have to be licensed either at DS by virtue of the set of grid relations (cf. section 2.3.3.1 for discussion), or at SS by virtue of the rule of predicate-linking (cf.

¹² Williams (1980) and Rothstein (1983) define predication as a relation holding between two maximal categories. However, this is not always the case in Speas' PA theory, as evidenced by the fact that the subject NP *Zhangsan* is a sister of a nonmaximal V projection. This means that we have to relax Williams and Rothstein's definition so as to allow nonmaximal categories to be predicates. Thus, under our EPA theory, any category can be a predicate insofar as it possesses a theta grid which contains an undischarged '1' position corresponding to the external argument.

section 3.1.1.2 for discussion). Third, all such licensing relations have to proceed according to the directionality requirements outlined in (10).

Let us turn to the SS representation in (12). At the bottom, the verb 'hit' discharges its '2' grid position rightward (at DS), resulting in the complement NP *Lisi* being licensed in the postverbal position. Further up, the three levels of adjuncts, 'cruelly', 'at school', and 'yesterday' are legitimized (again at DS) through theta-identification with the *e* position in the verb's theta grid. Since the directionality of this licensing relation is from right to left (i.e. from the verbal head to the nonheads), all adjuncts wind up preverbally. Then, at the level immediately below VP, the '1' grid position is discharged (this time at SS) through the linking between the predicate VP and its subject NP *Zhangsan*, the directionality of which proceeds from right to left, as required. At last, at the VP level, the *e* position is finally discharged (once again at DS) through theta-binding by INFL (the directionality of which will not have a crucial bearing on the issues to be discussed, and therefore is left unspecified).

3.2.3 Accounting for the Marked Patterns

In this section, we look at the word order patterns which have posed serious problems for Travis' (1984) and Li's (1990) analyses, namely those in which an FDRS element appears in postverbal position (cf. sections 1.1.1.2 and 1.1.1.3 for discussion). Apparently, these patterns also present difficulties for our parameter settings since as predicted by (10b), an FDRS element, being an adjunct by definition, is supposed to appear preverbally in order to satisfy the directionality requirement of theta-identification. However, as we will see, the postverbal placement of such adjunct-like elements are determined not by the directionality parameter of theta-identification, but instead by that of the predicate-linking; and this in turn provides further empirical evidence for incorporating predication relation into the licensing mechanisms of EPA theory.

In what follows, we first look at F/D expressions (section 3.2.3.1), arguing that they can be analyzed as a predicate XP predicated of a sentential subject (cf. Teng 1975; Ernst 1987). Then, we will turn to R/S expressions (section 3.2.3.2), treating them as instances of secondary predicates which require a control/predication analysis in the sense of Williams (1980) and Huang (1992). Taken together, our discussion will show that the

postverbal occurrences of FDRS expressions fall out naturally under the directionality parameters in (10).

3.2.3.1 The Postverbal Occurrences of F/D Expressions

We noted in chapter 1 that the postverbal occurrences of frequency/duration (F/D) expressions like those in (13) present an interesting complication to the otherwise straightforward description of the Chinese word order pattern in which adjuncts are neatly distributed on the left of the verb:¹³

- (13) a. Zhang1san1 pao3-le [NP san1 ci4]. (Frequency Expression)
 ZS run-PER three time
 'Zhangsan has run for three times.'
- b. Zhang1san1 pao3-le [NP san1 xiao3shi2]. (Duration Expression)
 ZS run-PER three hour
 'Zhangsan has run for three hours.'

Below, we take a closer look at the F/D expressions in (13) within the framework of EPA theory, showing that they are in fact instantiations of primary predication, that is, simple subject-predicate structures. As a result, the fact that they appear in postverbal position is expected under the directionality parameter (10c) which stipulates a left-to-right ordering of subject and predicate in Chinese.

¹³ It is important to note that the F/D expressions under discussion here cannot be considered as complements subcategorized for by the verb *pao* 'run', because unlike complements, they are strictly optional:

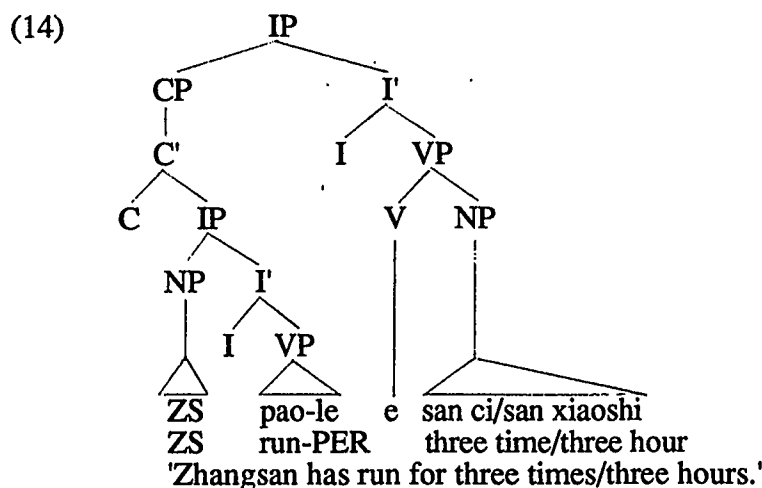
(i) Zhang1san1 pao3-le.
 ZS run-PER
 'Zhangsan has run.'

According to Grimshaw's (1990) theory of argument structure, F/D expressions should be classified as semantic participants which correspond to the variables in a lexical item's lexical conceptual structure (LCS). The LCS defines a set of semantic participants involved in the meaning of the lexical item, and only some of these participants are realized as syntactic arguments and projected into an argument-structure representation. In our case, the verb *pao* 'run' may have a number of semantic participants in its LCS which may include an agent variable, and among other things, a direction variable (e.g. 'to the shop'), a duration variable (e.g. 'for three hours'), a manner variable (e.g. 'very quickly'), etc. However, only the agent has the privilege of projecting into the argument structure and becoming a syntactic argument, and all the other semantic participants simply serve to define the meaning of the verb. The same line of analysis can be applied to R/S expressions as well.

3.2.3.1.1 The Sentential Subject Hypothesis (SSH)

It has been suggested (e.g. by Teng 1975 and Ernst 1987) that F/D expressions are indeed predicates themselves, where the preceding part of the sentence is a sentential subject. This analysis, known as the Sentential Subject Hypothesis (SSH), is plausible on intuitive grounds, since in (13), the event of *Zhangsan's* running and the duration/frequency of this event are semantically distinct units, and therefore should be represented syntactically as separate constituents. Under the SSH, there are essentially two approaches, neither of which relies on treating F/D expressions as an adjunct of the verb.

The first approach simply analyzes F/D expressions as an NP predicated of a sentential subject, with the main verb of the sentence left unexpressed. Accordingly, this approach will give (14) as the syntactic representation for (13):



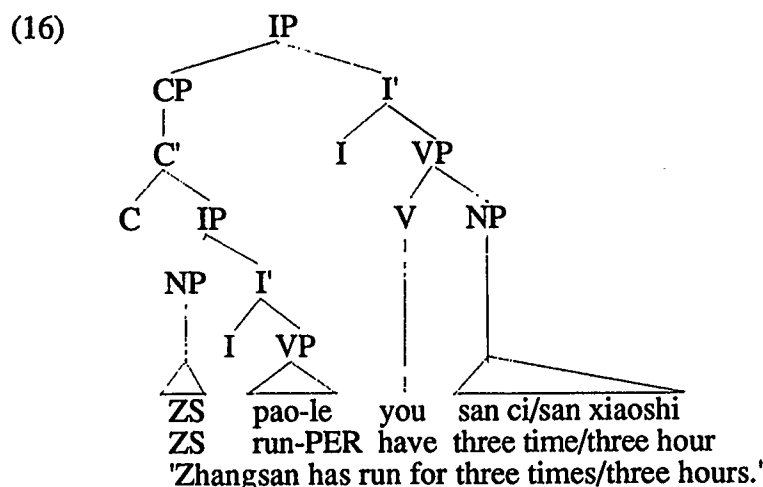
One strong piece of evidence in favor of this approach is based on the fact that verbless constructions similar to (14) with a predicate NP denoting an attribute of its subject are grammatical in Chinese:

- (15) a. [NP zhe4 ben3 shu1] [VP e [NP yi1 bai3 yuan2]].
 this CL book one hundred dollar
 'This book costs one hundred dollars.'
- b. [NP wo3men yi1 jia1] [VP e [NP wu3 kou3 ren2]].
 we one family five CL person
 'There are five members in our family.'

- c. [NP na1 ge4 jia1huo] [VP e [NP hao3 pi2qi]].
 that CL fellow good temper
 'That fellow has a good temper.'

By analogy, it can be argued that in (14), the F/D expressions are themselves predicate NPs denoting an attribute of *Zhangsan's* running event. Thus, more precisely, the F/D expressions should be rendered as "it is three times/three hours", and the entire sentences as "The event of Zhangsan's running has been for three times/three hours".

The second approach makes a similar claim to the one discussed above. The essence of this approach is that it argues for the existence of a verb *you* (literally 'have') in the predicate part of the sentence containing a F/D expression, which nevertheless does not surface phonetically because of a stylistic rule which optionally deletes *you* at PF.¹⁴ Thus, instead of the verbless construction in (14), we can have the equally acceptable (16), which means exactly the same as (14):



¹⁴ It is worth pointing out that the second approach is problematic with auxiliaries expressing a subjunctive mood, in which case the presence of *you* seems to make the sentences concerned ungrammatical:

- (i) Zhang1san1 xilwang4 pao3 (*you3) san1 ci4/san1 xiao3shi2.
 ZS hope run have three time/three hour
 'Zhangsan hopes to run for three times/three hours.'
 (ii) Zhangsan da3suan4 pao3 (*you3) san1 ci4/san1 xiao3shi2.
 ZS intend run have three time/three hour
 'Zhangsan intends to run for three times/three hours.'

However, it should be clear that the ungrammaticality here is due to the fact that *you* signals an indicative mood, and as a result is incompatible with the subjunctive mood inherent in (i) and (ii). Accordingly, we will still consider the two approaches as equally plausible for the SSH.

In comparison with (14), the syntactic representation in (16) has the advantage of satisfying the requirement of endocentricity as imposed by the X'-theory which mandates that there be a verb to head the VP. It is evident that *you* is a verb in (16) since it can be negated (as in 17a), be modified by adverbials like *yijing* 'already' (as in 17b), and be involved in a V-not-V question¹⁵ (as in 17c):

- (17) a. Zhang1san1 pao3-le mei2 you3 san1 ci4/san1 xiao3shi2.
 ZS run-PER not have three time/three hour
 'Zhangsan has not run for three times/three hours.'
- b. Zhang1san1 pao3-le yi3jing1 you3 san1 ci4/san1 xiao3shi2.
 ZS run-PER already have three time/three hour
 'Zhangsan has already run for three times/three days.'
- c. Zhang1san1 pao3-le you3-mei2-you3 san1 ci4/san1 xiao3shi2?
 ZS run-PER have-not-have three time/three hour
 'Has Zhangsan run for three times/three hours?'

On the assumption that (14) or (16) is a base-generated structure, the unacceptability of preverbal F/D expressions receives a plausible explanation under the SSH. This is because under the standardly assumed theory of movement, the structures in (18) are simply undervivable:

- (18) a. *[IP [CP Zhang1san1 [vp_i (you3) san1 ci4] pao3-le] t_i].
 ZS have three time run-PER
- b. *[IP [CP Zhang1san1 [vp_i (you3) san1 xiao3shi2] pao3-le] t_i].
 ZS have three hour run-PER

In the literature (cf. Chomsky (1986b), Chomsky and Lasnik (forthcoming)), it is generally recognized that there are two types of movement operations: substitution and adjunction. The former always moves a maximal projection into an (empty) Spec position, while the latter always adjoins a maximal projection to another (nonargument) maximal projection.¹⁶ Thus, if we assume that the sentential subject (i.e. the CP) in each instance of (18) acts as a single constituent, whose internal structure is opaque to syntactic processes, then there will

¹⁵ The English counterparts of V-not-V questions are yes-no questions. It has generally been accepted in Chinese syntax that the ability to take a V-not-V form is a test for whether an element is a main verb or not.

¹⁶ It should be noted that an X⁰ category is also the target for these two movement operations, although this possibility does not bear on the issue under discussion.

be no Spec position within the CP itself which can serve as a landing site for the VP to move into, nor will there be a maximal projection within the CP itself for the VP to adjoin to.

3.2.3.1.2 Fitting the SSH into EPA Theory

If the SSH is on the right track, we can accordingly treat sentences with a F/D expression preceded by a sentential subject as simple subject-predicate structures. As we stated in section 1.1.2.4, the predicate-linking rule of Rothstein (1983) requires that every predicate be linked to a syntactic subject at SS under the c-command condition. Thus, in the case involving a F/D expression as discussed above, this linking rule will simply produce a paradigm case of predication:

- (19) [_{CP_i} Zhang1san1 pao3-le] [_{VP_i} (you3) san1 ci4/san1 xiao3shi2].
 ZS run-PER have three time/three hour
 'Zhangsan has run for three times/three hours.'

Now, translating the idea of the SSH to our EPA theory, the postverbal occurrences of F/D expressions are expected under our directionality parameter in (10c) which constrains a right-to-left linking of a predicate to its subject:

- (20)
-
- predicate-linking (R-L)
 sentential subject licensed ---> 'Zhangsan run-PER' 'three time/three hour'

All in all, we can assume that in Chinese, F/D expressions have a predicative function rather than the kind of modification function involved in other adverbials which are to be licensed by theta-identification (cf. (12) for illustration). Thus, the fact that F/D

17 As mentioned above, the non-endocentricity of VP is due to the application of an optional stylistic rule which deletes the verb *you* 'have' at LF.

expressions are ordered after the main verb is simply a reflection of subject-before-predicate ordering in Chinese.

3.2.3.2 The Postverbal Occurrences of R/S Expressions

As suggested in chapter 1, the postverbal occurrences of result/state (R/S) expressions like those in (21) are also unexpected given the fact that genuine adjuncts in Chinese occur only preverbally:

- (21) a. Zhang1san1 pao3-de¹⁸ [AP hen3 lei2]. (Result Expression)
 ZS run RM very tired
 'Zhangsan ran and got very tired.'
- b. Zhang1san1 pao3-de [AP hen3 kuai4]. (State Expression)
 ZS run RM very fast
 'Zhangsan runs very fast.'

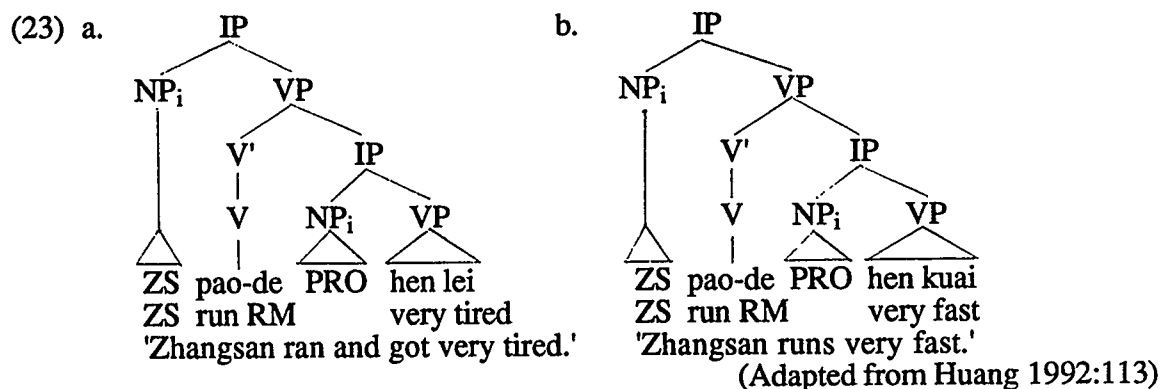
Below, we offer a detailed account of the R/S expressions in (21) in terms of EPA theory. Specifically, we first discuss the analyses of R/S expressions as proposed by Huang 1988 (i.e. the Secondary Predication Hypothesis) and Huang 1992 (i.e. the control analysis). Thereafter, we outline Williams' (1980) assumption that obligatory control can be treated as a special case of predication, and argue that this assumption can also be applied to the case of R/S expressions in Chinese. Finally, we will subsume this control/predication approach under our EPA theory, with the ultimate goal of showing that the distribution of R/S expressions falls out nicely under the directionality parameter (10c).

3.2.3.2.1 The Secondary Predication Hypothesis (SPH)

In the standard literature on Chinese phrase structure (see for example Huang 1988 and Li 1990), sentences containing R/S expressions are most commonly analyzed as instantiations of secondary predication. In (22a) and (22b) below (= (21a) and (21b), respectively), we can see that each structure has two verbs (V_1 and V_2). V_1 is the action verb *pao* 'run' in both cases, while V_2 corresponds to the adjective *lei* 'tired' in (22a) and

¹⁸ The morpheme *de* is historically derived from the full verb *de* meaning 'obtain, get, reach'. On our account, it is analyzed as a clitic which obligatorily cliticizes to the preceding verb (see Huang (1982, chapter 2) for a detailed discussion along similar lines).

control. Along these lines, he posits a control analysis to account for the internal structure of the adjunct secondary predicates, viz. the embedded IPs, in (22). Essentially, his claim is that the IPs in question are composed of a predicate VP and a clausal subject PRO, i.e. in the form of [IP PRO VP]:



In each instance of (23), the embedded subject is base-generated in the form of PRO, the empty pronominal, which is assigned an antecedent at LF by a construal rule of control (cf. section 1.1.2.5 for details). After the coindexing, PRO is understood to be controlled by the matrix subject *Zhangsan*, which is then interpreted as the subject of the R/S expression as well.

