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**Chinese Relativization:
Ordering at the Syntax-Phonology Interface**

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**CHINESE RELATIVIZATION:
ORDERING AT THE SYNTAX-PHONOLOGY INTERFACE**

Chiu-Hung Chen

Thesis submitted to the
Faculty of the Graduate Studies
University of Ottawa
In partial fulfillment of the requirements
for the PhD Degree in Linguistics

Department of Linguistics
Faculty of Arts
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Abstract

The main concern of this dissertation is Chinese word order, with a special focus on Chinese relative clauses. Chinese is generally considered a head-initial language. Nevertheless, judging from the surface word order, relative clauses appear to be head-final. This fact seems to violate the Head-Direction Parameter according to which all phrase categories in one language are either head-initial or head-final. I propose a theory from a syntax-phonology interface perspective, arguing that (i) relative clauses in Chinese receive a head-initial modifier phrase analysis, following Rubin (in prep.); (ii) *de* is a clitic-like element that lowers to the first relevant XP it finds, a special movement operation at the syntax-phonology interface. The main argument is built upon the evidence that *de* behaves like a clitic. I argue that there are in fact two types of clitics in Chinese, one being toneless and another being tone-bearing. The former lacking tone and stress appears in the enclitic position, while the latter always appears in the proclitic position. The differential behavior of these two types of clitics is triggered by the absence of a foot in toneless clitics. It is this absence which forces lowering of *de*. The generalization based on the behavior of these two types of clitics is accounted for in an Optimality framework. I also show that the position of other functional categories such as aspectual markers and sentence-final particles in Chinese is influenced by their prosodic status.

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Chapter 1 Introduction

1. Goal and data

Chinese is generally considered a head-initial language. Nevertheless, judging from the surface word order, relative clauses appear to be head-final. This fact seems to violate the Head-Direction Parameter according to which all phrase categories in one language are either head-initial or head-final. Head-final relative clauses in Chinese have been treated as exceptions to an otherwise consistently head-initial language in the literature (Aoun and Li 2003, among others). The main goal of this dissertation is to investigate head directionality with special reference to Mandarin Chinese relative clauses. In particular, I propose a theory from a syntax-phonology interface perspective, arguing that relative clauses are head-initial in line with other phrase categories in Chinese.

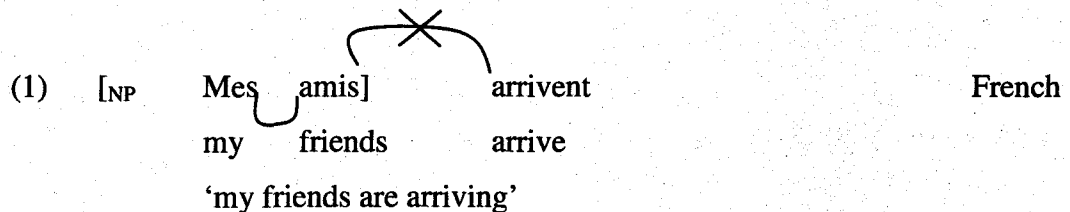
The dialect under study, Mandarin Chinese, also known as Mandarin or Chinese, is the official language of China, Taiwan, and Singapore. Mandarin Chinese is based on the pronunciation of the Beijing dialect. It belongs to the Mandarin family (or Northern family) which is the largest of the seven dialect families commonly spoken in Northern and Southwest China (Duanmu 2000). In this dissertation, I use Chinese to refer to Mandarin Chinese. The language data provided in this study are presented in *Pinyin*, the official Romanization system adopted by the Chinese government in 1958.

2. Theoretical framework and assumptions

Linguistic studies in the framework of generative grammar aim at characterizing the properties shared by all human languages, but at the same time accounting for differences among them. The Principles and Parameters Theory proposed by Chomsky (1981) provides an answer to these two seemingly contradictory features in natural languages. In the view of the Principles and Parameters Theory, all humans are equipped with a language faculty, namely, Universal Grammar (UG, henceforth) which consists, on the one hand, of basic principles common to every language, and on the other, of set of parameters that are responsible for syntactic variations. To account for word-order variation across languages, the Head-Direction Parameter has been proposed to capture the fact that some languages

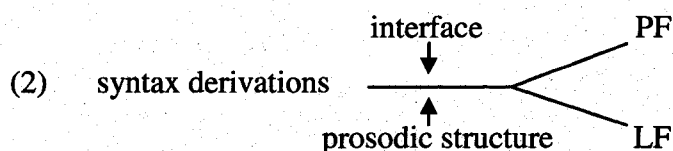
have the word-order pattern according to which a head is followed by a complement (head-initial), such as English (an SVO language), and in some languages, a head is preceded by its complement (head-final), such as Japanese (an SOV language). With this parameter, all phrase categories in one language are either head-initial or head-final. However, Kayne (1994) proposes a different view on the directionality of headedness within X-bar theory. He argues for a universal word order account according to which all languages are underlyingly head-initial. The head-final word order in SOV languages is in fact derived by the movement of the object to the position before the verb. It is important to note, however, that despite the fact that I will argue that phrase categories are consistently head-initial in a SVO language like Chinese, in this dissertation I nevertheless do not follow Kayne's claim that all languages (either SVO or SOV) are head-initial. Since I assume a bare phrase structure, there is no way indeed to derive the Linear Correspondence Axiom. Other problems with Kayne's theory are avoided, since my proposal is instead built on the Head-Direction parameter, according to which languages can vary: they are either head-initial or head-final.

Another assumption adopted for this dissertation is the syntax-phonology interface theory. Evidence for the syntax-phonology interface comes from cases such as (1) in which phonological rules (i.e. French liaison) are applied in syntactically defined domains (i.e. XP):



The above example clearly shows that syntax has some influence on phonology, despite the fact that they have been seen as independent levels of representation. There are different views of the interaction between syntax and phonology. In this dissertation, I adopt the theory according to which the syntactic component and the phonological component of the grammar do not have direct access to each other. Rather, prosodic structure is called for as a mediator between these two levels (Selkirk 1980, 1984; Nespor and Vogel 1986; Inkelas 1989; Inkelas and Zec 1990, among others). Prosodic structure is seen as the mapping between syntax and phonology based on the following grounds. First, prosodic structure comprises a series of hierarchically ordered prosodic categories, including syllable, foot,

prosodic word, phonological phrase, intonational phrase and utterance. The prosodic constituents above the prosodic-word level bear systematic relations to syntactic constituents (Selkirk 1984, among others)¹. Second, phonological rules are argued to apply only to phonological representations (c.f. prosodic structure), but not to syntactic structure (Inkelas 1989). I also follow a broad Minimalist approach (Chomsky 1995, 1998, 1999, 2001) to the grammar, assuming that utterances are first derived in syntax, and then split into two branches: logical form (LF) for interpretation and phonological form (PF) for spell-out. Under this approach, it is assumed that prosodic structure can interpret the output of the syntactic derivation. Finally, I adopt the idea that movement such as lowering can be performed based on phonological principles at the syntax-phonology interface². The following diagram shows the view adopted in this thesis:



As shown in (2), it is through prosodic structure that syntax and phonology can exert mutual influence.

3. An overview of the dissertation

The main concern of this dissertation is Chinese word order, with a special focus on Chinese relative clauses. It is necessary to understand first of all why Chinese word order has been an issue in the literature. In Chapter 2, I present an overview of issues related to Chinese word order. In particular, I discuss several studies built upon Greenberg's (1963) word order typology and the Principles and Parameters Theory. Under Greenberg's typology, Chinese is characterized as an SVO language; however, it possesses features of both VO and OV languages. Studies based on Greenberg's typology thus center on the issues as to whether Chinese is a VO or an OV language, and why Chinese has word order patterns of both VO and OV languages. With the development of the Principles and Parameters Theory

¹ However, prosodic structure has been argued not to be isomorphic to syntactic constituents.