Given that V_1 and V_2 in (23) assign independent theta roles to their subjects (cf. fn. 19), positing PRO as the subject of the R/S expression will satisfy the second clause of the Theta Criterion (cf. section 1.1.2.2) which states that every assignable theta role must be assigned to an argument. In (23), the V_2 *lei/kuai* 'tired/fast' can then assign its theta role to PRO, which counts as a lexical NP for the purposes of the Theta Criterion. As a result, V_1 and V_2 can each assign its theta role in (23) to an independent argument within the matrix clause and embedded clause respectively, as required.²¹

²¹ In a sense, Huang's control analysis of R/S expression is consistent with Rothstein's (1983) idea that secondary predication occurs when an XP is predicated of an argument which is in turn theta-marked by another lexical item, as in the following environment:

(i) [IP NP VP XP]

In adapting Rothstein's analysis for our purposes, we may say that while the subject NP *Zhangsan* is assigned a theta role by the matrix verb *pao* 'run', it is also assigned another (though periphrastically) by the secondary predicate *hen lei/hen kuai* 'very tired/very fast'.

Furthermore, the structures in (23) should be more precisely referred to as involving obligatory control, as opposed to optional control. As we have discussed above, there is a c-command restriction required between the controller and the controlled PRO in the case of obligatory control, but not in that of optional control. As predicted by the theory itself, when PRO is the subject of an adjunct clause, it must be obligatorily controlled. Accordingly, PRO in (23) cannot be arbitrary in interpretation; instead, it must be identified with *Zhangsan*, the c-commanding NP. In connection with this, another salient property of obligatory control is that a lexical NP cannot appear in the position of PRO:

- (24) *Zhang1san1 pao3-de [Li3si4 hen3 lei2/hen3 kuai4].
 ZS run RM LS very tired/very fast

In (24), the lexical NP *Lisi* has substituted for PRO in the environments of obligatory control. As a result, the sentence is uninterpretable.

3.2.3.2.3 Reducing Obligatory Control to Predication

Williams (1980) defines obligatory control (OC) as a special case of predication in that the former shows the properties of the latter. Thus, in his theory, the sentence in (25), a typical OC structure, is treated on a par with those in (26), cases that are standardly assumed to be predicate-linking structures:

- (25) John_i tried [_{IP}_i PRO to leave].
- (26) a. John made Bill_i [_{AP}_i sick].
 b. John made Bill_i [_{NP}_i a doctor].
 c. John kept it_i [_{PP}_i near him].
 d. John_i [_{VP}_i died].

The bracketed IP in (25), in the form of [_{IP} PRO VP], is defined as a complex predicate, and the various bracketed categories in (26) as simplex predicates. In particular, the occurrence of PRO in (25) is crucial since it is taken to be a 'predicate variable' that converts an IP in question into a (one-place) predicate. If a lexical NP were to appear in place of PRO, we would no longer have a predicate. Comparing (25) to (26), we can see that cases of OC are exactly cases of IP in positions of predication, both of which involve a

predicate coindexing with a subject. OC, then, is an indexing of an NP to an IP with a PRO subject, not to a PRO. In fact, PRO will always be indexed to the embedded VP anyway, by the predicate-linking rule, independent of control. So, more precisely, (25) should be represented as follows:

(27) John_k tried [IP_k PRO_i [VP_i to leave]].

In (27), there are two applications of the predicate-linking rule, with the result that the simplex VP predicate 'to leave' is linked to PRO, while the complex IP predicate 'PRO to leave' is linked to *John*.

3.2.3.2.4 R/S Expressions as an Instantiation of Predication

In section 3.2.3.2.2, we argued (following Huang 1992) that sentences with R/S expressions are canonical OC structures. In this section, we show that these cases of OC are indeed cases of IP in predication environments, following the procedure outlined in the preceding section. Crucially, we assume with Williams (1980) that the complex predicate involved in such Chinese OC structures is in the schematic form of [IP PRO VP], where both the IP and the embedded VP are required to be linked to a unique subject. Accordingly, with a double application of the rule of predicate-linking, the OC structure in (28) (= (23)) will be converted into the predicate-linking structure in (29):

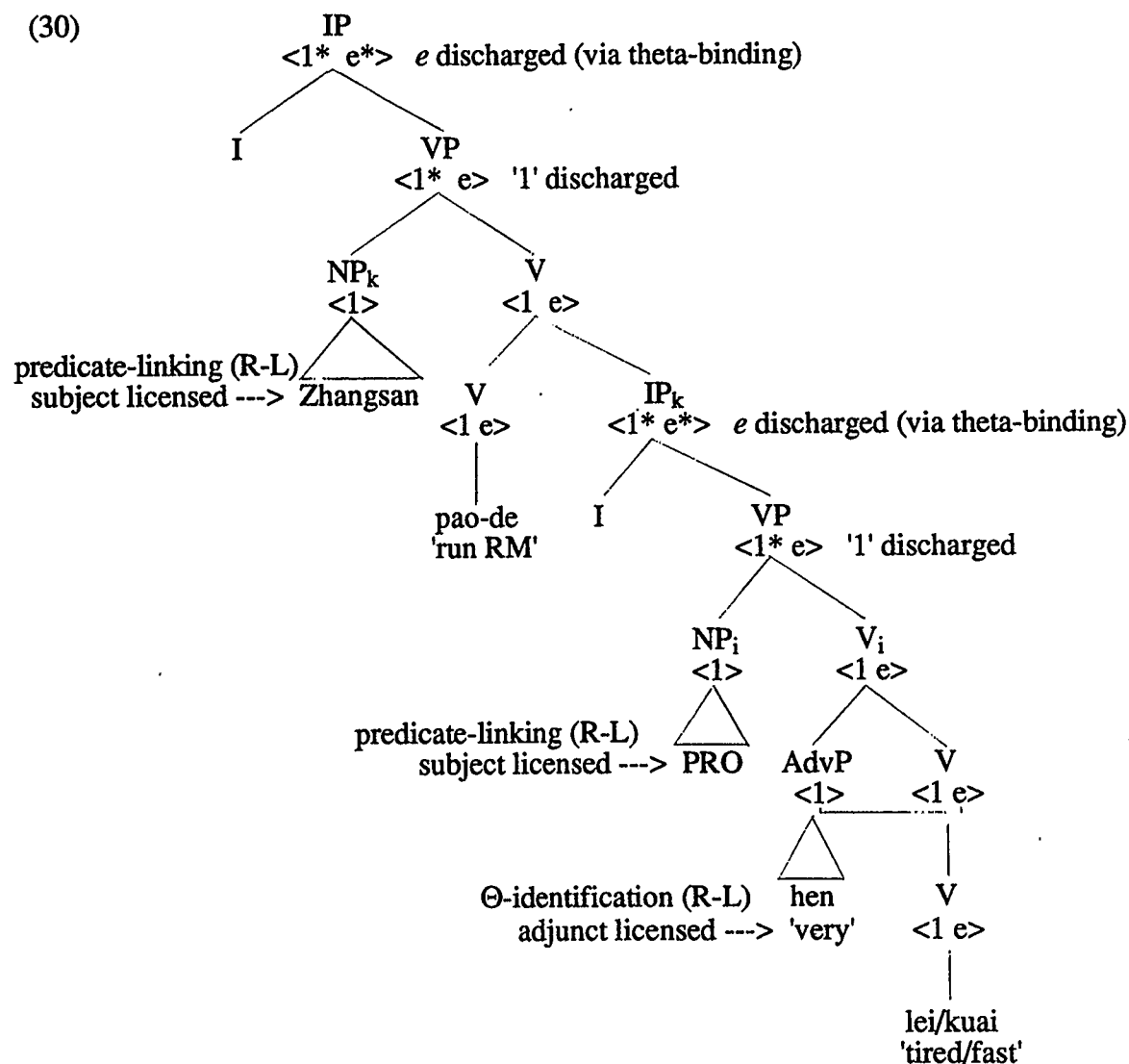
(28) Zhang1san1_i pao3-de [IP PRO_i hen3 lei2/hen3 kuai4].
 ZS run RM very tired/very fast
 'Zhangsan ran and got very tired./Zhangsan runs very fast.'

(29) Zhang1san1_k pao3-de [IP_k PRO_i [VP_i hen3 lei2/hen3 kuai4]].

In (29), the simplex predicate (i.e. the VP) is predicated of PRO, while the complex predicate (i.e. the IP corresponding to the entire R/S expression) is predicated of *Zhangsan*, in compliance with Williams' (1980) and Rothstein's (1983) claim that every predicate must be linked to a unique subject via coindexation.

3.2.3.2.5 Fitting the Control/Predication Approach into EPA Theory

Incorporating the insights of the control/predication analysis into our EPA theory, we find that a complex structure containing a R/S expression can be licensed in a principled way as shown below:



Under our EPA theory, the postverbal occurrences of R/S expressions receive a plausible explanation in (30). In particular, from the directionality parameter (10c) which constrains a right-to-left ordering of a predicate to its subject, it follows that an R/S expression, being

a secondary predicate following the primary predicate in Chinese, is restricted to occur only postverbally.

3.2.3.3 Summary

To sum up, we have seen how the postverbal placement of FDRS expressions, a problem which remains unresolved in the literature, can be effectively handled within EPA theory. As for F/D expressions, it has been shown that they are simply instantiations of primary predicates predicated of a sentential subject; as for R/S expressions, it has been shown that they are cases of secondary predicates instantiating a control/predication phenomenon. Taken together, the postverbal occurrences of FDRS expressions are expected under the proposed right-to-left predicate-linking parameter.

3.3 Empirical Evidence for EPA Theory: The Interpretation-Licensing Dependence

3.3.0 Introduction

In the preceding discussion, we have shown that an expanded version of Speas' (1990) PA theory which incorporates Williams' (1980) predication theory and Rothstein's (1983) rule of predicate-linking coupled with a concept of directionality is capable of explaining a range of word order facts in Chinese. In what follows, we will demonstrate that theta-identification and predication-linking as two legitimate licensing mechanisms are indeed independently motivated in Chinese. The arguments in favor of this claim are based on the different semantic interpretations associated with the preverbal and postverbal occurrences of Chinese adjuncts as provided by theta-identification and predicate-linking, respectively.

In section 3.1.1.2.2, we touched on the idea that different modes of licensing mechanisms will give rise to different interpretations (cf. Rapoport 1991, 1993). Thus, in Chinese, if a particular syntactic constituent is acceptable both in preverbal and postverbal position, we might expect this constituent to assume different interpretations, depending on the available licensing mechanisms. In what follows, we first argue in section 3.3.1 that this is indeed the case with Chinese R/S expressions. Specifically, we show that apart from their usual postverbal position, they can also appear preverbally. However, when

they do so, they are licensed by theta-identification, and no longer by predicate-linking. Given that it is the mode of licensing mechanism that determines the interpretation, we may accordingly expect a meaning change in such cases. Then, turning to other cases involving locative PPs headed by *zai* 'at' which can occur either preverbally or postverbally with a difference in interpretation (section 3.3.2), we provide more supporting evidence for the claim that semantic interpretation is dependent on the syntactic licensing mechanism available. From a broader perspective, this 'interpretation-licensing dependence' offers another piece of positive evidence arguing for the empirical adequacy of our EPA theory.

3.3.1 The Interpretation of Preverbal and Postverbal Adjuncts

It is a well-known fact of Chinese that certain expressions can occupy different positions relative to the verb, resulting in a different interpretation for the sentence in question. Thus, the claim that our EPA theory is explanatorily adequate to account for Chinese word order is further justified by this observation since this contrast in interpretation can always be described in terms of the interpretation-licensing dependence as discussed in the preceding section. Seen in this light, consider the difference in meaning which correlates with the preverbal or postverbal placement of the same adjuncts, as in (31) and (32) below:²²

- (31) a. Zhang1san1 wan2-de [hen3 gaolxing4].
 ZS play-RM very happy
 'Zhangsan was very happy as a result of playing.' (postverbal; resultative interpretation)
- b. Zhang1san1 [hen3 gaolxing4]-de wan2-zhe.
 ZS very happy DE play-DUR
 'Zhangsan was playing very happily.' (preverbal; simultaneous interpretation)
- (32) a. Zhang1san1 pao3-de [hen3 kuai4].
 ZS run-RM very fast
 'Zhangsan runs very fast.' (postverbal; stative interpretation)
- b. Zhang1san1 [hen3 kuai4]-de pao3-zhe.
 ZS very fast DE run-DUR
 'Zhangsan was running very fast.' (preverbal; simultaneous interpretation)

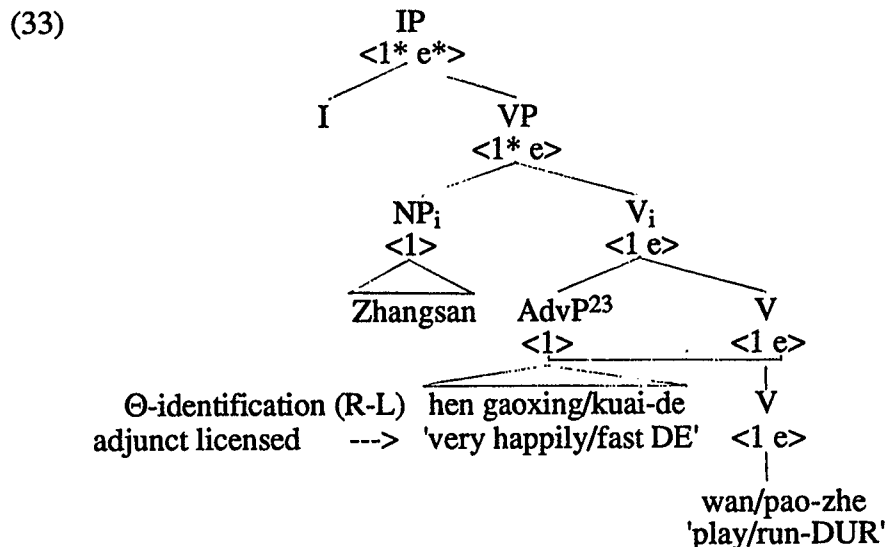
²² It is important for non-native speakers to distinguish the two uses of *de* in Chinese: the result/state marker in the (a)-examples, and the modification marker in the (b)-examples. Although they are usually pronounced in the same way, different characters are conventionally used to signal them as functionally distinct. In order to avoid confusion, we will gloss the result/state marker as RM, and the modification marker as DE throughout this study.

It can be noted that (31a) and (32a) are sentences with a typical result expression and state expression, respectively. Thus, (31a) means that the state of *Zhangsan*'s being very happy is a consequence of his playing, and (32a) implies that *Zhangsan* is able to run very fast on any occasion or that he habitually runs very fast. However, when the same expression appears preverbally, the resultative/stative reading is lost, as we see in (31b) and (32b). In such cases, we have an interpretation in which the event described by the expression is seen as simultaneous with the action referred to by the verb. Accordingly, the expression 'very happily' in (31b) denotes the state of mind in which *Zhangsan* has performed the action of playing, and the expression 'very fast' in (32b) denotes the manner in which *Zhangsan* has performed the action of running, and hence the simultaneous interpretation observed in both sentences.

Under our EPA theory, the meaning contrasts in (31) and (32) receive a systematic explanation. As we will elaborate below, the meaning differences between the preverbal and postverbal positioning of Chinese adjuncts in such cases are due to the different types of licensing mechanisms at work which yield the interpretations.

3.3.1.1 Theta-Identification and the Temporally-Bound Interpretation

Let us first consider the interpretation which correlates with the preverbal occurrences of Chinese adjuncts. In (31b) and (32b) above, we have an instantiation of theta-identification in each case where the adjunct is required to appear preverbally in order to satisfy the right-to-left directionality parameter of theta-identification. Under this operation, the open position in the theta grid of the adjunct is identified with the *e* position in the verb's theta grid, and this relation is indicated by a line linking the two positions:



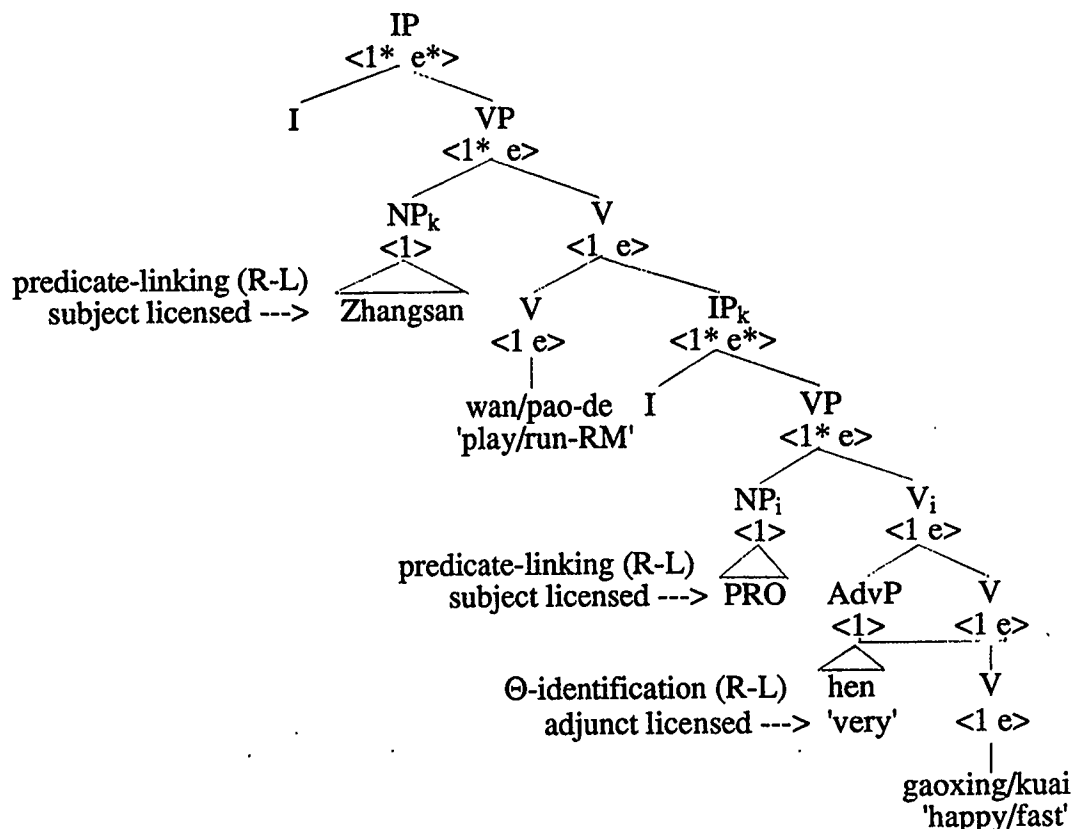
Recall that the *e* position in the verbal grid indicates a spatiotemporal location corresponding to the event denoted by the verb itself, as discussed in section 2.3.3.1.0. Thus in (33), by linking this *e* position to the open grid position of the adjunct, the event described by the verb gets anchored in time to the adjunct. Because of this *e*-position connection, (31b) is interpreted as meaning that *Zhangsan* is 'being very happy' at the time of the action denoted by the verb *play*, and (32b) as meaning that *Zhangsan* is 'being very fast' at the time of the action denoted by the verb *run*. Hence, we have a simultaneous interpretation in each case.