² The assumption is based on the theory of Distributed Morphology (Halle and Marantz 1994; Embick and Noyer 2001).

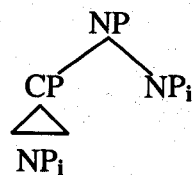
(Chomsky, 1981), the debate on Chinese word order shifts the focus to the directionality of headedness. Chinese phrase structure also poses challenges to this view. At the surface structure, there are two different word-order patterns among phrase categories: VP, PP and IP are head-initial while NP and CP are head-final. The goal of the research under this framework is to provide a uniform headedness account, solving the problem of the two seemingly contradictory word order patterns in the phrase categories as shown above.

In Chapter 3, I provide the relevant background necessary to understand Chinese relative clauses. The most salient feature of Chinese relative clauses is that they are prenominal, which is not expected in a VO language such as Chinese. The obligatory presence of the element *de* in forming a relative clause is another important characteristic, as illustrated in (3).

- (3) [Lisi xihuan de] shu
 [Lisi like DE] book
 'the book that Lisi likes'

Unlike in English, where *that* heads the relative clause *Lisi likes* (which makes the relative clause head-initial), in Chinese, the relative clause *Lisi xihuan* appears before the element *de*. Based on the surface word order, Aoun and Li (2003) argue that Chinese relative clauses are head-final and have the adjunction structure shown in (4).

- (4) adjunction structure in Chinese



(Aoun & Li 2003, 157)

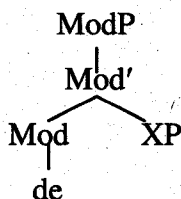
In contrast, Simpson (1997, 2001) argues that Chinese relative clauses should receive a complementation analysis based on Kayne (1994). Under this approach, a relative clause is headed by the determiner *de* in a determiner phrase (DP), in line with other head-initial phrase categories in Chinese. I show that both analyses are problematic to some extent: on

the one hand, relative clauses are exceptionally head-final among otherwise head-initial phrasal categories in Chinese under the adjunction view. On the other hand, the complementation analysis yields a desirable head-initial pattern for relative clauses, but is problematic when attempting to generate a complement structure for relative clauses and to treat *de* as a determiner. I conclude that a correct analysis of relative clauses in Chinese should include the following:

- (i) The phrase structure is head-initial in Chinese.
- (ii) The relative clauses are adjuncts in Chinese.

In Chapter 4 and 5, I put forward a proposal based on the conclusion in Chapter 3, arguing that (i) relative clauses in Chinese receive a head-initial modifier phrase analysis, following Rubin (in prep.); (ii) *de* is a clitic-like element that lowers to the first relevant XP it finds, a special movement operation at the syntax-phonology interface. In Chapter 4, I spell out the first part of the proposal, namely, the head-initial modifier phrase hypothesis, as illustrated below:

- (5) The structure of the modifier phrase



The modifier phrase is headed by *de*, which selects an XP, such as IP, NP or AP, as its complement. This hypothesis provides a unified analysis of *de*, which has been shown to have a wide range of distribution in Chinese phrase structure:

- (6) *Possessive phrase*

Wo	de	yifu
I	DE	clothes
'my clothes'		

(7) *Adjective phrase*

meili	de	hua
beautiful	DE	flower

‘beautiful flower’

(8) *Relative clause*

Lisi	xihuan	de	shu
Lisi	like	DE	book

‘the book which Lisi likes’

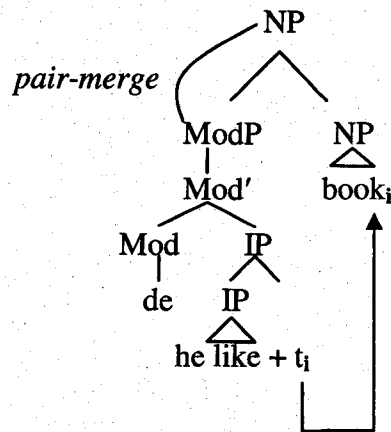
This proposal also defines the functional properties of *de*. That is, *de* is the head of the modifier phrase, triggering modifying relations. To derive the surface word order, I propose a derivation involving two movement operations for argument relativization. First, the head noun is raised from inside the relative clause. Second, *de* is lowered to attach to the relevant phrase category at the syntax-phonology interface. An example is given below:

(9)	ta	xihuan	de	shu
	he	like	DE	book

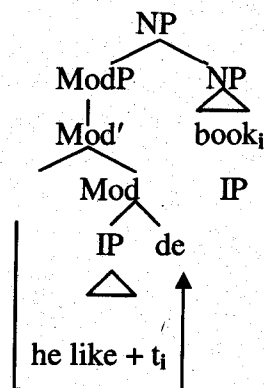
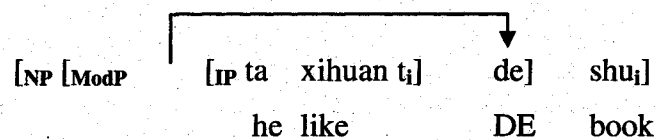
‘the book that he likes’

(10) First step in derivation:

[NP	[ModP	de	[IP	ta	xihuan	t _i	shu _i]]]]
				he	like		book



(11) Second step in derivation: lowering of *de*



The first step involves raising the head noun from the IP (with potential reconstruction effects), and merging the ModP into the dominant NP. The second step of derivation requires lowering of *de* to attach to the IP.

In Chapter 5, I present the second part of my proposal, which argues for a movement at the syntax-phonology interface. The main argument is built upon the evidence that *de* behaves like a clitic. I argue that there are in fact two types of clitics in Chinese, one being toneless and another being tone-bearing. The former lacking tone and stress appears in the enclitic position, while the latter always appears in the proclitic position. The distinction

between these two types of clitics is triggered by the absence of a foot in the toneless clitics. It is this absence which forces lowering of *de*. The generalization based on the behavior of these two types of clitics is accounted for in an Optimality framework. I also show that the position of other functional categories such as aspectual markers and sentence-final particles in Chinese is influenced by their prosodic status.

Chapter 2 Word order and Parameterization in Chinese

1. Introduction

The goal of this chapter is to provide an overview of the issues related to Chinese word order. Specifically, I discuss several studies devoted to the understanding of word-order variations of main phrasal categories, such as VP, PP, NP and CP, in Chinese. The theoretical frameworks upon which these studies are built include Greenberg's (1963) word-order typology and Chomsky's (1981) parametric theory.

Greenberg (1963) establishes three basic word-order patterns, namely SVO, SOV and VSO. More importantly, he shows the correlations between VO/OV and other elements. For instance, a VO language like English tends to have the relative clause following the head noun while an OV language such as Japanese usually has the head noun following the relative clause. However, Chinese, which is characterized as a VO language by Greenberg (1963: 109), possesses features of both VO and OV languages. For instance, the relative clause in Chinese precedes the head noun, just like in an OV language such as Japanese. Studies built upon Greenberg's typology thus center on the issues as to whether Chinese is a VO or an OV languages, and why Chinese has word-order patterns of both VO and OV languages.

With the development of the X' Theory (Chomsky 1970, 1981), the debate on Chinese word order shifts the focus to the directionality of headedness. According to X' Theory, all languages have the same X' structure—for any lexical category X, there is a maximum projection of X'' which consists of the specifier of X' and X'. X' in turn consists of the head X and its complement. The order between the specifier and the X', and the head X and its complement, is argued to be responsible for word-order variations among languages. For instance, in a head-initial language, the complement of the head always follows the head. In contrast, in a head-final language, the complement consistently precedes the head. Phrase structure in Chinese also poses challenges to this view. At the surface structure, there are two different word order patterns among phrasal categories: VP, PP and IP are head-initial while NP and CP are head-final. Research in favor of a uniform headedness account—whether Chinese is head-initial or head-final—focuses on explaining the two seemingly contradictory word order patterns in the phrasal categories shown above.

This chapter is organized as follows. In section 2, I discuss Greenberg's word order typology relevant to the thesis, and the studies on Chinese word order conducted within this framework. In section 3, I turn to the parametric theory and review the research dealing with the directionality of headedness in Chinese. I conclude in section 4.

2. Greenberg's (1963) word order typology

Greenberg (1963) investigates a sample of 30 languages, establishing some universals in terms of word order.³ He first employs three sets of criteria to determine the basic word order of a language. Significantly, he shows the correlations among these criteria. I will briefly summarize his word-order typology relevant to the present study below.

The most important criterion in Greenberg's typology is the relative order of subject, verb, object in declarative sentences with nominal subject and object. There are six logically possible orders: SOV, SOV, VSO, VOS, OVS and OSV. However, Greenberg observes that the dominant order among the three elements (subject, verb and object) is almost always the one in which the subject precedes the object; therefore, SVO, SOV and VSO are the only possible orders. The second criterion is whether a language has prepositions (Pr, henceforth) or postpositions (Po, henceforth). The third criterion specifies the word order within the noun phrase, namely, the order of an adjective and its modifying noun, and the order of demonstratives, articles, numerals, quantifiers and the noun. These three criteria might seem to be logically independent from each other. Nevertheless, Greenberg shows that the relative order between a verb and an object correlates with the presence of prepositions/postpositions, and with the order of certain pairs of grammatical elements such as NG (noun-genitive) and NA (noun-adjective). To a large extent, a VO language and an OV language have the following tendencies (cf. Comrie 1981)⁴:

³ Greenberg begins his article with the sentences: 'The tentative nature of the conclusions set forth here should be evident to the reader. Without much more complete sampling of the world's languages, the absence of exceptions to most of the universals asserted here cannot be fully assured' (p.73).

⁴ According to Lehmann (1973), the order of the subject is not relevant from a typological point view; therefore, VSO and SVO can be collapsed into a single category. This leaves only two major categories: VO and OV languages.

- (1) a. VO/Pr/NG/NA
b. OV/Po/GN/AN

(Greenberg 1963: 109)

A VO language, as shown in (1a), tends to have prepositions. The word order of VO in fact correlates with the word order of NG and NA. That is, when the object follows the verb in a language, the modifier tends to follow the modified element: N + G, N + A, V + Adv. In contrast, an OV language, which tends to have postpositions as shown in (1b), has the word order of the verb being preceded by the object. It is therefore predicted that the modifier in this type of language tends to precede the modified element: G + N, A + N, Adv + V. A summary of some of the correlations in VO and OV languages is given below:

(2)

VO	OV
preposition	Postposition
noun + genitive	genitive + noun
noun + adjective	adjective + noun
noun + relative clause	relative clause + noun
verb + adverb	adverb + verb
auxiliary + verb	verb + auxiliary
no sentence-final particle	sentence-final particle

Greenberg characterizes Chinese into the following type of languages:

- (3) SVO/Po/GN/AN: Finnish, Estonian, Ijo, **Chinese**, Algonquian (probably), Zoque

(Greenberg 1963: 109)

As shown in (3), Chinese is a VO language, but has many features of an OV language, namely postpositions, the order of [genitive + N], and [adjective + N]. A more detailed

comparison between SVO and SOV features in Chinese provided by Li and Thompson (1981) is shown below:

(4) SOV and SVO features of Chinese

SVO language features	SOV language features
VO sentences occur	OV sentences occur
prepositions exist	prepositional phrases precede the V, except for time and place phrases
auxiliaries precede the V	postpositions exist
complex sentences are almost always SVO	relative clauses precede the head noun
	genitive phrases precede the head noun
	aspect markers follow the V
	certain adverbials precede the V

(Li & Thompson 1981: 24)

The mixed nature has led to a number of heated debates (Li and Thompson 1974, 1975; S.-F. Huang 1978; Light 1979; Sun and Givón 1985; Sun 1996; Peyraube 1996, among others). Li and Thompson (1974, 1975), for instance, argue that Chinese has been undergoing a process of changing from SVO to SOV in the last two millennia. One piece of evidence for this comes from the position of prepositional phrases (PPs, henceforth) which has changed from a predominantly postverbal position in Old Chinese to a preverbal position beginning in the 15th-16th centuries A.D. Another argument for this conjecture is the emergence of *ba*-construction which involves moving the object before the verb (i.e. OV):

- (5) Wo ba **fan** **zhi** le.
 I BA rice eat PRF
 'I've eaten the rice.'

Li and Thompson claim that Chinese exhibits a mixture of SVO and SOV language features because it has not yet completed the transformation from SVO to SOV. However, Sun (1995)

points out that Li and Thompson's claim about the position of PPs in Old Chinese is simply not true. He shows that preverbal PPs not only exist in Old Chinese, they in fact make up half of the appearances of all PPs. Therefore, Sun argues that preverbal PPs cannot be seen as a new development, as Li and Thompson claim. In terms of *ba*-construction, Sun (1996) shows that *ba* initially was a lexical verb meaning 'to hold' and it was not commonly used in Old Chinese. Moreover, Sun shows that *ba*-construction is in fact the replacement of the early *yi*-construction which is used to mark the syntactic object in Middle Chinese (citing Zhu (1957)). Therefore, Sun points out that *ba*-construction cannot be treated as an indication of the emergence of OV. In addition to Sun's argument, Light (1979) also claims that OV in Chinese is in fact a marked and emphatic construction in discourse. Therefore, OV should not be considered a canonical word order. Moreover, in their quantified text study, Sun and Givón (1985) show that the majority of sentences in Modern Chinese are VO. The OV order which appears less than 10% of the time in text functions as an emphatic/contrastive discourse device.

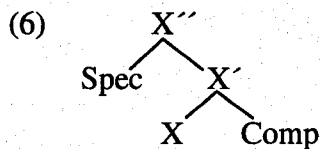
In summary, Greenberg's typology shows that languages can be categorized into three main groups, namely, SVO, SOV, and VSO. Moreover, the relative order of the verb and the object is shown to correlate with that of other elements. For example, in a VO language, the noun tends to appear before its modifier. However, the word order of Chinese seems to pose a challenge to Greenberg's typology because the features of both SVO and SOV languages can be found in Chinese. Several proposals from both synchronic and diachronic perspectives have been made to show that the word order of Chinese is not typologically different from other languages. On the one hand, Li and Thompson (1974, 1975) claim the word order of Chinese has been undergoing a shift from SVO to SOV, with evidence for this in the position of PPs and the *ba*-construction. On the other hand, Light (1979), Sun and Givón (1985) and Sun (1996) maintain that the basic word order of Chinese is SVO, arguing that OV is used only in marked, emphatic and contrastive constructions in discourse.

Greenberg's typology aims at establishing universal patterns of word order, but it does not intend to explain why the relative order of the subject and the object correlates with the order of phrasal categories, such as the noun and its modifier. In the following, I will

discuss a theory within the generative grammar framework which accounts for the correlations from a parametric point of view.

3. The parametric theory

The goal of linguistic studies in the framework of generative grammar is to characterize the properties shared by all human languages, but at the same time to account for differences among them. The Principles and Parameters Theory put forward by Chomsky (1981) proposes a resolution to these two seemingly contradictory features in natural languages. Under this view, all humans are equipped with a language faculty, namely, Universal Grammar (UG, henceforth) which consists, on the one hand, of basic principles common to every language, and on the other, of a set of parameters that are responsible for syntactic variations. In other words, all languages are considered to be fundamentally the same, and their differences are the result of parametric variation. With this analysis, all languages have an X' phrase structure, where X refers to lexical categories, such as a noun, a verb, an adjective or a preposition. The X' structure is shown in the following diagram:



There are three distinct levels in an X' phrase structure as shown in (6). First, the phrasal category X has a maximal projection X'' which contains a specifier and an intermediate projection X' . X' in turn consists of the head X and its complement (comp.). This structure ensures that the lexical category X heads the same phrasal category XP . In other words, phrase structures such as $VP \rightarrow AP PP$ or $N \rightarrow V P$ do not occur.