3.3.1.2 Predicate-Linking and the Interpretations for Postverbal Adjuncts

Let us now turn to the interpretations associated with the postverbal occurrences of Chinese adjuncts. As noted above, two interpretations are possible with the postverbal adjuncts in question. These are the resultative interpretation in (31a), and the stative interpretation in (32a). The fact that these meanings correlate only with postverbal, but never with preverbal placement of such adjuncts is due once again to the licensing mechanisms available for semantic interpretations. Thus, in (31a) and (32a), we have a double application of the predicate-linking rule in each case whereby the adjunct is required to appear postverbally in order to comply with its right-to-left directionality requirement:

²³ For the sake of conciseness, we simply analyze the intensifier *hen* 'very' as part of the entire AdvP (but see the representation in (34), where the same constituent is given an independent maximal projection). This does not affect our discussion, however.

(34)



Below, we will show how predicate-linking is involved in determining the resultative/sequential interpretation on the one hand, and the stative/generic interpretation on the other, both of which are only possible with the postverbal positioning of the adjuncts in question.

3.3.1.2.1 The Resultative/Sequential Interpretation

Let us first consider how predicate-linking is responsible for yielding the resultative or sequential reading associated with (31a) above (i.e. 'Zhangsan was very happy as a result of playing'). As shown in (34), there are two instances of the predicate-linking rule in this representation, resulting in the linking of the simplex predicate 'very happy' to PRO, and that of the complex predicate 'PRO very happy' to *Zhangsan*. In terms of event structure, we can take these predicate-linkings as implying that there are two independent events, viz. *Zhangsan*'s playing and *Zhangsan*'s being very happy, which are related to each other by means of coordination (cf. Ross 1984). Since neither event is subordinated

to the other, a resultative/sequential interpretation is open to them, as it is to any coordinated string. However, when the same adjunct 'very happy' appears preverbally (cf. (33)), theta-identification requires that the two events be holding simultaneously (due to the *e*-position connection), and accordingly the resultative/sequential interpretation is not possible with preverbal modification.

3.3.1.2.2 The Stative/Generic Interpretation

Second, we turn to the relevance of predicate-linking in providing a stative or generic interpretation for (32a) above (i.e. 'Zhangsan runs very fast'). This sentence does not make reference to any particular event at a specific time; instead, it has a stative/generic interpretation, in which it attributes a quality of being 'very fast' to *Zhangsan's* running event. Notice that this quality is taken to be a characteristic property pertaining to *Zhangsan*, which does not need to be anchored in any location in time. As shown in (34), it is predicate-linking which licenses the postverbal adjunct under consideration; and the temporally-bound interpretation, provided by theta-identification, is thus not available in this case. In other words, whenever there is no *e*-position connection, a stative/generic interpretation is open to the adjunct in question. Accordingly, the postverbal adjunct 'very fast' here is not related to any specific event, but is a generic statement of *Zhangsan's* running event.

It should be clear from the discussion above that there is strong evidence supporting the interpretation-licensing dependence associated with the preverbal or postverbal placement of certain adjuncts in Chinese. In the following sections, we will show that there are yet other noteworthy meaning contrasts between the preverbal and postverbal position that can be attributed to this dependence.

3.3.2 More Positive Evidence from the Locative *zai*-PP

It has been observed (e.g. by Chao 1968, Li and Thompson 1981, and Travis 1984) that the locative PP headed by *zai* 'at' can either precede or follow the verb, but there is a difference in meaning depending on the position relative to the verb. The relevant distinctions are given in (35) and (36):

- (35) a. Zhang1san1 [zai4 zhuo1zi-shang3] tiao4.
 ZS at table-top jump
 'Zhangsan was jumping (up and down) on the table.' (preverbal; locative reading)
- b. Zhang1san1 tiao4 [zai4 zhuo1zi-shang3].
 ZS jump at table-top
 'Zhangsan jumped onto the table.' (postverbal; goal reading)
- (36) a. Zhang1san1 [zai4 di4ban3-shang3] xie3-le yi1-ge4 zi4.
 ZS at floor-top write-PER one-CL character
 'Zhangsan wrote a character (on a piece of paper) on the floor.' (preverbal; locative reading)
- b. Zhang1san1 xie3-le yi1-ge4 zi4 [zai4 di4ban3-shang3].
 ZS write-PER one-CL character at floor-top
 'Zhangsan wrote a character on the surface of the floor.' (postverbal; goal reading)

We see that in (35a), the *zai*-PP has a locative reading (*Zhangsan's* jumping event is located on the table), whereas in (35b) it has a goal reading²⁴ (*Zhangsan* ends up on the table as a result of the jumping event in which he participates). Similarly, this difference in interpretation applies to (36): in (36a), *zai diban-shang* 'on the floor' indicates the location where the event of *Zhangsan's* writing a character has taken place (i.e. the locative reading), while in (36b), it indicates the location at which the character ends up being written (i.e. the goal reading).²⁵ Thus, as is evident from the English glosses, in (36b), the character is necessarily written on the surface of the floor, whereas in (36a), the character can be written on a piece of paper or on anything else, and not necessarily on the surface of the floor.²⁶

3.3.2.1 Preverbal *zai*-PPs and the Spatially-Bound Interpretation

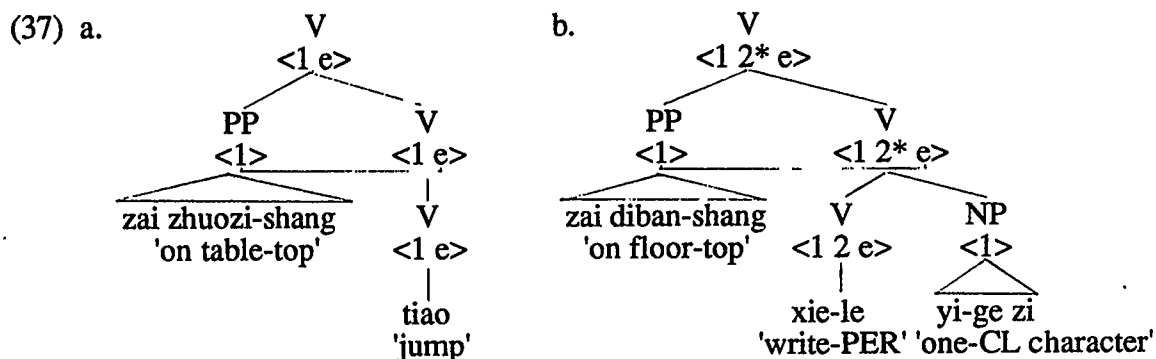
Under our assumption that semantic interpretation is a function of the syntactic licensing mechanism available, we can say that the locative (i.e. spatially-bound) reading correlating with the preverbal occurrences of *zai*-PPs is forced by the *e*-position connection

²⁴ Insofar as goals are spatial results, it is not surprising that in Chinese, the goal interpretation and result interpretation are constrained to correlate with the postverbal position.

²⁵ It is worth mentioning that the difference between (35b) and (36b) is that, in the former case, it is the subject *Zhangsan* which ends up at the location expressed by the *zai*-PP, whereas in the latter case, it is the object *yi-ge zi* 'one character' which ends up at that location.

²⁶ In (36a), what is crucial is the interpretation that *Zhangsan's* writing activity is located on the floor.

produced by theta-identification as discussed above. Thus, in terms of EPA theory, (35a) and (36a) will have the following partial representations (irrelevant details omitted):



In each instance of (37), the open position in the theta grid of the *zai*-PP undergoes theta-identification with the *e* position in the verb's theta grid. Because of this connection, the event described by the verb gets anchored in space to the *zai*-PP. In other words, the event of jumping in (37a) and that of writing a character in (37b) are spatially bound and accordingly we have a locative reading in each case which indicates the location where the action denoted by the verb has occurred.

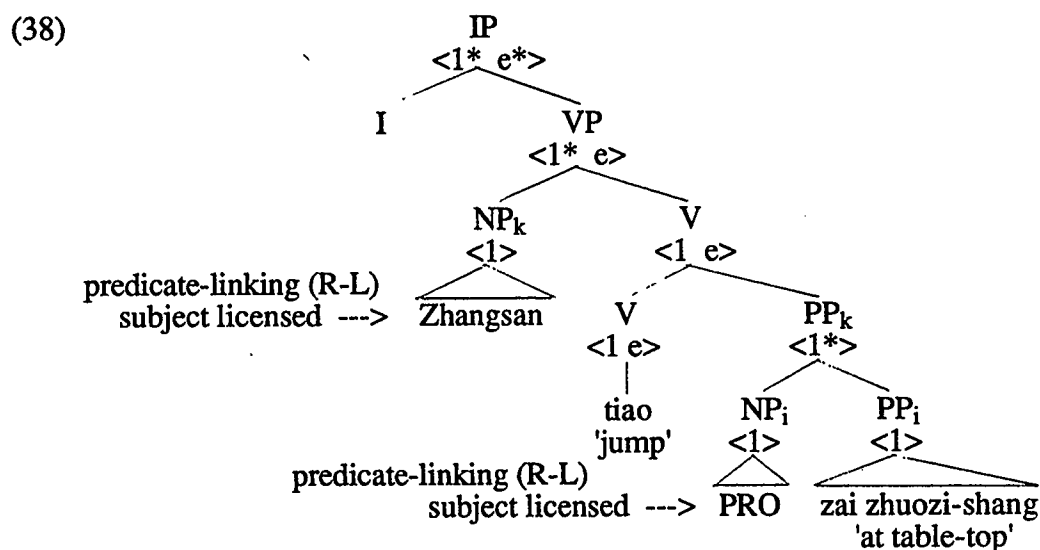
In combination with the discussion in section 3.3.1.1, we can conclude that whenever an adjunct appears preverbally in Chinese, it describes a particular event at a specific point of time/space that is co-temporal/co-spatial with the action referred to by the verb. This temporally/spatially-bound interpretation is due to the fact that theta-identification is the licensing mechanism which provides the relation yielding the interpretation as a result.

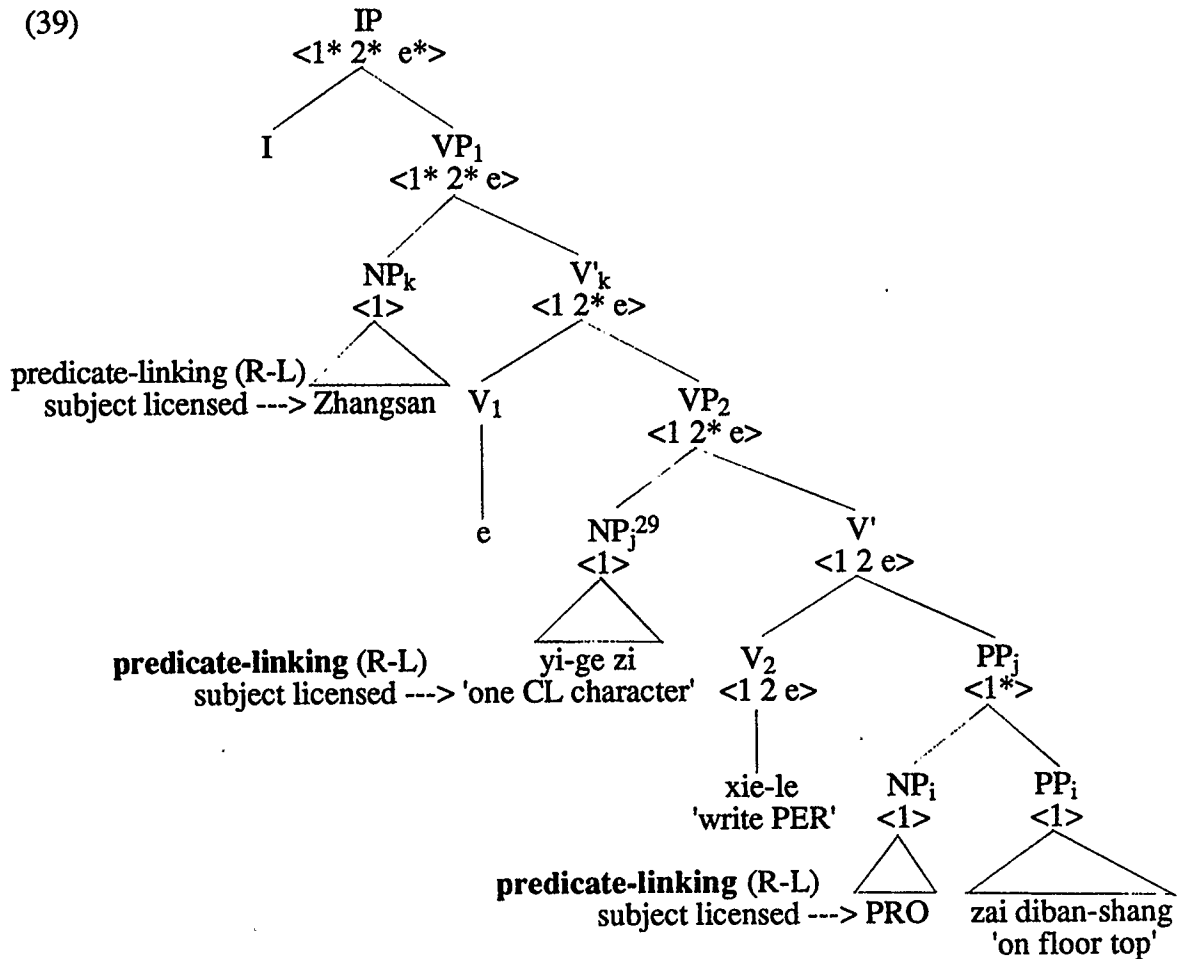
3.3.2.2 Interpretation of Postverbal *zai*-PPs

Following the lines of our analysis of R/S expressions, the goal reading associated with the postverbal occurrences of *zai*-PPs can be seen as determined by the predicate-linking rule which provides a relationship between the entity (or entities) expressed by a particular NP and the location denoted by the *zai*-PP. Here, we adopt Mulder and Sybesma's (1992) proposal that the *zai*-PP projects a small clause (SC) structure, in the

canonical form of [pp PRO PP],²⁷ and assume that it is syntactically parallel to the IP structure projected by the R/S expression as suggested in the previous discussion.

Within the framework of EPA theory coupled with this assumed SC analysis, we first consider (35b) above, which can be represented as follows:





In (39), we have three instances of the predicate-linking rule, two of which (in bold type) are relevant for our present concerns. The lower PP predicate, as in (38), is linked to PRO; however, the higher PP predicate in this case is linked to the matrix object 'one character',

representation (39), the locative *zai*-PP 'on the table' occurs as the complement of the embedded VP, the Theme NP 'one character' as the Spec of that VP, and the Agent NP *Zhangsan* as the Spec of the higher VP-shell headed by the empty V_1 . The lexical verb 'wrote' originates in V_2 in the lower VP-shell and raises into the position of V_1 . The surface word order of (36b) is derived after verb movement, with the verb followed by both the Theme NP and the locative PP. This process of V-raising can be viewed as motivated by the need to assign Case to the Theme NP, given that Case is assigned from left to right in Chinese; otherwise, a violation of the Case Filter will result.

²⁹ Given that theta-marking in Chinese operates strictly from left to right (cf. (10a)), the fact that the Theme NP 'one character' here occurs to the left of the verb seems incompatible with this directionality parameter. However, as we can see, the NP in question is rather compatible with, and hence licensed by, the parameter of predicate-linking which mandates that a subject precede its predicate in Chinese (cf. (10c)). The claim that this NP is understood as a subject is in need of independent empirical justification, and we leave this as a topic for future research.

rather than to the matrix subject *Zhangsan*.³⁰ Thus, after the application of these predicate-linkings, the *zai*-PP is understood as ascribing a property to 'the character' concerned. As a result, we have another goal reading, in which it is 'the character', instead of *Zhangsan*, which is interpreted as ending up on the surface of the floor.

3.3.2.3 Further Remarks: Postverbal *zai*-PPs and the Metaphorical Interpretation

We have pointed out in the previous sections that the interpretation-licensing dependence is crucially involved in the meaning differences between the preverbal and postverbal occurrences of *zai*-PPs. Finally, we will show that this dependence can be extended to explain another interesting meaning contrast with respect to the preverbal and postverbal placement of such PP's. Let us consider the following:

- (40) a. zhe4 jian4 shi4 gua4 [zai4 wo3de xin1-shang3].
 this CL matter hang at my heart-top
 'This matter worries me.'
- b. ??zhe4 jian4 shi4 [zai4 wo3de xin1-shang3] gua4-zhe.
 this CL matter at my heart-top hang-DUR
 'This matter hangs on my heart.'
- (41) a. ta1de jing1shen2 huo2 [zai4 wo3mende xin1-li].
 his spirit live at our heart-inside
 'We will always remember what he preaches.'
- b. ??ta1de jing1shen2 [zai4 wo3mende xin1-li] huo2-zhe.
 his spirit at our heart-inside live-DUR
 'His spirit lives in our hearts.' (Adapted from Mulder and Sybesma 1992:455)

As the English translations show, the two sentences only have a metaphorical interpretation which is related by extension to their literal interpretation. Under our proposed analysis, the anomaly of (40b) and (41b) can be plausibly accounted for by the licensing mechanism of theta-identification which requires that a connection be made between the open position of the *zai*-PP and the *e* position of the verb in each case. Because of this *e*-position connection, the event described by the verb is necessarily interpreted as being anchored in

³⁰ As suggested by Huang (1992), this state of affairs follows from some version of Rosenbaum's (1970) Minimal Distance Principle which requires that a predicate select as its subject the minimal c-commanding NP.

some spatial location, and hence the only possible interpretation both sentences have is necessarily 'literal' in nature. In other words, (40b) must be taken to mean "this matter hangs 'literally' on my heart", and (41b) to mean "his spirit lives 'literally' in our hearts", hence the fact that they are semantically odd. By contrast, in (40a) and (41a), it is predicate-linking which licenses, and hence provides the interpretation for, the postverbal *zai*-PPs in question. In such cases, since the *e*-position connection is no longer present, the metaphorical interpretation is available to them, and hence the fact that they are acceptable.

3.3.3 Summary

It is interesting to note that it is by no means an innovative observation that there are meaning differences correlating with the preverbal or postverbal placement of Chinese adjuncts (see the relevant discussion in Li and Thompson 1981, Ross 1984, Travis 1984, Tai 1985, Mulder and Sybesma 1992, among others). However, we have gone one step further in this study by deriving these meaning contrasts from some deeper mechanism, namely the interpretation-licensing dependence as assumed in our EPA theory. Thus, a certain preverbal adjunct and its postverbal counterpart will be interpreted differently, depending on which licensing mechanism is available for determining the interpretation.

When appearing preverbally, the open position in the adjunct's theta grid is required by theta-identification to be connected with the *e* position in the verb's theta grid. Due to this connection, the event described by the verb is interpreted as temporally or spatially bound by the event described by the adjunct. Hence, the interpretation is that the two events are co-temporal or co-spatial with one another. In contrast, when the adjunct in question occurs postverbally, predicate-linking takes over and provides the licensing mechanism for interpretation. Accordingly, the *e*-position connection is no longer available, and a range of interpretations (i.e. the resultative/sequential, stative/generic, and metaphorical interpretations) are open to the postverbal adjunct.

Under the previous analyses in the literature, the variety of interpretation differences as discussed in the preceding sections are regarded as totally unrelated to each other. However, within our EPA theory, these seemingly sporadic phenomena fall together naturally under the assumed interpretation-licensing dependence.

3.4 Conclusion

In this chapter, we have examined how an expanded version of Speas' PA theory can be applied to account for a range of Chinese word order phenomena within the confines of IP structure. In particular, we have shown that the longstanding controversy concerning the postverbal occurrences of FDRS expressions can be resolved under the predicate-linking parameter assumed under EPA theory. Furthermore, we have also shown that the proposed directionality parameters are well motivated empirically because of an interpretation-licensing dependence which exists in the preverbal or postverbal occurrences of Chinese adjuncts, thus further justifying the empirical adequacy of our EPA theory.

In the next chapter, we will turn to a detailed study of Chinese noun phrase structure, and show that our three proposed directionality parameters can be extended to resolve another longstanding controversy in that domain, the head-final character of Chinese noun phrases.

CHAPTER 4

EXPANDED PROJECT ALPHA THEORY AND WORD ORDER IN CHINESE NOUN PHRASES

4.0 Introduction

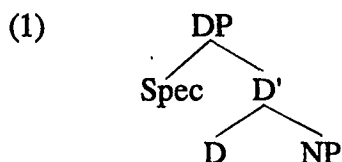
Within the framework of Expanded Project Alpha (EPA) theory as established in the preceding chapter, this chapter examines the word order phenomenon in the domain of Chinese noun phrases. The organization of this chapter is as follows. Section 4.1 sets out to deal with the controversy surrounding the analyses of Chinese noun phrase structure. Specifically, in section 4.1.1, we first review the basic properties of Chinese noun phrases and Tang's (1990a,b) DP analysis. In section 4.1.2, we then point out some difficulties that Tang's analysis faces and demonstrate that her arguments for the DP hypothesis in Chinese are not strong. Section 4.1.3 shows how the same range of data relating to Chinese noun phrases are better accommodated by an NP analysis as first suggested by Huang (1982), and section 4.1.4 concludes with a remark that there is no language-specific evidence in favor of the DP hypothesis in Chinese. After arguing against the DP structure and for the NP structure for Chinese noun phrases, in section 4.2 we investigate the relationship between this NP structure and our proposed directionality parameters of EPA theory. In particular, section 4.2.1 sets the stage by discussing a number of theoretical issues that are presupposed throughout our discussion. In section 4.2.2, we show that although Chinese has the process/result distinction of deverbal nominals (cf. Lebeaux 1986; Zubizarreta 1987), its process nominals have a theta-grid structure which differs substantially from that of their English counterparts. Specifically, we argue, extending Grimshaw's (1990) insights, that the '2' position corresponding to the internal argument, in addition to the '1' position corresponding to the external argument, undergoes lexical suppression in Chinese process nominals. By stipulation, suppressed positions cannot be saturated syntactically by arguments, although via theta-identification, they can license argument adjuncts which correspond to the optional subject and object of the process nominals. Along this line of analysis, we go on to argue in section 4.2.3 that the strictly head-final character of Chinese noun phrases can be attributed to the fact that theta identification is the only licensing theta relation available in that domain, and that its right-to-left application dictates that no postnominal constituent is ever allowed in Chinese. To

obtain a broader generalization, we also argue that Chinese has a consistent head-initial specification for its lexical categories, and that the head-final behavior of Chinese noun phrases is accounted for as a consequence of the operation of nominalization which suppresses the two thematic grid positions of process nominals.

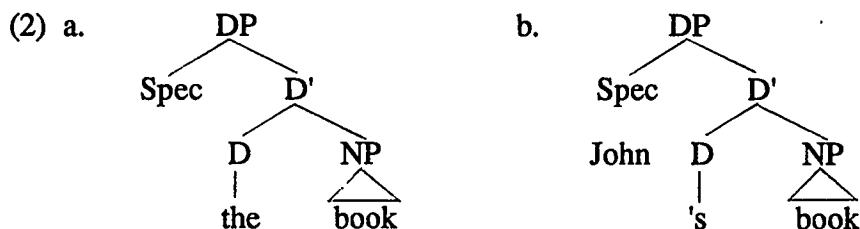
4.1 The Structure of Chinese Noun Phrases

4.1.0 Introduction

Traditionally, noun phrases have been analyzed as NPs with the noun as the head and the determiner as the specifier. However, in recent years, there is a growing conviction that noun phrases should be considered as determiner phrases (DPs), thus allowing some similarities between sentences and noun phrases to be captured. This is the DP hypothesis (cf. Abney 1987, Brame 1982, Fukui and Speas 1986, among others). According to this hypothesis, the internal structure of noun phrases is as follows:¹



Under this hypothesis, the determiner is no longer the specifier of the NP, but is the head of DP which selects an NP as its complement. As for the possessor, it is reanalyzed as the specifier of the DP which is assigned genitive Case by the functional head *-s* (cf. Fukui and Speas 1986; see section 2.3.3.2). These two possibilities are illustrated below:



¹ With the postulation of DP in (1), we will, throughout our subsequent discussion, refer to the nominal construction itself as a noun phrase, and the different types of projections as DP and NP.

The DP hypothesis has been applied (and extended) in the analysis of Chinese noun phrase structure (cf. Tang 1990a,b). In what follows, we show that the supporting evidence for the DP hypothesis in Chinese is not strong. As a matter of fact, Chinese does not even have articles corresponding to *the* or *a* in English. In contrast, we demonstrate that an NP analysis of Chinese noun phrases is still a competitive, or perhaps superior, analysis to the DP analysis. In section 4.1.1, we first outline some Chinese noun phrase facts relevant to our discussion, and then present Tang's (1990a,b) extension of the DP hypothesis which analyzes Chinese noun phrases in terms of a string of projections (i.e. DP-KP-NP), which is intended to parallel the sentential CP-IP-VP structure standardly assumed in the literature (cf. Chomsky 1986b). Section 4.1.2 provides counterevidence to the structural parallelism she mentions, and shows that her proposed DP structure cannot account for the distribution of prenominal modifiers in Chinese without some ad hoc stipulations and unwelcome consequences. We then offer an alternative NP analysis of Chinese noun phrases in 4.1.3 which will be demonstrated to be free from the empirical problems encountered by Tang's DP analysis. The noun phrase structure that we advocate essentially dates back to Huang's (1982) suggestion that the demonstrative-numeral-classifier sequence forms a single constituent CIP, which occurs in the Spec position of the NP. Finally, on the basis of the different behavior with respect to English and Chinese possessive phrases, section 4.1.4 draws attention to the fact that there is no motivation for the DP hypothesis in Chinese.

4.1.1 Chinese Noun Phrase Properties and the DP Hypothesis

4.1.1.1 Chinese Noun Phrase Facts

Tang (1990a,b) observes that Chinese noun phrases have the following basic properties. First, demonstratives and numerals cannot by themselves modify a head noun; instead they must cooccur with a classifier:²

² A note is in order here to provide a basic understanding for the concept of 'classifier', a linguistic category that is not widespread in Indo-European languages. In a non-classifier language like English, a noun like *book* is specific with respect to quantity, and as a result, it can be used in direct combination with a numeral (e.g. *one book*, *two books*) or a determiner (e.g. *a book*, *these books*, *those books*). In Chinese, a typical classifier language, a noun itself does not inherently reflect quantity, and the Chinese counterpart *shu* 'book' simply indicates a collectivity of books. In order to individualize a unit from this collectivity, we must insert a classifier between the numeral/determiner and the noun. Thus, we say *yi ben shu* (one CL book) 'one book', *liang ben shu* (two CL book) 'two books', *na ben shu* (that CL book) 'that book', and so on. In other words, the function of a classifier here is one of individualization, i.e. to make a noun in a classifier language eligible to be counted.

- (3) a. *na4 shu1
that book
- b. na4 ben3 shu1
that CL book
'that book'
- (4) a. *san1 shu1
three book
- b. san1 ben3 shu1
three CL book
'three books'

Second, classifiers cannot appear without a numeral, as illustrated by the ungrammatical (5b), to be compared with the grammatical (5a) with a bare noun (cf. fn. 2):

- (5) a. shu1
book
'books'
- b. *ben3 shu1
CL book
- c. san1 ben3 shu1
three CL book
'three books'

Third, the order of the demonstrative, numeral and classifier is fixed; specifically, the demonstrative precedes the numeral, which in turn precedes the classifier. No other word order is allowed:

- (6) na4 san1 ben3 shu1
that three CL book
'those three books'

Fourth, there exists a kind of agreement or selectional restriction between the classifier and the head noun.³ That is, the classifier varies with different head nouns. In

³ The agreement may involve geometrical shape (e.g. *gen* (long) agrees with *gunzi* 'stick', and *ke* (round) with *shitou* 'stone', etc.), qualitative attributes (e.g. *tiao* (flexible) agrees with *shingtze* 'string', and *zhi* (rigid) with *bi* 'pen', etc.), functional characteristics (e.g. *jian* (clothing) agrees with *waiyi* 'jacket', and *jia* (machine) with *chezi* 'car', etc.), among other groups of attributes. Which agreeing classifier a particular noun takes is idiosyncratic and must be learned word by word.

(7), for example, the classifier *ben* (for flat things) can be used with nouns like *shu* 'book' which agree with it in terms of the permanent property denoted, but cannot be used with nouns like *niu* 'ox', which do not:

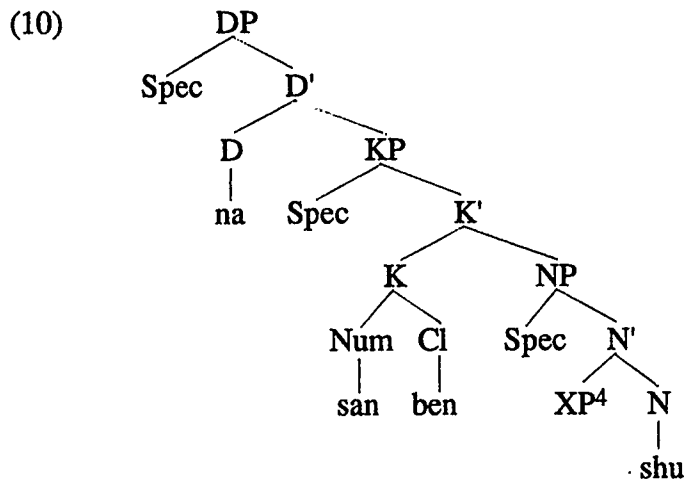
- (7) a. na4 san1 ben3 shu1
 that three CL (flat) book
 'those three books'
- b. *na4 san1 tou2 shu1
 that three CL (animate) book
- (8) a. na4 san1 tou2 niu2
 that three CL (animate) ox
 'those three oxen'
- b. *na4 san1 ben3 niu2
 that three CL (flat) ox

Fifth, a single noun is sometimes compatible with more than one classifier; however, only one classifier is allowed to cooccur with a head noun in each case:

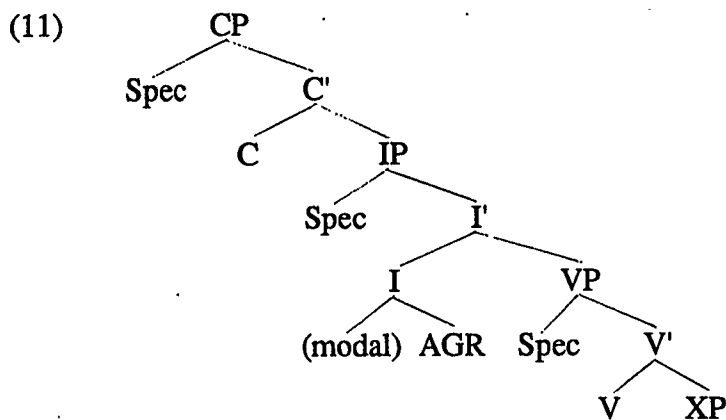
- (9) a. (*san1-bu4) san1-ben3 shu1
 three-CL three-CL book
 'three books'
- b. (*san1-wei4 san1-ming2) san1-ge4 xue2sheng
 three-CL three-CL three-CL student
 'three students'

4.1.1.2 Tang's (1990a,b) DP Analysis of Chinese Noun Phrases

Applying and extending the DP hypothesis, Tang (1990a,b) suggests a more intricate DP structure to account for the Chinese noun phrase facts presented above. That is, in addition to DP and NP, she posits an intermediate-level Classifier Phrase (KP) between the two projections. Accordingly, Chinese noun phrases such as *na san ben shu* 'those three books' should have the following configuration:



Tang calls particular attention to the resemblance of the Chinese noun phrase structure in (10) to the sentence structure standardly adopted in the literature (cf. Chomsky 1986b), which is illustrated in (11):⁵



According to Tang, two structural similarities between (10) and (11) are worthy of note. The first is that they both contain two functional projections (i.e. DP-KP and CP-IP) and one lexical projection (i.e. NP and VP); in either case, the first two projections are functional while the last projection is lexical. The second is that the heads K and I both

⁴ Notice that XP stands for the complement/modifier of the head noun which occurs as a rule to its left (see below for discussion).

⁵ It should be noted that the structure in (11) is no longer generally assumed. In particular, recent work (e.g. Pollock 1989) suggests that INFL should be split into two functional categories: Tense and AGR, each projecting its own phrasal category and Spec position. In order to do justice to Tang's analysis, we will ignore this split INFL clause structure in the following discussion.

contain a lexical element (i.e. the numeral and modal) and an agreeing element (i.e. the classifier and AGR). This parallel relationship between the sentential CP-IP-VP and the proposed Chinese noun phrase structure DP-KP-NP is crucial in Tang's analysis⁶ because some of the principles applicable to sentences are applied directly to Chinese noun phrases without further motivation.

Now, let us see how the Chinese noun phrase facts in (3)-(9) can be accounted for under the DP structure in (10). First, the fact that neither the demonstrative, numeral nor classifier may modify the head noun by itself follows if we make two further assumptions with respect to (10). The first assumption is that under K, both the numeral and the classifier are obligatory; that is, if a lexical instantiation is given to K, both the Num and Cl must be lexically realized. This then captures the intuition that neither the numeral nor classifier can occur alone, as illustrated by the ill-formed cases (4a) and (5b), respectively. The second assumption concerns the occurrence of the demonstrative. In this respect, notice that whenever there is a demonstrative, there must be a numeral-classifier sequence, but not vice versa. This relationship can be seen as an instance of complement selection. That is, the head D selects a KP as its complement. On the assumption that selected elements are obligatory, it follows then that when the demonstrative appears, the numeral-classifier sequence must be present. Thus, cases like (3a) where the demonstrative occurs alone are ungrammatical.

Second, as for the fixed word order of the demonstrative-numeral-classifier sequence, it also follows from the assumption that D selects KP, and within KP, the Num precedes the Cl.

Third, the agreement relation between the classifier and the head noun can be captured by the structure in (10), in which NP is the complement of K, and hence K may impose certain selectional restrictions on its NP complement.

⁶ In a sense, Tang's analysis is not just an extension, but a revision of the DP hypothesis, since she takes the parallel to be between DP and CP, not DP and IP as is commonly assumed (cf. Szabolcsi 1986 for a similar proposal).

Fourth, it is also predicted under (10) that the classifier contained in K cannot be iterated, as is the case with other kinds of projections (lexical and functional), which allow only one head for each projection.

4.1.2 Problems with Tang's Arguments for the DP Analysis

Although Tang's DP analysis for Chinese noun phrase structure is interesting, it seems that there are significant problems associated with it. These are discussed below.

First, consider the structural parallelism Tang draws between her proposed Chinese noun phrase structure and the generally assumed sentence structure in the literature. As Gao (1991) remarks, there are some differences between the two which Tang fails to point out. One of these differences is the agreement facts. In an English sentence, for instance, agreement is always seen to be between the Spec of IP and the head INFL. In a Chinese noun phrase, however, the agreement is between the head K and its complement NP. This difference is shown in the following examples:

- (12) a. [CP [IP John [_I does not] [VP run very fast]]].
 b. *[CP [IP John [_I do not] [VP run very fast]]].

- (13) a. [DP [KP [K yi ge] [NP haizi]]]
 one CL child
 b. *[DP [KP [K yi ge] [NP haizimen]]]⁷
 one CL children

(Guo 1991:12)

The data in (12) and (13) show at least that different agreement principles have to be established to account for Chinese noun phrases in Tang's proposal. This in turn weakens the arguments for the DP-KP-NP structure based on structural parallelism.

In addition to the above problem, Tang's DP analysis faces another complication. In Chinese, prenominal modifiers may either precede or follow the determiner-numeral-classifier sequence, as exemplified below:

⁷ It is worth pointing out that the head noun in Chinese agrees with the numeral in number and with the classifier in permanent property.