To account for word-order variations among languages, the Head-Direction Parameter has been proposed to capture the fact that some languages have the word-order pattern according to which a head is followed by a complement (head-initial), such as English (a VO language), and in some languages, a head is preceded by its complement (head-final), such as Japanese (an OV language). These patterns can be generalized in the following rules for specifiers, adjuncts and complements:

- (7) Specifier rule:
 - a. $XP \rightarrow X' YP$
 - b. $XP \rightarrow YP X'$
- (8) Adjunct rule:
 - a. $X' \rightarrow X' ZP$
 - b. $X' \rightarrow ZP X'$
- (9) Complement rule:
 - a. $X' \rightarrow X WP$
 - b. $X' \rightarrow WP X$

A head-initial language has the structure (7a)-(9a), while a head-final language has the structure (7b)-(9b). With this parameter, all phrasal categories in one language are either head-initial or head-final.

It is not surprising that word order in Chinese also poses challenges to the parametric approach, as shown in many studies (Huang 1982, 1994; Travis 1984; Li 1990; Mulder and Sybesma 1992; Feng 2002; Tsai 2003, among others). Recall that with the Head-Direction Parameter, all phrasal categories in one language are either head-initial or head-final. However, phrasal categories in Chinese do not seem to be consistent with this dichotomy, at least from the surface structure. Examples of major phrasal categories are shown below:

- (10) Head-initial: IP, VP, PP
 - a. VP

Ta	[xihuan	du-shu]
he	like	read-book

‘He likes reading.’

b. IP

ta zhidao [Lisi xihuan kan dianying].

he know Lisi like see movie

‘He knows that Lisi likes to see movies.’

c. PP

Ta [zai zhuozi-shang] xie gongke.

he at table-on write homework

‘He does homework at the desk.’

(11) Head-final: CP, NP

a. NP

yenjiu de [dongji]

research DE motive

‘the motive of research’

b. CP

[dai maozi de] ren

wear hat DE person

‘the person who wears a hat’

In addition to these categories, adjuncts also seem to be problematic to the adjunct rule (cf. (8)). That is, adjuncts appear both preverbally and postverbally. Examples are given below:

(12) Preverbal adjunct:

Ta [zuotien] [zai-jia] xiuxi

he yesterday at-home rest

‘He rested at home yesterday.’

(13) Postverbal adjunct:

Ta pao-le [yi-tien].

He run-Perf one-day

'He's run for a day.'

In terms of headedness, the above examples show that at least at the surface structure, Chinese exhibits very inconsistent patterns across phrasal categories. To account for these peculiarities, the studies conducted within the parametric theory framework fall into two groups—those which claim that word order of Chinese is head-final with the exception of VP, PP and IP, or that it is head-initial with the exception of CP and NP. In the following subsection, I will discuss several proposals aiming to provide a consistent headedness pattern for Chinese.

3.1 Head-final proposals

The early proposals for head-final account focus mostly on explaining the two 'abnormal' patterns: why VP and PP are head-initial, and why some adjuncts appear postverbally. I will discuss two well-known studies by Huang (1982) and Li (1990) below.

Huang's (1982) account

Huang (1982) argues that Chinese is head-final and proposes the following X' filter operated at PF to account for the word order in Chinese:

(14) The X-bar structure of Chinese is of the form

a. $[x^n \ X^{n-1} \ YP^*]$ iff $n=1$, $X \neq N$ b. $[x^n \ YP^* \ X^{n-1}]$ otherwise

(Huang 1982: 41)

As shown in (14a), except for N, the head-initial rule is applied 'at the lowest level of expansion', i.e. the head is followed by its complement (p.40). This rule accounts for the phrasal categories such as VP, IP, and PP which involve subcategorized complements (i.e.

VP $\rightarrow$ V + NP, PP $\rightarrow$ P + NP, IP $\rightarrow$ I + VP).⁵ It also accounts for the strict N-final nature in Chinese (i.e. N selects the complement to its left). In contrast, the head-final rule is applied to the rest of the bar levels (Huang assumes that X' structure has multiple bar levels), as shown in (14b). In other words, specifiers, subjects and all modifiers are placed at the left to their heads.

The only problem left now is postverbal adjuncts which consist of expressions of frequency and duration.⁶ The occurrence of postverbal adjuncts contradicts the adjunct rule shown in (8). An example of this type of adjunct is shown below.

- (15) Zhangsan pao-le [liang ci].
 Zhangsan run-Perf two time.
 'Zhangsan ran twice.'

(Huang 1994: 17)

However, those adjuncts cannot follow the complement of the verb, as shown below.

- (16) Zhangsan kan-le (*shu) [liang ci].
 Zhangsan read-Perf book two time
 'Zhangsan read (a book) twice.'

(Huang 1994: 17)

If the object is moved to a preverbal position, the sentence is grammatical.

- (17) Zhangsan shu kan-le liang ci.
 Zhangsan book read-Perf two time
 'The book, Zhangsan read twice'.

(Huang 1994: 18)

⁵ In his later paper, Huang (1994) argues that the heads of VP, PP and IP are verbal in nature. Rather than arguing that the head-initial rule applies to any phrasal category except N, Huang argues that the head-initial rule applies to phrasal categories which have a [+v] feature.

⁶ Huang (1994) refer this type of adjuncts as FDRM elements, which comprise frequency, duration, result and manner adverbs.

The sentence can also be acceptable if postverbal adjuncts such as *liang ci* shown in (18) appear to be at the same constituent as the following object NP:

- (18) Zhangsan kan-le [liang ci (de)⁷ shu].
 Zhangsan read-Perf two time DE book
 ‘Zhangsan read twice (lit. read twice of books).’

(Huang 1994: 17)

The positions of duration/frequency phrases are summarized below:

- (19) a. V + F/D (frequency/duration)
 b. O + V + F/D
 c. V + [F/D + (de) + O]
 d. *V + O + F/D

The behavior of duration/frequency phrases has led to a common assumption that a verb can only be followed by one constituent, known as the Postverbal Constraint (cf. Sybesma 1999). When more than one constituent appears, the object is forced to move to a preverbal position, as shown in (19b), or ungrammaticality would result, as shown in (19d). Therefore, in addition to explaining postverbal F/D phrases, Huang also attempts to account for cases like (19c), where the verb is followed by two constituents.

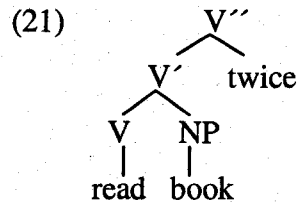
To account for postverbal adjuncts, Huang argues that the head-initial rule in (14a) can also be argued to be right-branching at the lowest level, as shown below:

- (20)
- $$\begin{array}{c}
 & & V'' \\
 & \swarrow & \searrow \\
 V' & & \text{twice} \\
 | & & \\
 \text{ran} & &
 \end{array}$$

V' is the lowest level (i.e. the intransitive verb *run* is not subcategorized for complements) and it can be followed by a constituent based on the rule in (14a). This explains why the

⁷ The insertion of *de* is optional.

postverbal adjunct in (19a) is allowed. In contrast, the word order of (19d) is prohibited because the two lowest levels (V'' and V') are both right branching (i.e. only the lowest level can be right-branching), as shown below:



The structure in (21) violates the rule shown in (14a) according to which only the lowest level can be right branching. With regard to (19c) where a verb is followed by two constituents, Huang proposes a restructuring process in which all postverbal constituents can become one constituent. For instance, the two NPs in (18) (*twice* and *book*) can be restructuring into one NP, with the insertion of *de* (similar to the possessive construction: *laoshi de shu*: ‘teacher’s book’).