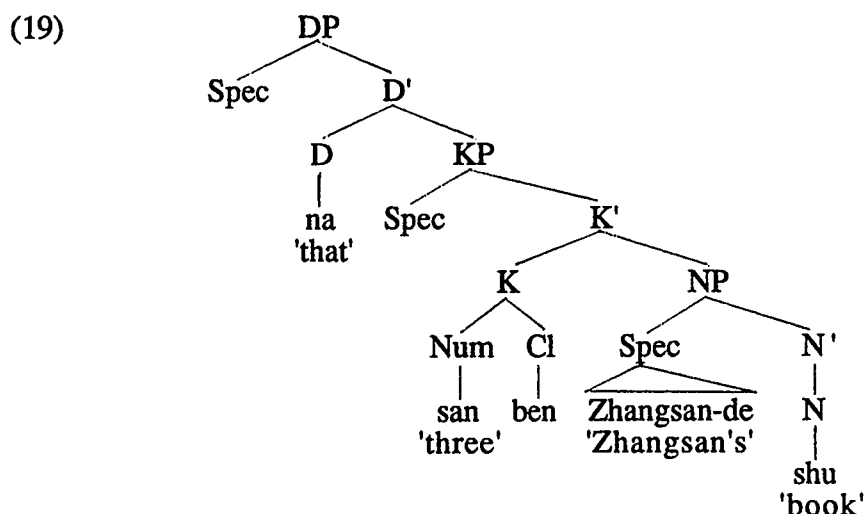
- (14) a. na4 san1 ben3 [Zhang3san3]-de shu1
 that three CL ZS DE book
 'those three books of Zhangsan's'
- b. [Zhang1san1]-de na4 san1 ben3 shu1
 ZS DE that three CL book
 'those three books of Zhangsan's'
- (15) a. na4 san1 ben3 [xin1]-de shu1
 that three CL new DE book
 'those three new books'
- b. [xin1]-de na4 san1 ben3 shu1
 new DE that three CL book
 'those three new books'
- (16) a. na4 san1 ben3 [zai4 shu1jia4-shang3]-de shu1
 that three CL at bookshelf-top DE book
 'those three books on the bookshelf.'
- b. [zai4 shu1jia4-shang3]-de na4 san1 ben3 shu1
 at bookshelf-top DE that three CL book
 'those three books on the bookshelf'

However, the same prenominal modifiers may not intervene between the demonstrative and the numeral-classifier sequence, as shown in (17); nor can they intervene between the numeral and the classifier, as shown in (18):⁸

- (17) a. *na4 [Zhang1san1]-de san1 ben3 shu1
 that ZS DE three CL book
- b. *na4 [xin1]-de san1 ben3 shu1
 that new DE three CL book
- c. *na4 [zai4 shu1jia4-shang3]-de shu1
 that at bookshelf-top DE book
- (18) a. *na4 san1 [Zhang1san1]-de ben3 shu1
 that three ZS DE CL book
- b. *na4 san1 [xin1]-de ben3 shu1
 that three new DE CL book
- c. *na4 san1 [zai4 shu1jia4-shang3]-de shu1
 that three at bookshelf-top DE book

⁸ Tang does not mention the ill-formed cases in (18), though she does discuss those in (17) and tries to provide an account for them (see below for details).

On the one hand, to account for the variations in (14)-(16) where a prenominal modifier may occur on the either side of the demonstrative-numeral-classifier sequence, Tang claims that there are movements occurring in Chinese noun phrases which are analogous to V-to-I movement and I-to-C movement (in English sentences). Thus, she proposes that for each pair of noun phrases in (14)-(16), the examples in (a), where the prenominal modifiers follow the demonstrative-numeral-classifier sequence are the base-generated structures. The following is an illustration of the noun phrase in (14a):



Now, in order to derive the grammatical (14b), where the possessive phrase⁹ 'Zhangsan's' precedes the demonstrative-numeral-classifier sequence, this possessive phrase must move first to the Spec of KP. Tang claims that this movement is parallel to the V-to-I movement at the sentence level in English, where if no modals appear, V must move to I.¹⁰ Then, from the Spec of KP, this possessive phrase will move to the Spec of DP to produce (14b), a movement analogous to I-to-C movement in English subject-auxiliary inversion.

We must point out that Tang gives no independent evidence to support her proposed sequence of movements from Spec of NP to Spec of DP except for the

⁹ Possessive phrases in Chinese should be considered as nominal modifiers. Empirical evidence in favor of this claim is given in section 4.1.4.

¹⁰ It is worth mentioning that the V-to-I movement in English sentences is no longer valid under the current analysis, where the assumption is that INFL lower onto V at SS (cf. Pollock 1989 and Chomsky 1991), or that verbs are generated with their inflectional endings at DS (cf. Chomsky 1993). Once again, such modifications need not concern us here.

parallelism she posits between the CP-IP-VP structure at the English sentence level and the DP-KP-NP structure at the Chinese noun phrase level. Moreover, there is a major flaw in Tang's analogy between the movements assumed for these two kinds of structures. V-to-I and I-to-C movements at the sentence level are head-to-head movements. However, the movement from Spec of NP to Spec of KP is not a head movement, nor is the movement from Spec of KP to Spec of DP. Hence, there actually exists no parallel relationship between the movements in the English sentence structure and her proposed movements in the Chinese noun phrase structure.

On the other hand, the ungrammatical cases in (18), where a prenominal modifier intervenes between the demonstrative and the numeral-classifier sequence, seem to pose problems for the DP structure in (10), in which D and K are not adjacent to each other. Tang has noticed this problem and suggested two possibilities to prevent this. One possibility is to propose that a K-to-D movement obligatorily applies in Chinese noun phrases. As a result, at PF, D and K behave like one head, and therefore no element may intervene between the two categories. Another possibility is to assume that some functional categories like K are defective, and project only to an intermediate level.¹¹ In this way, there will be no Spec position between D and K which can serve as a landing site for the prenominal modifier to move into. Furthermore, given that adjunction is possible only to a maximal projection (cf. Chomsky 1986b; see section 3.2.3.1.1), the prenominal modifier cannot occur between D and K by means of adjunction, either, since K projects only to K', not KP.

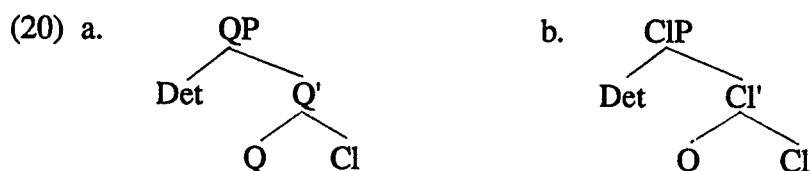
However, both alternatives seem to be problematic. Consider the first possibility. It is unclear as to what motivates the K-to-D movement in question, and why the numeral-classifier must always be moved as a single unit. It should be pointed out here that head-to-head movement is usually motivated by a morphological requirement, but it seems clear that numerals and classifiers in Chinese are not inflections. Thus, until independent evidence is available for head-to-head movement in Chinese, the K-to-D movement will remain an ad hoc solution. As to the second possibility that K projects only to K', it is quite obvious that this is at best a stipulation which has no explanatory force. A better account would explain the same range of facts without such a stipulation. Taken together,

¹¹ It is worth noting that this assumption is against the spirit of Fukui (1986), who proposes that only 'lexical' heads can be defective and project as far as the single-bar level.

we feel that Tang should provide a theoretically sound justification to rule out the ungrammatical structures in (18). However, no such justification is provided.

4.1.3 An NP Analysis of Chinese Noun Phrases

In this section, we will propose a different analysis for Chinese noun phrases based on the more commonly assumed NP structure. Our discussion draws on Huang's (1982) suggestion that there are two possible structures for a Chinese demonstrative-numeral-classifier sequence:

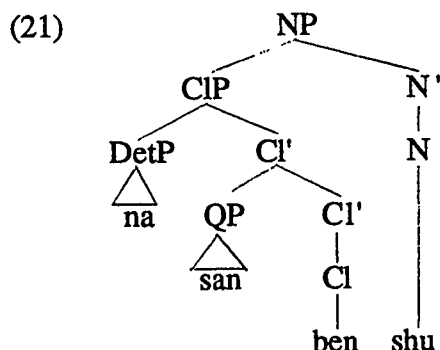


In (20a), the quantifier (i.e. the numeral in Tang's analysis) is treated as the head, while in (20b), the classifier is treated likewise. In both structures, the demonstrative is treated as the specifier of the containing QP or CIP. According to Huang (1982), the whole QP or CIP is analyzed as an adjunct or the specifier of the NP. However, Huang's analysis does not go beyond the simple description of data and does not constitute a principled account. In what follows, we will pick up Huang's suggestion, and show that an NP analysis of Chinese noun phrases is not only theoretically sound but also empirically correct. Specifically, we will assume (20b) in the rest of this chapter, since (20a), with the numeral as the head of QP, would face a difficulty in accounting for the agreement relationship between the classifier and the head noun. However, such a relationship is easily expressible in terms of (20b), in which Cl is the head of the containing CIP.

4.1.3.1 Motivations for the NP Analysis

In the spirit of Huang (1982), we can put forward an alternative analysis of Chinese noun phrase structure. In particular, we propose that Chinese noun phrases such as *na san ben shu* 'those three books' essentially have the phrase structure in (21):¹²

¹² See Ernst (1991) for a very similar proposal.



This structure is very different from the structure under Tang's DP analysis, since it consists of only one maximal projection NP and the demonstrative-numeral-classifier sequence as a whole forms a single constituent. In (21), the classifier is treated as the head of a classifier phrase (CIP) which does not take complements, as in the case of intransitive verbs. The demonstrative no longer heads a DP projection but is analyzed as the specifier of the CIP, while the numeral is treated as a modifier which recursively expands Cl' into Cl'. Another salient feature of (21) is that the whole CIP is taken to be the specifier of the NP. Below, we will discuss the arguments in favor of this structure.

Let us first consider the motivations for analyzing the CIP as the specifier. Recall that the demonstrative-numeral-classifier sequence as a whole is optional.¹³ If the CIP is treated as the specifier, this fact is predicted. Specifiers are optional elements, so the CIP is optional. This analysis also predicts that no more than one classifier can be found in each single noun phrase. This is because each noun phrase only allows one specifier, and as a result the occurrence of the CIP in a single noun phrase is limited to one. The final major motivation for treating the CIP as the specifier is that the agreement relationship between classifiers and head nouns can be expressed as an instance of Spec-head agreement,¹⁴ which is independently needed in other places of the grammar. In (21), the CIP, as the specifier of the NP, is headed by the classifier *ben*. Since the feature of the classifier *ben*

¹³ Bare nouns in Chinese like *shu* 'book' and *ren* 'man' can be used independently, but they can only have a collective interpretation. In other words, the demonstrative-numeral-classifier sequence is used only when we want to refer to a single unit from a particular collectivity (cf. fn. 2).

¹⁴ This is also one of Ernst's (1991) arguments for treating the CIP as the specifier of NP. Spec-head agreement is one of the two basic agreement relationships in phrase structure, the other being that between a head and its complement(s), as is exemplified by the agreement between K and its NP complement in Tang's analysis. In our case, the head selects a categorial feature in Spec; in other words, a noun of a certain class selects a particular classifier. This CIP/N relation in Chinese thus can be seen to be on a par with the gender/number agreement between the determiner and head noun in Romance languages.

may percolate up via the convention of head feature percolation, the whole CIP bears the feature of the classifier and hence is able to agree with the head noun via Spec-head agreement. The Spec-head agreement thus naturally accounts for the agreement relationship between classifiers and head nouns.

Now let us go into more details about the CIP projection. Recall that in Chinese, the demonstrative and numeral cannot modify the head noun without a classifier. This fact is predicted under the NP analysis that we are proposing. In (21), the demonstrative and the numeral are treated as the specifier and the modifier of the CIP, respectively. This means that their distribution must be sensitive to the presence of the classifier. In other words, since the demonstrative and numeral are licensed by the classifier, they cannot appear without the licensing head.¹⁵

Under our analysis, the other properties related to Chinese noun phrases also fall out naturally. Consider the issue of the relative ordering between the demonstrative, numeral, and classifier. In (21), since the demonstrative is in the highest Spec position within the CIP projection, it should come first. QP is a modifier which is adjoined to Cl', it thus comes before the head Cl, which is in the lowest position. As a result, the fixed word order of the demonstrative-numeral-classifier sequence is captured.

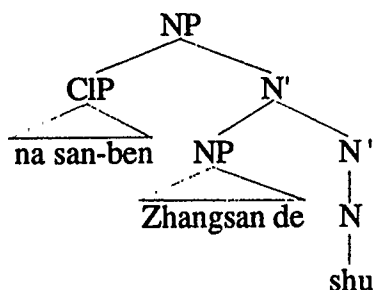
4.1.3.2 Advantages over Tang's DP Analysis

A desirable consequence of the above analysis is that a very simple account can be given without any stipulation to the fact that pronominal modifiers such as NPs, APs, or PPs can either precede or follow the demonstrative-numeral-classifier sequence; but they cannot appear after the demonstrative and before the numeral-classifier sequence, nor can they intervene between the numeral and the classifier (cf. section 4.1.2). This is exemplified again in (22) (= (14)):¹⁶

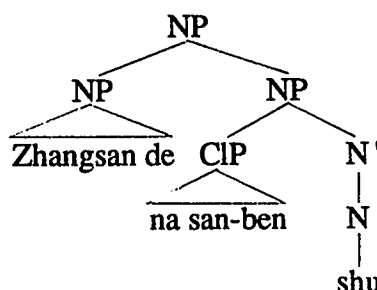
¹⁵ The situation here is very similar to one where a manner adverb is projected but the verb is missing. If no verb appears in a sentence, it is pointless to talk about what the manner adverb modifies.

¹⁶ As argued by Huang (1982), (22a) and (22b) have different scope facts which can be explained in terms of the c-command relationship between the CIP and the possessive phrase 'Zhangsan's'. In (22a), 'Zhangsan's' is c-commanded by the CIP, it therefore only has a narrow scope reading, which is equivalent to an English restrictive relative. By contrast, (22b) shows that 'Zhangsan's' falls outside of the c-command domain of the CIP, and we get the interpretation that is parallel to an English nonrestrictive relative. As a result, (22a) will be appropriate if we want to refer to three books from a set of books which belong to

- (22) a. na4 san1 ben3 [Zhang1san1]-de shu1
 that three CL ZS DE book
 'those three books of Zhangsan's'



- b. [Zhang1san1]-de na4 san1 ben3 shu1
 ZS DE that three CL book
 'those three books of Zhangsan's'



In (22), if we assume with Tang (1990b) that nominal modifiers are base-generated under a recursive N' or NP, then it is expected that prenominal modifiers such as possessive phrases can only have the option of attaching to either an N' (cf. (22a)) or NP (cf. (22b)).¹⁷ Meanwhile, since nominal modifiers are licensed by N (cf. Travis 1988), and given that Chinese noun phrases consist of only NP projections, it is also correctly predicted that the prenominal modifiers are banned from occurring in a position internal to the CIP projection (i.e. between the demonstrative and the numeral-classifier sequence, or between the numeral and the classifier), since in that case, they will be licensed by Cl, rather than by N. Thus, we see that an NP analysis, coupled with the assumption that the demonstrative and numeral are the specifier and modifier of the CIP, respectively, gives a neat account of the distribution of prenominal modifiers without the postulation of the K-to-

Zhangsan, and (22b) will be appropriate if we want to refer to three books from a set of books and those books belong to *Zhangsan*.

¹⁷ Apparently, (22b) involves adjunction to an NP, which is in principle ruled out (cf. Chomsky 1986b). To solve this problem, we need to make a stipulation to the effect that adjunction from within the maximal NP projection itself is allowed by the overall theory of movement.

D movement in Tang's DP analysis. This constitutes a very strong argument for the NP structure that we assign to Chinese noun phrases. It should also be emphasized that the inseparability of the demonstrative-numeral-classifier sequence by other prenominal constituents strongly indicates that the sequence as a whole is a constituent.¹⁸

4.1.4 Concluding Remarks

As a final remark, we would like to point out that although the DP hypothesis is plausible in certain languages, there is no a priori necessity that Chinese noun phrases are also DPs. To maintain the DP hypothesis for Chinese noun phrases, we have to seek independent empirical evidence from the Chinese language itself. From the preceding discussion, we hope it has become clear that the evidence for the DP hypothesis in Chinese is actually very weak.

As pointed out by Tang (1990a), in languages such as English, there are indeed independent motivations favoring the proposal of the DP hypothesis. Consider the following examples:

- (23) a. *that John's book
 b. *John's that book
- (24) a. *three John's books
 b. John's three books (Tang 1990a:349)

The fact about (23) and (24) may be attributed to Fukui's (1986) suggestion that there is a DP projection above NP in English and that DET may contain elements like the demonstrative and the possessive marker *-s*. The latter assigns genitive Case,¹⁹ while the former does not. As a result, the demonstrative cannot cooccur with the possessive phrase in English (cf. (23)), for they are both contained in DET. Also, since in English the possessive phrase must be moved to the Spec of DP in order to be assigned genitive Case, the numeral must follow the possessive phrase (cf. (24)).

¹⁸ Ernst (1991) suggests that in most, if not all, classifier languages, demonstratives, numerals, and classifiers act as a single constituent. Hence, the fact that such sequences are inseparable in Chinese is not an accident.

¹⁹ It should be noted that genitive Case in English is regarded as an instance of inherent Case (cf. Chomsky 1981). In contrast to structural Case, inherent Case is assigned at DS and is linked to the thematic properties of the Case assigner (cf. chapter 1, fn. 11 for further discussion on this issue).