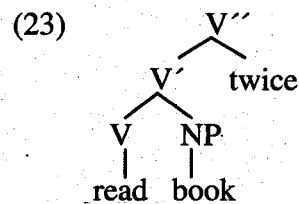
However, Li (1990) points out several problems with Huang’s analysis. First, the distinction between the category N and other categories seems to be an *ad hoc* stipulation. Moreover, different branching directions at different levels—the lowest level branches to the right, but other levels branch to the left—would result in many different word orders that are not attested in natural languages. Empirically, Huang’s proposal also makes wrong predictions. Li argues that the treatment of structures such as (21) implies that a sentence should be grammatical as long as there is only one constituent following the verb. However, the following sentences contradict the implication:

- (22) a. *Zhei jian shi, ta shuo [dui wo] le.
 This CL matter he say to me PAR⁸
 ‘This matter, he has told me.’

⁸ CL: classifier. PAR: perfective particle.

- b. Zheijian shi, ta [dui wo] shuo le.
 This CL matter he to me say PAR
 'This matter, he has said to me.'

The sentence shown in (22a) should have been acceptable since the verb is followed by only one constituent (the PP). Nevertheless, this sentence comes out ungrammatical. Instead, the PP should appear preverbally as shown in (22b). Sybesma (1999) also points out that the restructuring strategy seen in (18) would incorrectly predict sentences such as (21), repeated below:



By inserting *de*, the restructuring of the two NPs (*book* and *twice*) into one NP (*book de twice*) should result in a grammatical sentence. However, that is not true.

In summary, Huang's account has raised both theoretical and empirical questions. Theoretically, Huang's X-bar filter is not motivated. Namely, it is not clear why the category N behaves differently from other categories. Moreover, different directions of branching at different bar levels are not a common property in natural languages. Empirically, Huang's proposal also makes wrong predictions in terms of word order. In the following subsection, I turn to Li (1990) who discusses the directionality of headedness from the perspective of Case assignment.

Li's (1990) account

Li argues that word order in Chinese is determined by both X'-theory and Case assignment. She proposes the following Word Order Constraint for Chinese:

- (24) The Chinese Word Order Constraint
 a. Chinese is head-final except under the requirements of Case assignment.

- b. Case is assigned from left to right in Chinese.
- c. A Case assigner assigns at most one Case.

(Li 1990: 11)

The constraint in (24a) accounts for the distinction between phrasal categories such as VP and PP, and phrasal categories like NP. That is, only the former categories, but not the latter, can assign Case based on the Case Theory (Chomsky 1981). Since Case is assigned from left to right (c.f. (24b)), VP and PP must move from the underlying positions (e.g. OV) to the surface head-initial positions in order to assign Case to their objects in the right. This constraint also explains the occurrence of preverbal prepositions in Chinese—PPs are not assigned Case (only NP arguments are Case receivers), therefore they do not appear postverbally.

Similarly to Huang's analysis, Li also needs to explain why frequency/duration phrases appear postverbally. Li argues that these phrases are in fact NPs which need to be assigned Case, even though they are not subcategorized NPs⁹. This accounts for the observation in which they can appear postverbally, as shown in (19a). She further claims that a Case assigner (c.f. (24c)) can only assign one Case. Consequently, the verb cannot be followed by the complement and frequency/duration expressions at the same time, as shown in (19d).

In terms of the directionality of headedness, Li's proposal seems to be convincing. On the one hand, the observation that VP and PP are head-initial is due to their Case assigner identity. On the other hand, the head-final nature of NP is the result of being assigned Case to the right of the Case assigner. However, as pointed out by Li herself, this approach might encounter several problems. For instance, with the Word Order Constraint, only those

⁹ The argument that non-subcategorized NPs need Case is attested by the following pair of sentences:

- | | | | | | |
|----|-----|--|-------------|-------------|-----------|
| a. | *wo | | gongyuan-li | kandao | ta |
| | I | | park-inside | see | he |
| b. | Wo | | zai | gongyuan-li | kandao ta |
| | I | | at | park-inside | see he |

'I saw him in the park.'

(Li 199: 26)

Li argues that the preposition *zai* is a Case-assigner, assigning Case to the localizer *li* (which is an NP according to Li). Therefore, the absence of the Case-assigner *zai* results in ungrammaticality as shown in (a). Li notes that the locative expression is not subcategorized for by the verb, but the above example show that non-subcategorized NP (i.e. *li*) still needs to be assigned Case (otherwise it would be ungrammatical). Li therefore concludes that non-subcategorized NPs need Case.

elements that receive Case are allowed to appear postverbally. This constraint accounts for preverbal prepositions, but cannot explain the situation in which the complements of the verb are PPs and clauses (i.e. these phrasal categories do not have Case). Another problem with the Case approach is that some elements that are not subcategorized also appear postverbally. Third, there are sentences containing more than one constituent postverbally. This is not predicted by (24d)—a Case assigner only assigns one Case at most. Finally, duration/frequency phrases are often preceded by intransitive verbs. This is unusual under the standard assumption, according to which, intransitive verbs do not assign Case. To solve the first problem which PPs and clauses appear postverbally, Li first argues that the structure of PPs should be reanalyzed as $[[_{\text{V}} \text{ V P}] \text{ NP}]$. In other words, P combines with V, forming a complex verb. With regard to postverbal clauses, Li claims that they can in fact receive Case, against the standard assumption. In terms of the second problem in which more than one constituent appears postverbally such as a double object construction $[\text{V NP}_2 \text{ NP}_1]$, Li argues that NP_2 is incorporated with V, and NP_1 receives Case from the complex V: $[[\text{V NP}_2] \text{ NP}_1]$. With regard to the last problem, Li argues that intransitive verbs are Case-assigners because duration/frequency phrases are in fact NPs that need to be assigned Case (but they cannot be assigned theta-roles).

Despite Li's solutions, several questions still remain. First, Huang (1994) and Sybesma (1999) point out that the argument in which all postverbal constituents require Case is controversial. Another problem is with the structure of $[\text{V} + \text{PP}]$. PP is not a Case receiver, but it nevertheless appears postverbally. Li resorts to a reanalysis process, resulting in the structure of $[[\text{V} + \text{P}] + \text{NP}]$ (i.e. $\text{PP} \rightarrow \text{P} + \text{NP}$). The verb and the preposition together form a complex VP and then assign Case to the object NP. However, it is not clear what triggers the reanalysis of postverbal PPs in the first place (c.f. Huang (1994)). Finally, Li argues that intransitive verbs can assign Case to frequency/duration phrases as shown in (15). However, this claim is contrast to the standard assumption in which only transitive verbs assign Case.

In sum, both Huang (1982) and Li (1990) argue that the word order of Chinese is head-final. However, their approaches for the 'exceptional' head-initial VP and PP are very different. On the one hand, Huang proposes the X' bar filter to account for the word order in Chinese. That is, the head-initial rule only applies to phrasal categories which require subcategorized complements at the lowest bar level. On the other hand, Li shows that it is

only under the Case assignment that VP and PP appear to be head-initial. However, as discussed above, both Huang and Li's accounts raise some questions that need further explanations.¹⁰

3.2 Head-initial proposals

CP and NP in Chinese are traditionally considered as head-final in the literature. Therefore, the proponents of the head-initial account need to explain why these two phrasal categories behave differently from other head-initial ones. In the following subsection, I will discuss some of these proposals.