However, unlike Fukui's (1986) proposal concerning the English possessive phrase, the possessive phrase in Chinese does not need to be moved to the Spec of DP and may cooccur with the demonstrative (cf. (22)). Furthermore, unlike English, Chinese allows multiple possessive phrases, suggesting that the occurrences of these possessive phrases are not constrained by the biunique requirement of Case assignment (i.e. Case assignment in Speas' terms):

- (25) a. wo3-de Zhao4yuan2ren4-de yu3yan2xue2-de shu1
 I DE ZYR DE linguistics DE book
 'the book on linguistics that is written by Chao Yuanren and that belongs to me'
- b. *John's Chomsky's linguistics's book

Based on the discussion above, we can conclude that there is actually no need to postulate a functional category DET to assign genitive Case in Chinese noun phrases, and ultimately, no need for the DP hypothesis in Chinese. Thus, from now on, we will assume the empirical correctness of the NP analysis for Chinese noun phrases in the remainder of this chapter.

4.2 Relating Chinese NP Structure to EPA Theory

4.2.0 Introduction

In Chapter 3, we posited three directionality parameters within the framework of EPA theory (repeated here as (26)), which were shown to be capable of explaining an array of word order facts with respect to the domain of Chinese inflectional phrases:

- (26) a. Theta-marking of complements by a head proceeds uniformly from left to right.
 b. Theta-identification of 'modifiers' by a head proceeds uniformly from right to left.
 c. Linking of a predicate to its subject proceeds uniformly from right to left.

If these directionality parameters are to be maximally general, they are supposed to hold in the case of Chinese noun phrases as well. In what follows, we argue that this is indeed the case. Specifically, section 4.2.1 first introduces a number of theoretical notions that are of direct relevance to the issues to be addressed in our ensuing discussion. Then, in section 4.2.2, based on some independent empirical evidence in Chinese, we argue that although

the process/result distinction of deverbal nominals (cf. Lebeaux 1986; Zubizarreta 1987) is relevant for Chinese, there is a significant difference between the theta-grid structure of Chinese process nominals and that of their English counterparts. In particular, we show that due to the suppression of the two thematic grid positions, the seemingly internal and external arguments of a Chinese process nominal are actually argument-adjuncts (cf. Grimshaw 1990) licensed by theta-identification. Finally, in section 4.2.3, we claim that this suppression analysis, coupled with the three assumed directionality parameters of EPA theory, has a direct bearing on the strictly head-final character of Chinese noun phrases. Specifically, we argue that theta-identification is the only licensing theta relation available in Chinese noun phrases, and that its right-to-left parametrization dictates that only prenominal constituents are ever allowed in Chinese. Also, our analysis provides positive evidence for a consistent headedness statement for Chinese lexical categories, with the head-final behavior of Chinese noun phrases reconciled with the general head-initial behavior of other categories.

4.2.1 Preliminaries

In order to lay the groundwork for our later discussion, we will articulate a number of basic assumptions about nominal constructions. We first outline the conception of nouns' theta grids as assumed in Higginbotham (1985, 1987), and introduce Grimshaw's (1990) classification of deverbal nominals based on a difference in argument-structure representation. Within the framework of Grimshaw's theory, we then introduce the notion of 'argument-adjunct' and its associated proposal about suppression of an argument position. Finally, we incorporate the insights of Grimshaw's theory into our EPA theory, and show that the two tie in nicely with each other.

4.2.1.1 The Theta Grids of Nouns²⁰

As elaborated in chapter 2, under Higginbotham's (1985, 1987) theory of theta grids, the lexical category N also has a theta grid as part of its lexical entry. In particular, he argues that all nouns have a non-thematic open grid position *R* (for reference) which in

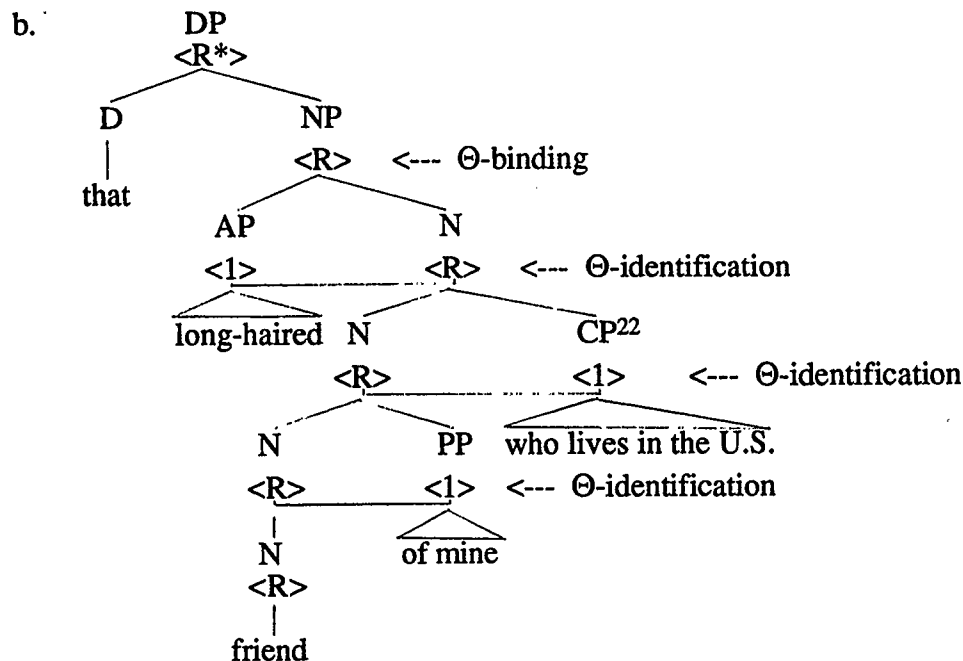
²⁰ Unfortunately, in her brief discussion of the projection properties of nouns (pp. 64-5), Speas does not investigate the theta grids of nouns in any detail. The projection of verbs, however, is discussed at length (pp. 72-109). The analysis developed here is therefore a generalization of her theory of verbal projection to nominal projection.

effect corresponds to the noun itself (cf. Williams 1981; di Sciullo and Williams 1987; Grimshaw 1990),²¹ and which is theta-bound when a determiner or measure word is added. To illustrate, a noun like *dog* has *R* in its theta grid because the word denotes each of the various dogs in the domain of discourse. When it is used in conjunction with a determiner like *the*, as in *the dog*, the determiner is seen as theta-binding this open position, thereby specifying the reference of the noun phrase. In this sense, then, all nouns have a theta grid which contains at least *R*, even if they have no other grid positions.

This nonthematic grid position *R* is also involved in modification, and in this function, it is parallel to the *e* position in the verb's theta grid, which corresponds to the event place denoted by the verb itself. As we have noted in various places, modification is accomplished by theta-identification whereby the open position in the modifier's theta grid is linked to a non-thematic grid position in the head (i.e. *e* in the case of verbs, and *R* in the case of nouns). Bearing this in mind, consider the English complex noun phrase in (27a) and its corresponding DP structure in (27b):

- (27) a. that long-haired friend of mine who lives in the United States

²¹ It is worth pointing out that *R* is interpreted differently in other theories. In di Sciullo and Williams (1987), for example, *R* is intended to be the external argument which is coindexed with the maximal projection of the noun. We will restrict further discussion to the approach to *R* as described in the text.



With R in the theta grid of the nominal head *friend*, we can express the formalizations with respect to theta-binding and theta-identification as stated above. In (27b), then, R can be theta-identified thrice (or indeed as far as is necessary since there is in principle no limit on the number of modifiers in a noun phrase) in order to license all the modifiers in question. It should also be noted that at the second highest level of projection, the determiner *that* functions to theta-bind R , thus discharging it, and providing a specific reference for the noun phrase as a result.

4.2.1.2 Three Types of Nominals

Recent work by Grimshaw (1990) has advanced our understanding of the argument structure (a-structure) of various types of nominals. Specifically, besides the well-

²² For the sake of conciseness, we simply represent the relative clause as a CP without detailing its internal constituency. Under standard assumptions, relative clauses should be represented as having an operator in a non-argument position binding a variable in an argument position; the operator is further coindexed with the head of the noun phrase. Thus, more precisely, the internal structure of the relative clause in question will be as follows:

(i) friend_i [CP who_i [$\text{C}' e$ [$\text{IP } t_i$ lives in the U.S.]]]

In (i), *friend* is identified via coindexation with the chain $\langle \text{who}_i, t_i \rangle$, which is assigned the external theta role of *live*. The reference of such a phrase is taken to be those individuals who are friends and who live in the U.S.

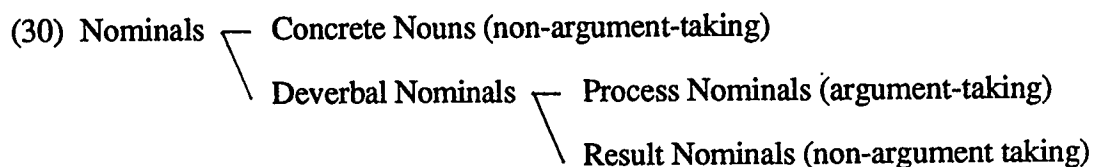
established dichotomy between concrete nouns and deverbal nominals, Grimshaw draws attention to a further distinction within the latter category. Her central claim is that some nouns have an a-structure, and therefore take obligatory arguments; while others do not have an a-structure, and therefore do not require arguments. This difference between nouns with and nouns without an a-structure corresponds to a semantic difference, often labeled as the process/result distinction. 'Result' nominals refer to the output of a process or event, whereas 'process' nominals refer to the process or event itself. For example, the noun *examination* has both interpretations:

- (28) a. The examination/exam was long.
 b. The examination/*exam of the patients took a long time.

While *examination* is ambiguous between a result reading (28a) and a process reading (28b), the abbreviated form *exam* is unambiguously a result nominal, and therefore does not occur in the same context as the argument-taking process nominal. Based on this observation, Grimshaw argues that the seemingly optionality for the complement in the case of *examination* is due to the fact that what is involved is an alternation between the two instances of the same nominal. On the process reading (28b), the nominal behaves exactly like its corresponding verb *examine* in taking an obligatory complement:²³

- (29) The instructor examined *(the papers).

By this reasoning, nominals can be classified into three types, according to whether they take obligatory arguments or not, as illustrated by the following diagram:



Grimshaw's insight can be incorporated into Higginbotham's theory of theta grids by supposing that concrete nouns and result nominals have only the non-thematic *R*, while

²³ Grimshaw also provides a battery of tests to disambiguate between the two classes of deverbal nominals, and we will invoke some of them in our examination of the properties of Chinese deverbal nominal constructions.

process nominals have the grid positions '1' and '2' (corresponding to the external and internal argument, respectively) in addition to *R*:^{24, 25}

- (31) a. book <R> [concrete noun]
 b. exam <R> [result nominal]
 c. examination <1 2 R> [process nominal]

According to Grimshaw, the assertion that concrete nouns and result nominals do not have any thematic grid position is confirmed by the interpretations associated with the following examples:

- (32) a. John's book was long.
 b. John's exam was long.

Since concrete nouns and result nominals are uniformly non-argument-taking, the possessive subject *John's* in each case is not an external argument; rather it is a modifier. As such, it receives a free thematic interpretation in relation to the nominal head in question. In fact, *John* can be interpreted as an author or possessor of *book* in (32a), and it can be interpreted as an agent, theme, owner, or even author of *exam* in (32b). By contrast, the possessive subject²⁶ in construction with a process nominal is restricted in its interpretation:

- (33) John's examination of the patients took a long time.

²⁴ It should not go unnoticed that in Grimshaw's (1990) proposed theory, the two types of deverbal nominals have different non-thematic positions in their a-structure representations: while result nominals have *R*, process nominals have *Ev* (i.e. the counterpart of *e* in Higginbotham's theory), a position from which the process reading is derived. This proposal is suggestive, but does not have a direct bearing on our main argument. For ease of exposition, we will continue to take *R* to be the non-thematic position for both result and process nominals.

²⁵ As Speas (1990) points out, some nouns which do not denote processes may also possess additional grid positions. Presumably, relational nouns like *top* and *corner*, kinship terms like *mother* and *father*, and bodypart nouns like *arm* and *leg* might have grid positions other than the *R* which all nouns have. This is because the semantics of such nouns cannot be defined without reference to a relation between *R* and another entity. In contrast, to define the meaning of nouns like *book* and *dog*, no such relation is required. We will not explore this possibility here.

²⁶ In fact, Grimshaw refers to the possessive subject as an argument-adjunct, a hybrid entity which has an intermediate status between arguments and adjuncts (see below for further discussion).

In (33), *John* is the external argument of *examination* on its process reading, and as a result, it can only have an a-structure-related interpretation, i.e. one corresponding to the agent of the action.

4.2.1.3 The Suppressed '1' Position and the Notion of 'Argument-Adjunct'

As mentioned in section 2.2.3, under the Higginbotham/Speas conception of the Theta Criterion, the theta grids of verbs must be syntactically saturated, hence the obligatoriness of their arguments: elements required to saturate thematic positions in theta grids. Accordingly, if the theta grid of a process nominal has exactly the same status as that of its corresponding verb, it must also be syntactically saturated. The prediction is, then, that arguments of process nominals will be obligatory. In the foregoing discussion, we see that one of the important findings of Grimshaw's (1990) is that contrary to common belief, process nominals do take obligatory complements. However, as is well-known, the possessive subject is never obligatory. As a result, even argument-taking process nominals like *examination* will never require a subject. Thus, in addition to (33), where both the subject and object of *examination* are syntactically realized, examples like (34) with an object but no subject are perfectly grammatical:

(34) The examination of the patients took a long time.

In terms of Grimshaw's proposed analysis, nominalization is characterized as involving the suppression of an argument position, in that the external argument of a predicate undergoes lexical suppression. Suppressed positions are listed in the a-structure, but are not available for the purposes of licensing arguments. Thus, more precisely, (31c) above should be represented as in (35), where the suppressed position is parenthesized:

(35) examination <(1) 2 R> [process nominal]

The suppressed '1' position cannot be saturated by a syntactic argument, because it has already been saturated lexically; however it can license 'argument-adjuncts' (a-adjuncts),²⁷

²⁷ In the theory of licensing adopted under Speas' PA theory, two relationships hold. A lexical head licenses a nonhead item, and the nonhead item in turn saturates a position in the theta grid of the head. It should be borne in mind that although we have been conflating the two relationships for expository

of which possessive subjects are an example. A-adjuncts are elements which share the characteristics of both adjuncts and arguments. On the one hand, they resemble adjuncts in that they are not subcategorized, and hence they are not required to saturate grid positions of any kind (whether thematic or non-thematic). Recall that under our EPA theory, adjuncts are licensed by theta-identification which does not result in the saturation of any grid position. On the other hand, they are argument-like because they are regulated by their relationship to a thematic grid position, in the sense that they contribute information about a particular thematic position in the theta grid of a process nominal. Thus, the possessive in (33) is interpreted as providing information about the examiner argument of the nominal. In other words, since a-adjuncts (in the form of possessive subjects) must be licensed by suppressed positions, they only cooccur with process nominals (recall that concrete nouns and result nominals do not have such positions). Moreover, since they are a type of adjunct and are not required to saturate grid positions, they are systematically optional.

Under Grimshaw's a-adjunct hypothesis, the apparent optionality of possessive subjects of process nominals is thus accounted for as a function of an a-structure difference between nouns and verbs. In particular, the same principle of saturation applies to both categories: nouns are just like verbs with respect to the obligatoriness of their arguments; arguments of nouns behave just like arguments of verbs, and possessives are optional precisely because they are not required to saturate grid positions.

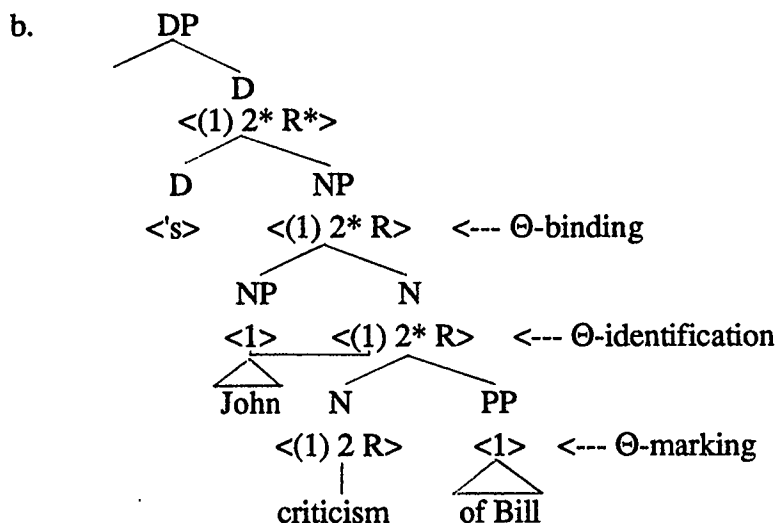
4.2.1.4 The Modes of Saturation in Process Nominal Constructions

We mentioned in chapter 2 that under EPA theory, the saturation of positions in a verb's theta grid is achieved by means of three licensing theta relations: predicate-linking for the '1' position (i.e. the external argument), theta-marking for the '2' position (i.e. the internal argument), and theta-binding for the non-thematic *e* position. Following the lines of analysis developed in the preceding section, we can assume that because of the suppression of the '1' position, predicate-linking is not available as a means of saturation in the theta grid of a (process) nominal. However, due to the obligatoriness of the internal argument, theta-marking must operate as usual in order to saturate the '2' position, as must theta-binding in order to saturate the non-thematic *R* position. Translating the essence of

convenience, they are logically distinct, and the a-adjuncts under discussion here show that they are empirically distinct. This is because a-adjuncts are licensed by a grid position, but do not saturate it.

Grimshaw's analysis to our EPA theory, the process nominal construction in (36a) should have the DS representation in (36b), where the various licensing theta relations are annotated:²⁸

(36) a. John's criticism of Bill



Beginning at the bottom, the PP complement of *of Bill* saturates the '2' position in the theta grid of the process nominal *criticism* by virtue of theta-marking (as indicated by the star notation).²⁹ Going up to the next level, we assume that the subject *John*, being an a-adjunct as discussed above, is licensed through theta-identification. This assumption seems to be well supported because of the following two pieces of evidence. First, theta-identification does not involve the saturation of any grid position, and this matches the descriptions of a-adjuncts, in which they are licensed by suppressed positions which cannot be syntactically saturated, as they are (already) lexically saturated. Second, theta-

²⁸ A note is in order here to make explicit certain basic assumptions with respect to the DP structure in (36b). Specifically, (36b) is an instantiation of Fukui's (forthcoming) Predicate-Internal Subject hypothesis (an extension of the VP-Internal Subject hypothesis (cf. section 2.1.5)), according to which all arguments of a predicate, including, crucially, its external argument (subject), are initially generated within its own projection. In (36b), then, *John* arises in a base-generated adjoined position within the NP projection because it is the external argument of the nominal head *criticism*, and it moves up to the [Spec, DP] position in order to receive genitive Case from DET. One of the intended virtues of this hypothesis is that it leads to a unified version of theta assignment, in that the subjects of not only V, but also of N and any other predicate will be assigned their theta roles in the same fashion.

²⁹ It should be noted that, as Grimshaw argues (following Edmonds 1985), nouns in general are defective theta-markers. As such, even the argument-taking process nominals will never theta-mark directly, but only through the mediation of a preposition. The consequence of this is that nominals can license only PPs and not bare maximal projections of any other kind (see section 4.2.2.4 for more discussion).

identification licenses the occurrences of adjuncts by linking them to a particular non-thematic grid position (*e* in the case of verbs, and *R* in the case of nouns), and this is exactly what happens to a-adjuncts, which are by stipulation regulated by association with a suppressed thematic grid position.³⁰ Thus, as an indication of theta-identification, a line is drawn in (36b) linking the position in the theta grid of *John* to the suppressed grid position of *criticism*. Notice in particular that after the linking, *John* does provide information about a particular thematic position in the theta grid of the process nominal, in the sense that *John* is interpreted as the agent argument of *criticism*. Going further up, the functional head DET theta-binds the non-thematic *R*. As a result, all the positions in the theta grid of *criticism* are saturated, and according to our EPA theory, the process nominal construction in (36b) is well-formed.

4.2.2 Process Nominal Constructions in Chinese

4.2.2.1 General Discussion

Having discussed the theoretical issues relevant to our subsequent analysis, let us return to Chinese. So far, our attention has been focused on noun phrases involving concrete nouns. This is because they most often cooccur with a determiner-numeral-classifier sequence. In this section, we will examine the properties of process nominal constructions in Chinese. Specifically, we will address whether Chinese process nominals have a theta-grid structure similar to their English counterparts' as discussed above. The closest corresponding nominal construction to (36a) is as follows:

- (37) Zhang1san1 (de)³¹ dui4 Li3si4 de pi1ping2
 ZS DE toward/to LS DE criticism
 'Zhangsan's criticism of Lisi'

The nominal construction in (37) has many interesting properties and we will look at each of them in turn. Let us begin with the *dui*-NP phrase. In (37), the NP *Lisi* is the internal

³⁰ Notice however that there is a crucial difference between genuine adjuncts and a-adjuncts in this case, in that the former can have multiple occurrences, while the latter cannot have this possibility. This is indeed expected in view of the intermediate status of a-adjuncts.

³¹ In certain cases, *de* can be optionally deleted without affecting the grammaticality of a nominal construction, and this should be regarded as an instance of stylistic rules which apply at PF (cf. Tang 1990b).

argument of the process nominal, which is introduced by the preposition *dui* 'toward, to'.³² Notice that the *dui*-NP is obligatorily followed by the clitic *de*. If *de* is omitted, the nominal construction is then ungrammatical, as shown below:

- (38) *Zhang1san1 (de) dui4 Li3si4 pi1ping2
 ZS DE toward/to LS criticism
 'Zhangsan's criticism of Lisi'

This fact suggests that the *dui*-NP phrase is actually a sort of modifier, since as will be elaborated below, modifiers licensed by theta-identification generally take *de* to modify the head noun. Indeed, there is evidence supporting the claim that the *dui*-NP is not a complement of the deverbal nominal, but must be represented as a modifier. If the *dui*-NP phrase were a complement of the deverbal nominal (i.e. the sister of the deverbal nominal), we would expect it to occur after a prenominal adjective. However, this prediction is not borne out:

- (39) *Zhang1san1 (de) yan2li4 de [N' [dui4 Li3si4 de] pi1ping2]
 ZS DE severe DE toward/to LS DE criticism
 'Zhangsan's severe criticism of Lisi'

But if the *dui*-NP phrase occurs before the prenominal adjective, the nominal construction becomes perfectly grammatical:

- (40) Zhang1san1 (de) dui4 Li3si4 de yan2li4 de pi1ping2
 ZS DE toward LS DE severe DE criticism
 'Zhangsan's severe criticism of Lisi'

Thus, (40) clearly shows that the *dui*-NP occurs outside the lowest N' dominating the head noun and its complement, if any. In other words, it is syntactically represented as a modifier adjoined to an N' projection, rather than as a complement sister to an N⁰. This in turn implies that the *dui*-NP phrase is not a syntactic internal argument of the nominal

³² Under Tang's DP analysis of Chinese noun phrases, *dui* is analyzed as a Case assigner, serving to assign Case to the following argument NP as a result of the lack of Case-assigning ability of the nominal head (as is standardly assumed). However, under our NP analysis, such an account is not necessary because the *dui*-NP phrase is treated as a nominal modifier which does not require Case according to Chomsky's (1981) Case theory.

pipíng 'criticism'. In this connection, it is worth mentioning that a *dui*-NP phrase does occur as a modifier of a non-argument-taking result nominal as in (41):

- (41) Zhang1san1 (de) dui4 Li3si4 de tai4du
 ZS DE toward LS DE attitude
 'Zhangsan's attitude toward Lisi'

Now, let us turn to the status of the subject of the nominal construction. As we noted in section 4.2.1.2, Grimshaw points out that although many deverbal nominals are like *examination* in being systematically ambiguous between process nominals and result nominals, the presence of a complement always serves to disambiguate a nominal in the direction of the process reading, where the nominal has a thematic grid position (namely the position '2') to be saturated. Accordingly, an associated possessive in this case must have a subjectlike interpretation (which in most cases, corresponds to the agent of an action). But if no complement appears, then the possessive can only be construed as a possessive modifier, which is somehow associated with the nominal. Bearing this in mind, consider (42):

- (42) Zhang1san1 de pí1ping2
 ZS DE criticism
 Zhangsan's criticism

In (42), the nominal *pipíng* 'criticism' is not a process nominal with a thematic grid position to be saturated, since no complement appears. Moreover, when a prenominal modifier is added, we find that its positioning with respect to the possessive subject is quite free. This is shown in (43):

- (43) a. Zhang1san1 (de) zuo2tian1 de pí1ping2
 ZS DE yesterday DE criticism
 'Zhangsan's criticism yesterday'
- b. zuo2tian1 (de) Zhang1san1 de pí1ping2
 yesterday DE ZS DE criticism
 'Zhangsan's criticism yesterday'

The fact that the possessive subject and the other nominal modifier are freely ordered in prenominal positions in (43) suggests that these two kinds of phrases should have the same

syntactic status. In other words, they are both syntactically represented as modifiers in a Chinese noun phrase.

From the above data, one generalization emerges: if both the seemingly internal and external arguments of process nominals are actually syntactic modifiers, then it is plausible to claim that all deverbal nominals in Chinese are of a unique type corresponding to result nominals. More evidence in favor of this claim can be given on the basis of Grimshaw's (1990) tests for process and result nominals.

4.2.2.2 Further Discussion

Grimshaw (1990) provides us with a number of disambiguating techniques to distinguish between argument-taking process nominals and non-argument-taking result nominals, and we will apply some of them to the case of Chinese deverbal nominals in what follows. First, she points out that the determiner system is correlated to the interpretation of the nominal. One correlation is that demonstratives as well as indefinite determiners are compatible only with result nominals. Thus, (44) is ungrammatical:

(44) *They observed that assignment of the problem.

In (44), since the PP complement *of the problem* is present, the nominal can only be interpreted as a process nominal. Hence, it is incompatible with the demonstrative *that*. Bearing this correlation in mind, note that a demonstrative can be placed before the deverbal nominal *pipíng* 'criticism' in (37), as exemplified in (45):³³

(45) Zhang1san1 (de) dui4 Li3si4 de na4 yi1 dian3 pi1ping2
 ZS DE toward LS DE that one CL criticism
 'that criticism of Zhangsan's toward Lisi'

(45) is identical to (37) except that the demonstrative-numeral-classifier sequence is added (remember that a demonstrative cannot by itself modify a nominal). Especially worthy of note here is that though the *dui*-NP is still present in (45), its presence does not force the nominal to be interpreted as a process nominal. As we have noted (cf. fn. 2 and fn. 13),

³³ Note that unlike other prenominal modifiers, the determiner-numeral-classifier sequence generally does not take *de*.

classifiers are used to individualize a single unit from a collectivity identified by the nominal; thus, in (45) the classifier *dian* refers to *that instance/case of criticism of Zhangsan toward Lisi*. In other words, classifiers refer to the output of a process, rather than to the process itself, and by this reasoning, their semantics is compatible only with that of result nominals. Accordingly, the appearance of the classifier before the nominal *pipíng* 'criticism' in (45) immediately refutes the claim that the nominal is a process nominal.

Second, Grimshaw shows that the distinction between result nominals and process nominals can also be disambiguated by using modifiers such as *constant/frequent* or agent-oriented adjectives such as *intentional/deliberate*. Only process nominals can be modified by such modifiers:

- (46) a. The assignment is to be avoided.
 b. *The constant assignment is to be avoided.
 c. The constant assignment of unsolvable problems is to be avoided.

In (46a), the result reading of *assignment* does not require (or indeed allow) an argument, while in (46b-c), the addition of *constant* forces the process reading of the nominal, where its '2' grid position must be saturated, hence the ungrammaticality of (46b) and the grammaticality of (46c). In this connection, notice however that the Chinese deverbal nominal *pipíng* 'criticism' does not allow such modifiers:

- (47) a. *Zhang1san1 (de) dui4 Li3si4 de jin1chang2 de pipíng2
 ZS DE toward LS DE constant DE criticism
 'Zhangsan's constant criticism of Lisi'
 b. *Zhang1san1 (de) dui4 Li3si4 de gu4yi4 de pipíng2
 ZS DE toward LS DE intentional DE criticism
 'Zhangsan's intentional criticism of Lisi'

In (47), the modifiers *jinchang* 'constant' and *guyi* 'intentional' are not compatible with *pipíng* 'criticism'. This result may suggest that Chinese actually does not have the process/result distinction of deverbal nominals, which is sensitive to the presence of certain modifiers.

Third, another property of process nominals is that they may license the occurrence of an agentive *by*-phrase, as shown below:

- (48) a. The assignment *(of unsolved problems) by the instructor
 b. The examination *(of the papers) by the instructor

However, the Chinese deverbal nominal *piping* 'criticism' does not license such a phrase, suggesting that the nominal does not pattern with process nominals:

- (49) *bei4 Zhang1san1 (de) dui4 Li3si4 de pi1ping2
 by ZS DE toward LS DE criticism
 'the criticism of Lisi by Zhangsan'

Last but not least, still another difference between result nominals and process nominals is that while the former can occur predicatively, the latter cannot:

- (50) a. That was the assignment.
 b. *That was the assignment of the problem.

Yet, the Chinese deverbal nominal *piping* 'criticism' does occur predicatively, again systematically violating the criteria of process nominals as proposed by Grimshaw:

- (51) yi3xia4 zhe4-xie1 jiu4 shi4 Zhang1san1 (de) dui4 Li3si4 de pi1ping2.
 following this-CL then be ZS DE toward LS DE criticism
 'The following are Zhangsan's criticisms of Lisi.'

Thus, with respect to predication possibilities, cases like (51) undoubtedly indicate that *piping* 'criticism' behaves more like a result nominal.

4.2.2.3 Conclusion: The Modes of Saturation in Chinese Process Nominal Constructions

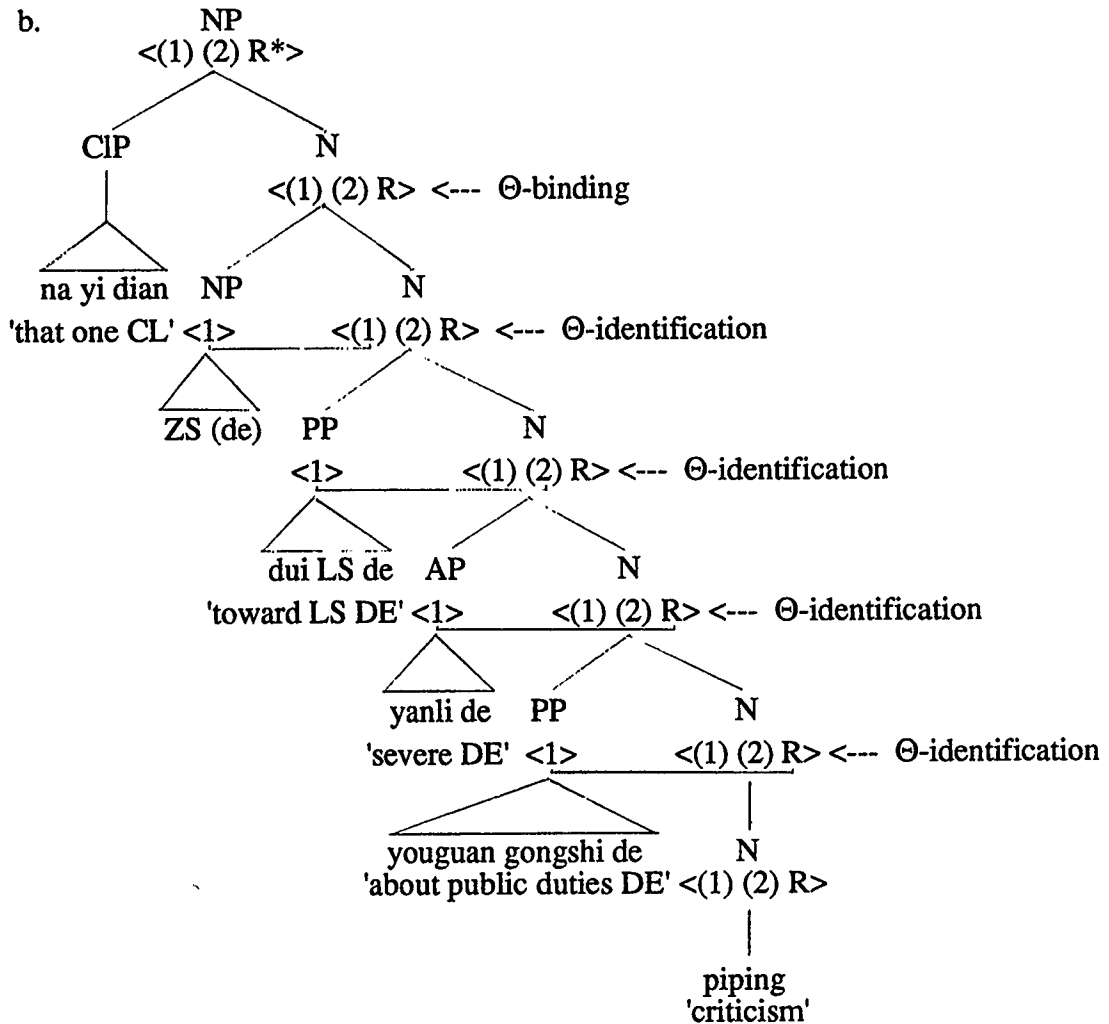
In the preceding discussion, it should be clear that the syntactic ramifications associated with the process/result distinction as argued by Grimshaw (1990) are not attested in Chinese deverbal nominals. For this reason, we may be justified in claiming that such a distinction is simply irrelevant for Chinese, and that all Chinese deverbal nominals belong in the very same category of result nominals which has only the non-thematic position *R* in their theta grids (cf. section 4.2.1.2). However, while this approach is not

implausible,³⁴ we believe that the distinction in question should have a universal applicability; and as a result, it would be more appropriate to say that it does apply in Chinese, and its absence is rather due to other independent theoretical reasons. According to this latter approach, Chinese process nominals, like their English counterparts, do have the suppressed '1' position in their theta grids (besides *R*). But unlike their English counterparts, the '2' position in the theta grids of Chinese process nominals is also suppressed, and therefore is not required to be syntactically saturated.³⁵ By this reasoning, the seemingly internal and external arguments of Chinese process nominals are actually a-adjuncts. This explains why on the one hand, they behave like syntactic modifiers, and on the other hand, they behave like arguments in having a subjectlike/objectlike interpretation. Thus, based on our EPA theory, in conjunction with Grimshaw's a-adjunct hypothesis, the process nominal construction in (52a) should have the DS representation in (52b):

- (52) a. na4 yi1 dian3 Zhang1san1 (de) dui4 Li3si4 de yan2li4 de
 that one CL ZS DE toward LS DE severe DE
 you3guan1 gong1shi4 de pilping2
 about public duties DE criticism
 'that severe criticism of Zhangsan's toward Lisi concerning public duties'

³⁴ This is because Chinese deverbal nominals invariably involve zero derivation, and according to Grimshaw (1990) zero-derived forms are a major characteristic of result nominals in English.

³⁵ Grimshaw (1990) also indicates that subjects do not seem to be the only argument which can be suppressed in nominal constructions. Objects may exhibit the same phenomenon as illustrated in languages like Greenlandic.



In (52b), notice that at the bottom, the deverbal nominal *piping* 'criticism' has two suppressed thematic positions '1' and '2' (in parentheses), in addition to the non-thematic *R*. Higher up on the tree, we see that the two layers of modifiers (i.e. the PP 'about public duties' and the AP 'severe') are licensed by theta-identification via linking to *R*. Still further up, the two suppressed positions, as discussed above, cannot be saturated by syntactic arguments, although they can license the two a-adjuncts -- the *dui*-NP *Lisi*, and the possessive subject *Zhangsan* -- through theta-identification.³⁶ In this connection, it is important to notice that after the linkings, these two phrases can be viewed as restricting the

³⁶ If we assume that Chinese process nominals have only the non-thematic position *R* in their theta grids, the two a-adjuncts here will have to be linked to the *R* position, rather than to the two suppressed positions. However, the claim that they are licensed by the relation of theta-identification still holds under this analysis.

interpretations of the thematic grid positions they are associated with, with the result that *Lisi* and *Zhangsan* are construed as the theme argument and agent argument of 'criticism', respectively.³⁷ Furthermore, it should also be noted that due to the right-to-left application of theta-identification, all nonhead items in (52b) uniformly appear on the left of nominal head. Finally, on the second highest level, the CIP functions as a theta-binder to saturate *R*,³⁸ and at this stage, the entire nominal construction is grammatical in our terms since every grid position of *pipi*ng 'criticism' is saturated (recall that suppressed positions are saturated, though lexically).