3.2.1 Head-initial CP

The argument that CP is head-final is mostly built on the position that CP occupies in the following constructions:

(25) Relative clause:

dai maozi **de** ren
wear hat DE person
'the person who wears a hat'

(26) Declarative/interrogative sentences with sentence final particles (SFP¹¹):

a. women zou **ba!**
 we go SFP
 'Let's go!'

b. Ni hao **ma?**
 you good SFP
 'How are you?'

However, there are other CPs appearing in the initial position of a clause as shown below:

¹⁰ In his paper presented at the Joint Meeting of the 4th international Conference on Chinese Linguistics and 7th North American Conference on Chinese linguistics, Huang (1995) takes the position that the head-parameter settings in Chinese have shifted from head-final to head-first (quoted from Tsai (2003)).

¹¹ Sentence final particles are treated as complementizers.

- (27) **Yinwei** [ta meiyou kong], wo meiyou qu jian ta.
 Because he no leisure I no go see he
 'Because he had no free time, I did not go to see him.'

- (28) **Suiran** [ta meiyou kong], wo rengran qu jian ta.
 Though he no leisure I still go see he
 'Although he had no time for me, I went to see him nevertheless.'

- (29) **Ruguo** [ni meiyou kong], wo jiu bu qu.
 If you no leisure I then not go
 'If you have no time, I won't go.'

(Huang 1982: 85)

Huang argues that *because*, *though*, and *if* shown in the above sentences are complementizers, selecting an IP to their right.

Another set of head-initial CPs taken by Hsieh (2005) is shown below:

- (30) Embedded complementizer:

Wo zhidao [_{CP}(shuo) [_{TP} ni shi Taiwan ren]] (Mandarin)
 I know COMP you are Taiwan people
 'I know that you are Taiwanese.'

- (31) Embedded complementizer selected by an epistemic modal

Hit-king hothelu b.etang [_{CP}*(kong) [_{TP}ciann kui]] (Taiwanese)
 that-CL hotel NEG.can COMP very expensive
 'That hotel is not likely to be very expensive.'

- (32) Free relatives

[_{CP}khuann [_{TP}li beh cu sann]], gua long ciah (Taiwanese)
 whether you want cook what I all eat
 'I will eat whatever you cook.'

Topicalized wh-word in conditional clause

(Taiwanese)

(where pg = parasitic gap)

Sheme-dongxi_i **ruguo** (**shuo**) ni mai-le pg_i what-
 thing IF_{ADV} COMP you buy-PERF
 (de-hua) jiu hui yong t_i
 IF then will use

‘What is the thing *x* such that you will use *x* if you buy *x*?’

•(Hsieh 2005, 3)

The above examples show that complementizers such as *shuo*, *kong*, and *khuann* can appear before the IP. Therefore, Chinese CP in fact appears in both the CP-initial and the CP-final positions.

A relative clause such as (25) is considered head-final because the element *de*, which is analyzed as a complementizer under the Government and Binding Theory, appears in the final position (Cheng 1986, Chiu 1993, Ning 1993, among others). With this analysis, the relative clause is a CP and *de* occupies the C position. *De* then selects an IP as its complement to the left. Nevertheless, as will be shown in the later chapters, *de* is not a complementizer and the relative clause is in fact head-initial, paralleling other phrasal categories in Chinese.

With regard to sentences with sentence-final particles, there are six of them as argued by Li and Thompson (1981):

(33) a. le: ‘currently relevant state’

ta chu-qu mai tongxi le
 he exit-go buy thing SFP
 ‘He’s gone shopping.’

b. ne: 'response to expectation'

ta hen kaixin ne
 he very happy SFP
 'He's very happy.'¹²

c. ba: 'solicit agreement'

women zou ba
 we go SFP
 'Let's go!'

d. ou: 'friendly warning'

xiaoxin ou
 careful SFP
 'Be careful, OK?'

e. a/ya: 'reduce forcefulness'

shei a/ya?
 who SFP
 'Who is it?'

f. ma: 'question'

ni hao ma?
 you good SFP
 'How are you?'

(Li & Thompson 1981:238-313)

As shown above, SFPs themselves do not have a denotative or referential meaning. Rather, they are used to express the mood or force of the sentence (Sybesma 1998). For instance, *le* shown in (33a) has a communicative function of signaling 'currently relevant state', as

¹² The scenario of this sentence, according to Li & Thompson, is 'in response to a person's observation that a friend does not appear to be too disturbed by an accident' (p.304).

argued by Li and Thompson. To complicate things more, ‘currently relevant state’ is further grouped into five categories where the mood of a sentence:

- (34) a. is a changed state
- b. corrects a wrong assumption
- c. reports progress so far
- d. determines what will happen next
- e. is the speaker’s total contribution to the conversation at that point

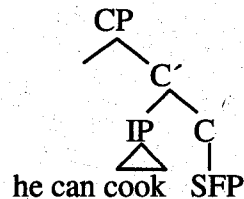
(Li & Thompson 1981:238)

The complicated semantic and pragmatic functions of *le* are also seen in other SFPs.

SFPs have been analyzed as complementizers, occupying the C position (Tang 1989).

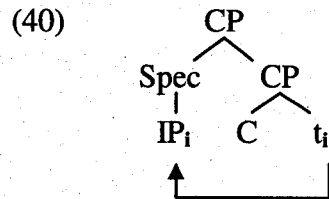
The structure is given below:

- (35) Ta hui zhu-fan **ma?**
 he can cook-rice SFP
 ‘Can he cook?’



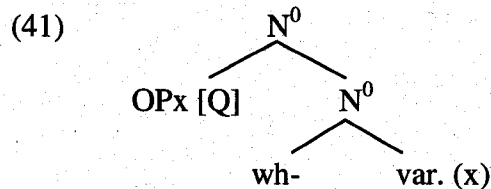
As shown in (35), the SFP *ma* occupies the C position, and selects an IP as its complement to the left. Consequently, CP is considered head-final in Chinese. However, the view of the head-final CP faces challenges in the literature (Sybesma 1999; Wu 2000; Hsieh 2005, among others). Wu (2000), for instance, argues that the question SFP *ma* as shown in (26b) can also be found in other head-initial languages such as English and Thai. Examples are given below:

- (36) She left, **right?**



(Sybesma 1999: 281)

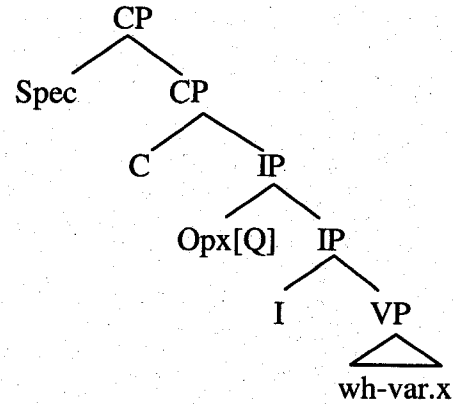
Sybesma argues that a question-sentence-final particle such as *ne* occupies the C position (like *wh*-words) so that the clause can be typed (i.e. into an interrogative sentence), following Cheng (1991). In English, a *wh*-word is assumed to contain a variable which is bound by a question operator, forming a chain. This chain is then adjoined to a head or a maximum projection, as illustrated below:



(Sybesma 1999: 284)

Similar to English, *wh*-words in Chinese are analyzed as variables and bound by a question operator (Tsai 1994). Nevertheless, unlike English where the variable is bound within the word itself, Tsai argues that the variable in Chinese is bound at the phrase level. For Tsai, the operator is base-generated under C^0 , and then moved to the Spec CP to check the Q features, so that *wh*-words can remain *in situ* in Chinese. However, Sybesma argues that the operator is generated under I^0 , and adjoined to the Spec IP. The CP structure (before derivation) proposed by Sybesma is given below:

- (42) Ni chi-le sheme
 You eat-ASP what
 'What did you eat?'