4.2.2.4 Excursus: *de* as a Transmitter of Theta-Identification

Before we turn to the issue concerning the head-final character of Chinese noun phrases, it may be useful to digress for a moment in order to consider another issue that, we hope, would shed new light on future research on Chinese phrase structure. As we noted above, prenominal elements in a Chinese noun phrase, irrespective of their categorial status, invariably take the clitic *de* to modify the head noun:³⁹

- (53) a. [NP Zhang1san1]-de fang2zi
 ZS DE house
 'Zhangsan's house'
- b. [AP kuai4le4]-de nu3hai2men
 happy DE girls
 'happy girls'
- c. [CP Zhang1san1 jian4-guo]-de ren2
 ZS see EXP DE person
 'the person that Zhangsan has seen before'

³⁷ Incidentally, there is a crucial difference between the suppressed positions and *R* in (52b) that is worth mentioning: while the former do not in principle allow multiple linkings (because of their argument-like properties), the latter does allow multiple linkings, hence the fact that there is in principle no limit on the number of modifiers in a nominal construction.

³⁸ As mentioned in section 4.1.3.1, the CIP, being analyzed as a specifier, is supposed to be optional in a Chinese noun phrase. Thus, in such cases where the CIP does not appear, we can assume that an empty CIP node still projects to theta-bind *R*. This assumption does not seem to be unmotivated, however. In principle, every Chinese nominal can be categorized by a classifier because even when there is no specific classifier for a certain nominal, the general classifier *ge* can be used by default.

³⁹ As another piece of evidence that *de* in Chinese noun phrases cannot be treated as a genitive Case marker, notice that in (53), the functions of *de* are more versatile than simply to mark a possessor/possessed relationship between the prenominal modifiers and the head noun.

- d. [pp you3guan1 yu3yan2xue2]-de shu1
 about linguistics DE book
 'books about linguistics'

In the literature (cf. for example Huang 1982, Ross 1983, 1984 and Cheng 1986), it is argued that *de* is a modification marker indicating a modifier/modifiee relationship between the prenominal elements and a head noun. While this claim is basically sustainable, a deeper claim is at stake given Grimshaw's (1990) theory of a-structure, coupled with our proposed EPA theory. Specifically, we can argue that Chinese nominals in general have no direct theta-identifying capacity, and they can take modifiers only when they combine with the clitic *de*. In this sense, *de* functions to transmit theta-identification from the nominal to its modifiers. If we take the further position that *de* is a functional category which heads a maximal projection, i.e. *de*-phrase, and which takes various X^{\max} categories as its complement (cf. Bowers 1993), we can come up with a parallel relationship between English and Chinese nominals with respect to their theta-licensing defectiveness:

- (54) a. John's criticism [pp [p of] [NP Bill]]
 b. [deP [NP Zhang1san1] de]] fang2zi
 ZS DE house
 'Zhangsan's house'

In (54), just as Grimshaw (1990) argues that English nominals are defective theta-markers, which can theta-mark its complements only through the help of a preposition (cf. fn. 29), so too we can argue that Chinese nominals are defective theta-identifiers, which can theta-identify its modifiers only via the mediation of *de*. In this way, we can draw a parallel between English and Chinese in which in the former language, nominals must take PPs as their complements, whereas in the latter language, nominals must take *de*-phrases as their modifiers. Moreover, treating *de* as a transmitter of theta-identification in Chinese noun phrases can also enable us to explain why in general Chinese adjuncts do not take *de* to modify the head verb.⁴⁰ This is because Chinese verbs are not defective categories with respect to theta-licensing capacity, in much the same way that English verbs are not. In

⁴⁰ Note that the fact that this generalization does not apply to AdvPs does not affect our argumentation. What we need to add is that Chinese verbs can either directly theta-identify an adjunct, or they can do it indirectly via *de*.

contrast, under the traditional approach in which *de* is analyzed as a modification marker, it seems that this question can only be accounted for by invoking some special stipulations.

4.2.3 Suppression, Theta-Identification, and the Head-Final Character of Chinese Noun Phrases

4.2.3.1 Discussion

If we are on the right track in claiming that in the theta grids of Chinese process nominals, both the '1' and '2' positions have been suppressed, then we may have a way to capture the strictly head-final character of Chinese noun phrases. Consider the following VP structure in (55a) and its corresponding NP structure in (55b) (assuming the Predicate-Internal Subject hypothesis; cf. fn. 28):⁴¹

- (55) a. [_{VP} Zhang1san1 [_{V'} [_V re4'ai4] [_{NP} zu3guo2]]].
 ZS love motherland
 'Zhangsan loves his motherland.'
- b. [_{NP} Zhang1san1-(de) [_{N'} [_{PP} dui4 zu3guo2]-de [_N re4'ai4]]]
 ZS DE toward motherland DE love
 'Zhangsan's love for his motherland'

As noted in chapter 1, verb phrases in Chinese are head-initial. This can be attributed to the fact that verbs in Chinese require their two thematic grid positions to be syntactically saturated. In particular, the '2' position requires an internal argument for its saturation, and this mode of saturation involves theta-marking which operates from left to right in Chinese. As a result, the verb phrase in (55a) exhibits a head-initial character, with the NP complement *zhoguo* 'motherland' following the head verb. In the case of (55b), if this '2' position were also required to be syntactically saturated, then Chinese noun phrases would be head-initial constructions as well, which is contrary to the fact. But if the position at issue is lexically saturated, as we have assumed; then by stipulation, it can license an adjunct, appearing in the form of *dui*-NP, by virtue of theta-identification. Under this licensing theta relation, no grid position is saturated, but its right-to-left operation predicts that no postnominal constituent is ever allowed in Chinese, hence the fact that the noun

⁴¹ As is usual throughout this study, we are restricting ourselves to the level X'-projection, i.e. the relation between an X⁰ and its complement(s). At the level of X"-expansion, Chinese is strictly head-final, with the specifier (i.e. the subject in each instance of (55)) preceding the X'-projection.

phrase in (55b) exhibits a strictly head-final character, with the a-adjunct *dui-zhogu* 'toward motherland' preceding the nominal head.⁴²

4.2.3.2 Conclusion: A Head-Initial Statement for Chinese Lexical Categories

In chapter 1, we saw that various linguists have tried to reconcile the inconsistency in headedness specification between NPs and other lexical categories⁴³ (recall that all lexical categories in Chinese, with the exception of NPs, are strictly head-initial). Among them, both Huang (1982) and Li (1990) choose to generalize the head-final specification of NPs to other phrases, and argues that Chinese is essentially head-final, with the head-initial behavior of VPs, PPs, and APs attributed to other independent theoretical reasons. In Huang (1982), this exception is achieved, through stipulation, in terms of his X'-Structural Constraint, while in Li (1990), this exception is accomplished via the directionality requirement on Case-assignment (cf. sections 1.2.1.1 and 1.2.1.3 for detailed discussion). It should be noted that Huang and Li's solution is not the only option; alternatively, we can restructure NPs so as to bring them into line with the general head-initial character of other lexical projections. Given our EPA theory, together with Grimshaw's (1990) proposal of argument suppression, this latter option is now given more theoretical strength. In particular, we can claim that Chinese lexical categories are basically head-initial,⁴⁴ and that the head-final character of NPs is expected under the present analysis as a result of nominalization which suppresses the external and internal argument positions of a base verb. In comparison to Huang and Li's approach, we think that our approach is more plausible, for the simple reason that it makes more sense to reanalyze one for the sake of three, instead of the other way round.

⁴² It should be clear that the same reasoning applies to the case of Chinese non-argument-taking nominals, whose head-final character also follows from the fact that theta-identification is the only licensing theta relation available in Chinese noun phrases.

⁴³ We do not want to enter into a discussion of the headedness specification of Chinese functional categories here, which is still a hotly debated topic in the current literature. The reader is referred to Aoun and Li (1990), and Ernst (1994) for some relevant discussion.

⁴⁴ In fact, this claim is implicit in Travis (1984), though the structural mechanisms she uses differ crucially from those adopted in this thesis (cf. section 1.2.1.2 for details).

4.2.4 Summary

In the foregoing discussion, we have examined the interaction of our three assumed directionality parameters with Chinese process nominal constructions within our proposed NP structure. Our basic claim is that while non-argument-taking nominals have a theta grid which contains only the nonthematic *R* position, argument-taking process nominals have one which contains, besides *R*, two thematic positions, namely '1' and '2', corresponding to the external and internal argument, respectively. The *R* position is an open position to which nominal modifiers can be linked in order to be theta-identified, and the two thematic positions must be saturated by other licensing theta relations. However, the latter are suppressed in Chinese under nominalization, and these suppressed positions cannot be saturated by syntactic arguments, although by virtue of theta-identification, they can license the occurrences of a-adjuncts which correspond to the optional subject and object of the process nominal. As a result, there is no licensing theta relation available in Chinese noun phrases other than that of theta-identification, whose right-to-left application predicts that Chinese can only have prenominal constituents. Based on this observation, we further argue that Chinese lexical categories are consistently head-initial, with the head-final character of noun phrases attributed to the operation of nominalization which suppresses all the thematic grid positions of process nominals.

4.3 Conclusion

In the preceding and the present chapters, it has been demonstrated that the three directionality parameters of our EPA theory are empirically adequate to account for the word order facts of Chinese under consideration. For now, we have reached the goal we set for ourselves in chapter 1, namely to resolve the word order problems posed by the postverbal distribution of FDRS expressions, and by the head-final behavior of Chinese noun phrases.

In the following chapter, we will conclude this thesis with a note that EPA theory can be made compatible with current research programs within the principles-and-parameters theory in which there are no directionality parameters. While the discussion there makes different predictions with respect to word order phenomena, it still keeps intact the core insight behind EPA theory.

CHAPTER 5

CONCLUDING REMARKS

5.0 Introduction

This chapter is organized as follows. Section 5.1 provides an overview of the major research results of this thesis. Section 5.2 examines some broader implications of Expanded Project Alpha (EPA) theory in which the directionality parameters discussed in this thesis can be argued to be universal rather than language particular.

5.1 Overview of the Major Research Results

Through a detailed analysis of the thematic properties of lexical items, this thesis opens up an innovative way of looking at the issue of Chinese word order. In Chapter 1, we discuss two Chinese word order patterns which were previously considered recalcitrant in the literature, and which set the stage for the development of this thesis. These are the postverbal distribution of FDRS expressions, and the head-final character of Chinese noun phrases.

Chapter 2 articulates Speas' (1990) PA theory in which we focus on the working of the various licensing grid relations which operate on the theta grids associated with lexical items. Among them, we draw particular attention to theta-marking and theta-identification which regulate the distribution of complements and 'modifiers', respectively, in a well-formed DS.

Chapter 3 introduces EPA theory which incorporates a concept of directionality and a specific relation of predication, and sets up three working parameters, i.e. the theta-marking, theta-identification, and predicate-linking directionality parameters to account for the Chinese word order phenomenon in the domain of inflectional phrases. We argue that while the first two parameters can properly capture the unmarked pattern in which complements always follow the verb, and adjuncts always precede the verb, the last parameter can correctly account for the marked pattern in which the FDRS expressions are distributed to the right of the verb. In particular, we show that F/D expressions and R/S

expressions are instantiations of primary predicates and secondary predicates, respectively; and that their postverbal occurrences are expected under the proposed right-to-left predicate-linking parameter. Finally, under the assumption of the interpretation-licensing dependence (cf. Rapoport 1991, 1993), we show that not only EPA theory is further empirically supported, but a number of seemingly sporadic phenomena are also unified in a principled way.

The first part of chapter 4 is devoted to a critique of Tang's (1990a,b) DP analysis of Chinese noun phrases, and a defense of the NP analysis as first suggested by Huang (1982). We show that the inseparability of the demonstrative-numeral-classifier sequence in a Chinese noun phrase strongly indicates that the sequence forms a single constituent CIP, which occurs in the Spec position of the NP. In the second part, we relate this NP structure to the three directionality parameters assumed under EPA theory. Here, we argue, extending Grimshaw's (1990) proposal of argument suppression, that the '2' position corresponding to the internal argument, in addition to the '1' position corresponding to the external argument, undergoes lexical suppression in Chinese process nominals. Under this analysis, the head-final character of Chinese noun phrases is expected since theta-identification is the only licensing theta relation available in that domain, and its right-to-left application dictates that no postnominal constituent is ever allowed in Chinese. Finally, we further argue (contra Huang 1982 and Li 1990) that Chinese has a consistent head-initial specification for its lexical categories, and that the head-final behavior of Chinese is explained as a necessary consequence of nominalization which suppresses all the thematic grid positions of process nominals.

5.2 Broader Implications: The Universality of Directionality Parameters

The study of Chinese word order presented in this thesis is couched within the principle-and-parameters theory, under which Universal Grammar (UG) is considered to consist of certain fixed principles and several open parameters to be set by the particular linguistic experience of the learner. Throughout this thesis, we have been assuming that there are universal licensing mechanisms (i.e. principles) whose directionalities are subject to parametrization. Thus, in our analysis of Chinese, we posit the parameter settings in (1) in order to account for the word order pattern in (2):

- (1) a. Theta-marking of complements by a head proceeds uniformly from left to right.
 b. Theta-identification of 'modifiers' by a head proceeds uniformly from right to left.
 c. Linking of a predicate to its subject proceeds uniformly from right to left.
- (2) Zhang1san1 zai4 jia1-li nu3li4-de kan4 shu1.
 ZS at home-inside diligent DE read book
 'Zhangsan read the book diligently at home.'

With respect to (2), while the theta-marking parameter (1a) and the theta-identification parameter (1b) will correctly put the complement *shu* 'book' on the right-hand side of the verb, and the adjuncts *zai jia-li* 'at home', and *nuli-de* 'diligently' on the left-hand side of the verb, respectively; the predicate-linking parameter (1c) will constrain a right-to-left ordering of the predicate and the subject *Zhangsan*. As a result, we can argue that although the various licensing mechanisms are invariant across languages (in the sense that syntactic elements must be licensed by well-defined principle), there is an open directionality parameter associated with each of them at which individual languages may differ. To illustrate, consider the Japanese counterpart to (2):

- (3) Taroo-ga uti-de kimbenni hon-o yon-da.
 Taroo-SM house-in diligently book-OM read-PAST
 'Taroo read the book diligently at home.'

In (3), we can see that the basic word order pattern in Japanese is SOV, with 'modifiers' preceding the modifying head. Thus, on the one hand, Japanese has the same parameter settings for theta-identification and predicate-linking as those of Chinese; on the other hand, being an OV language, Japanese differs from Chinese with respect to the parameter of theta-marking, which is specified as from right to left. Thus, the word order differences between Chinese and Japanese can be accounted for in terms of the directionality parameters associated with the various universal licensing mechanisms.

However, our proposed analysis seems to be against the spirit of current analyses, in which only the SVO type of word order is argued to be made available by UG (cf. Kayne 1993)¹, and in which the importance of directionality parameters is reduced to a minimum

¹ Under Kayne's analysis, the observed cross-linguistic word order variation is explained in terms of different combinations of movements. Take SOV languages and VSO languages as examples. For the former type of language, the complement preceding the associated verb must have moved leftward past the verb into a higher Spec position; for the latter type of language, the verb must have moved leftward past S

(cf. Chomsky 1993). In keeping with the current theoretical positions, we may modify our analysis somewhat by shifting the focus from the associated directionality parameters to the licensing mechanisms *per se*. Under this revised version of EPA theory, there will only be licensing mechanisms with built-in directionalities, which are intended to be principles applying unconditionally across languages.

Assuming with Kayne (1993) that all languages are like Chinese in being underlyingly SVO, in order to account for the Chinese/Japanese word order variation in (2) and (3), we need to stipulate that the licensing mechanisms in (1), together with their fixed directionalities, are universal. As a result, the VO/OV distinction between Chinese and Japanese is recast as a difference in licensing mechanisms (instead of a difference in directionality parameters). In the case of Chinese, it is theta-marking which is the mechanism licensing the occurrence of complements, and as a result complements will follow the verb. In the case of Japanese, however, it is theta-identification which is responsible for licensing the occurrence of complements, and accordingly complements will precede the verb.

One of the intended virtues of this revised analysis is that a more elegant account can be given to the head-final character of Chinese noun phrases. In particular, we mentioned in chapter 4 that in the domain of Chinese noun phrases, the only licensing mechanism available is theta-identification whose right-to-left application predicts that no postnominal constituent is ever allowed in Chinese. However, it seems that what is at issue here is simply a matter of licensing mechanism, rather than a matter of licensing mechanism, coupled with its associated parameter. In other words, it is clear, at least in this case, that the information of directionality is redundant, and what we need is to pick out the appropriate licensing mechanism.

In the final analysis, the discussion in this section is intended to show how our EPA theory can be modified so as to be consistent with the spirit of current research programs within the principles-and-parameters theory. It should be pointed out that although the revised version of EPA theory is attractive and plausible, it is not without its problems, however. To take a simple example, consider the complement *hon-o* 'book' in the

into the Spec position of a higher head. One of the consequences of Kayne's view is that it can simplify the description of the word order typology considerably.

Japanese example (3). Since we assume that directionality parameters no longer play a role in accounting for word order, this element has to be licensed by theta-identification with its universal leftward directionality. Among other things, this would entail the claim that in order to be licensed by theta-identification, complements and 'modifiers' in Japanese pattern together syntactically, which is, to say the least, counter-intuitive.² Moreover, the same problem will occur in SVO languages with postverbal adjuncts, in which case we have to consider 'modifiers' and complements in such languages to form a natural class in order to be licensed by theta-marking with its fixed rightward directionality. Thus, since this revised version is associated with both favorable and unfavorable arguments, we would like to conclude that insofar as our (original) EPA theory is compatible with the research objectives of the principles-and-parameters theory, it can still be argued that the theory is well motivated in its essentials.

² It remains to be seen how future cross-linguistic research within the principles-and-parameters framework can do justice to this claim.

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