(Sybesma 1999: 286)

As a result, the IP is the minimal domain containing both the Q-operator and the *wh*-variable. This is contrast to English, whose minimal domain is within the *wh*-word itself. The difference between English and Chinese is thus accounted for—in the former, only the *wh*-word is moved to the Spec CP to check Q-features, but in the latter, the whole IP must be moved.

One of the potential problems with Sybesma's analysis, as noted by himself, is that not all sentence final particles are *wh*-words as shown in (33). Only question particles, such as *ne* and *ma*, are likely to be involved with *wh*-movement. Another problem pointed out by Hsieh (2005) is the movement of the IP (the complement of CP) to Spec CP. This movement is arguably 'too local' based on Abels' (2003) Antilocality constraint. I will provide an alternative solution in Chapter 5.

3.2.2 Head-initial NP

Chinese NPs are usually treated as strictly head-final in the literature. It might result from the observation that the noun always appears in the final position of an NP. Examples taken from Li and Thompson (1981) are shown below:

(43) Classifier/measure phrases

san ge ren
 three CL person
 'three people'

(44) Associative phrases¹³

a. wo de chenshan
 I GEN shirt
 'my shirt'

b. Zhongguo de renkou
 China ASSOC population
 'China's population/the population of China'

(45) Modifying phrases

a. relative clauses¹⁴

[Zhangsan mai de] qiche
 Zhangsan buy NOM car
 'The car that Zhangsan bought'

b. attributive adjectives

ta shi yi ge hao ren
 3sg be one CL good person
 'S/he is a good person.'

(Li and Thompson 1981: 104-117)

The associative phrase (i.e. the possessive phrase) shown in (44b) and the relative clause shown in (45) are two structures that have been taken as strong evidence supporting the head-final NP account.

¹³ Li and Thompson categorize associative phrases into two types. One is genitive (GEN) phrases, and another one is associative (ASSOC) phrases.

¹⁴ NOM: nominalizer. For Li and Thompson, *de* is involved in a nominalization in which a verb, a verb phrase, a sentence, or a portion of a sentence including the verb can function like a noun phrase (p.573).

However, the argument that NPs are always head-final in Chinese is challenged by Tsai (2003). He takes the position that the head-parameter setting is shifted from head-final to head-first, following Mei (1991) and Huang (1995). Specifically, he argues that Chinese NPs are not consistently head-final based on the behaviour of the NP with measure words.

It has been argued in the literature that there are two types of classifiers in Chinese (Cheng and Sybesma 1999; Li 1999):

(46) Classifiers

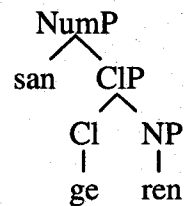
san ge ren
three CL person
'three persons'

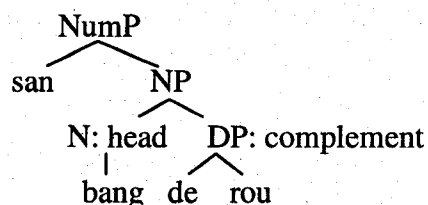
(47) Measure words

san bang (de) rou
three pounds DE meat
'three pounds of meat'

Tsai argues that the *de facto* head of (46) is *ge* which denotes individuals, while *bang* 'pounds' is the head of (47) which denotes quantities. Their structures are shown in the following diagrams:

(48) Individual denoting classifiers:



(49) Quantities denoting measure words:

(Tsai 2003: 10)

Tsai argues that the classifier shown in (46) is a functional category, 'individuating a mass denotation into countable atoms or minimal parts' (p. 10). On the other hand, the measure word shown in (47) is a lexical category expressing quantities or amounts in relation to measurement. Paralleling the head-initial CIP in (46), Tsai argues that the measure word *bang* heads the NP and takes the DP as its complement¹⁵.

One piece of evidence supporting the distinction between individual-denoting and quantity-denoting is taken from the distribution of demonstratives in Chinese. There are two types of demonstratives: one is contrastive while the other is appositive. Examples are shown below:

(50) Contrastive demonstrative:

wo yao jian **na**-ge Akiu, bu shi zhe-ge Akiu.
 I want meet that-CL Akiu not be this-CL Akiu
 'I want to meet that Akiu¹⁶, not this Akiu.'

(51) Appositive demonstrative:

Jiao **na**-ge Akiu lai zher!
 ask that-CL Akiu come here
 'Ask that Akiu to come here.'

(Tsai 2003: 11)

¹⁵ Tsai adopts Simpson's proposal according to which *de* is a bleached determiner heading the DP. The detailed discussion of Simpson's (2001) work is provided in the next chapter.

¹⁶ Akiu: a Chinese name.

Tsai argues that there is no such notion as ‘this quantity’ vs. ‘that quantity’ in a quantity-denoting NP; therefore it is predicted that such an NP cannot take a contrastive demonstrative. This argument is borne out by the following examples:

- (52) a. wo zuotian mai-le san **dai** mi.
 I yesterday buy-Prf three bag rice
 ‘I bought three (specific) bags of rice yesterday.’ (denoting individuals)

- b. wo zuotian mai-le san **dai** (de) mi.
 I yesterday buy-Prf three bag DE rice
 ‘I bought (the amount of) three bags of rice yesterday.’ (denoting quantities)

(Tsai 2003: 11)

According to Tsai, *dai* ‘bag’ in (52a) is a classifier denoting the specific reading. In contrast, it is a measure word in (52b), resulting in the amount reading. The same distinction can also be shown below.

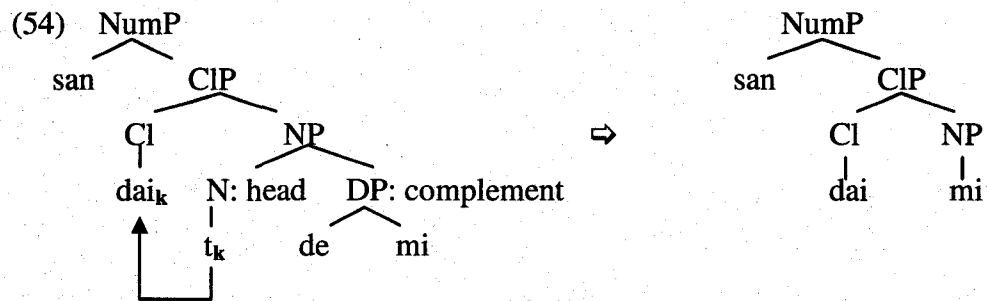
- (53) a. wo yao na san dai mi.
 I want that three bag rice
 ‘I want those three bags of rice.’ (individuals → contrastive)

- b. wo yao na san dai (de) mi.
 I want that three bag DE rice
 ‘I want that rice, the amount of which is three bags.’
 (quantities → appositive)

(Tsai 2003: 11)

Tsai argues that only the demonstrative in (53a) has the contrastive reading. The demonstrative in (53b), in contrast, has only the appositive reading. Moreover, Tsai claims that it is likely that measure words such as *dai* ‘bag’ are ‘on the fly to their true

classifierhood' (p.11). As shown below, *dai* is raised to the classifier head when it becomes a classifier:



(Tsai 2003: 12)

In summary, there are two types of classifiers available in Chinese. It is generally accepted that the first type of classifiers should be analyzed as a functional category, heading the CIP. With regard to the second type of classifiers, namely, measure words, Tsai argues that they should be treated as lexical categories heading the NP. The differences between classifiers and measure words lie in their semantic interpretations—the former has an individual reading while the latter expresses quantities or amounts. Finally, for measure words which also function like classifiers, Tsai argues that structurally, they are raised from the head of the NP to that of the CIP.

4. Conclusion

In this chapter, I discussed the issues of Chinese word order based on the studies conducted in the word order typology and the parametric theory. Under Greenberg's analysis, Chinese is a VO language. However, the word-order patterns found in Chinese are ambiguous between those of a VO language and an OV language. Li and Thompson (1974, 1975) argue that Chinese has been undergoing a process of changing from a VO to an OV language. Therefore it exhibits the features of both languages. The evidence put forward by Li and Thompson includes the position of prepositions and the emergence of *ba*-construction. However, Li and Thompson's proposal is challenged by Sun and Givón (1985) and Sun (1996). They show that preverbal prepositions in fact exist in Old Chinese. Moreover, *ba*-

construction is the replacement of the early *yi*-construction marking the syntactic object in Middle Chinese.

Studies conducted in the framework of the parametric theory are concerned with the directionality of headedness in Chinese. The head-final accounts are built on the argument that NP is strictly head-final. Consequently, all other phrasal categories should be head-final too. However, both Huang (1982) and Li's accounts seem to raise more problems in terms of explaining the 'exceptional' head-initial phrasal categories such as VP, PP and IP. The 'problematic' phrasal categories for head-initial accounts, in contrast, are CP and NP. In fact, not all CPs are head-final. As shown earlier, relative clauses and sentences with head-final particles are the only two constructions which are usually referred as head-final CPs. Sentences with head-final particles, as argued by Wu (2000) and Sybesma (1999), are not head-final CPs. With regard to NPs, Tsai (2003) claims that they are not consistently head-final as was previously believed. In this thesis, I will take the position that Chinese phrasal categories are consistently head-initial, providing evidence from the structure of relative clauses.

Chapter 3 Syntax of Chinese Relative Clauses

1. Introduction

The goal of this chapter is to provide the relevant background necessary to understand Chinese relative clauses. Specifically, I look at the following aspects:

- (i) The structure of Chinese relative clauses: The most salient feature of a Chinese relative clause is that it is prenominal, which is not expected in a VO language. The obligatory presence of the element *de* in forming a relative clause is another important characteristic. The peculiarity about *de* is that it is not a relative pronoun like *who/which* in English, and does not by itself add any descriptive content to the relative clause.
- (ii) The previous analyses of relative clauses in English: I will review two main analyses of relative clauses in the literature: the matching analysis (Chomsky 1977) and the promotion analysis (Schachter 1973; Vergnaud 1974; Kayne 1994). These two views differ in two important respects: in terms of structure and in terms of head movement (cf. Alexiadou et al 2000).
- (iii) The previous analyses of relative clauses in Chinese: I will review two proposals for relative clauses in Chinese. Aoun and Li (2003) argue for an adjunction structure while Simpson (1997, 2001) proposes a complementation structure.

2. The structure of relative clauses in Chinese

Chinese is a VO language like English. However, it has a pre-nominal relative clause structure which is typologically different from other VO languages. In this section, I look at this peculiar aspect from a typological perspective. I begin with a brief review of typological properties of relative clauses in general. It is followed by the summary of the status of Chinese relative clauses in typological studies in Section 2.1. In Section 2.2, I discuss the

distribution of the element *de*, which plays a crucial role in the structure of relative clauses in Chinese. The conclusion is presented in Section 2.3.

2.1 The typology of relative clauses

2.1.1 The semantics of relative clauses

A relative clause can be simply defined as a subordinate clause that modifies a noun. For instance, in the following sentence, the noun phrase *a man* is modified by the relative clause *who wears a hat*.

- (1) a man who wears a hat

Semantically, relative clauses can be categorized as the following three types depending on the semantic relation between the relative clause and the noun phrase (Grosu and Landman 1998):

- (2) Restrictive relative clauses:
My friend who graduated from MIT visited me yesterday.
- (3) Non-restrictive (appositive) relative clauses:
My friend, who graduated from MIT, visited me yesterday.
- (4) Maximalizing relative clauses¹⁷:
My friend spilled the water that there was in the glass.

In (2), the restrictive relative clause helps identifying the noun phrase it modifies. In other words, *my friend* is restricted to a specific friend who graduated from MIT. In contrast, the non-restrictive relative clause in (3) contributes to providing the information about the noun phrase, but it does not restrict the identity of the noun phrase. For instance, *my friend* can be any of my friends, who (by the way) graduated from MIT. Finally, in (4), the maximalizing relative clause does not modify the head (the water); rather, it refers to the amount of water.

¹⁷ Carlson (1977) calls them amount relative clauses and de Vries (2002) calls them degree relative clauses.

In fact, the head is interpreted inside the relative clause, where it shows a degree variable. A maximalization operation is applied to this type of relative clause (e.g. My friend spilled *all* the water).

With regard to Chinese, Chao (1968) indicates that the restrictiveness of a relative clause depends on the word order. For instance, a relative clause is restrictive when it precedes a demonstrative as shown in (5), but an appositive when it follows a demonstrative as in (6).

(5) **restrictive relative clause: RC¹⁸ + demonstrative**

[dai maozi] de ne-ge nanren
wear hat DE that-CL man
that man who wears a hat

(6) **non-restrictive relative clause: demonstrative + RC**

ne-ge [dai maozi] de nanren
that-CL wear hat DE man
that man, who wears a hat

Huang (1982) argues that the differences between a restrictive relative clause and an appositive relative clause can also be accounted for by scope modification. When the demonstrative is within the modification scope of the relative clause such as (5), it becomes anaphoric because its referential value is dependent on the c-commanding relative clause. The head noun is bound by the variable (the gap) in the relative clause. Consequently, the relative clause is restrictive. However, in (6), when the demonstrative is outside the modification scope of the relative clause, it is used deictically. It is because the demonstrative is not c-commanded by the relative clause. Under this condition, the head noun can refer to anyone in the discourse. Thus, the relative clause is appositive.¹⁹

¹⁸ RC: relative clause

¹⁹ Del Gobbo (in press) however argues that in Chinese, only restrictive relative clauses are available.

2.1.2 The patterns of relative clauses

Syntactically, there are four main types of relative clauses (de Vries, 2002). Their structures are shown below.

- (7) a. postnominal relatives [S-matrix ... [N RC] ...]
- b. prenominal relatives [S-matrix ... [RC N] ...]
- c. circumnominal relatives [S-matrix ... [[RC ... N ...]] ...]
- d. correlatives [S-matrix [RC (...) N ...] [S-matrix ... (Dem) ...]

(de Vries 2002, 20)

de Vries (2002) compiled typological data from 172 languages. He describes the following sample of patterns among relative clauses based on their parametric variation:

- (8) a. *kind of modification/relation*: restrictive, appositive, degree
- b. *hierarchical status of RC*: embedded within DP, correlative
- c. *presence of head*: headed/free relatives
- d. *presence of relative pronoun*: yes/no
- e. *presence of complementizer*: yes/no
- f. *presence of resumptive pronoun*: yes/no
- g. *hierarchical position of head*: externally/internally headed RCs
- h. *linear order of head and RC*: head initial/final relatives
- i. *inflectional completeness of RC*: finite/participial relatives
- j. *position of Det w.r.t. N and RC*: initial/middle/final
- k. *position of (Case) markers, if any*: on N, on N and RC

(de Vries 2002, 17)

As for the structure of relative clauses in Chinese, I summarize their properties according to the above parametric variation in the chart below (I skip the ones that do not apply to Chinese).

(9) Properties of Chinese relative clauses:

Parametric variation	Chinese
<i>kind of modification/relation</i>	restrictive, appositive
<i>presence of head</i>	headed ²⁰
<i>presence of relative pronoun</i>	no (but the presence of <i>de</i> is obligatory)
<i>presence of complementizer</i>	no
<i>presence of resumptive pronoun</i>	yes & no ²¹
<i>hierarchical position of head</i>	externally headed RCs
<i>linear order of head and RC</i>	head-final relatives (on the surface order)

The basic structure of relative clauses in Chinese can be summarized in (10).

(10) RC + *de* + Head Noun

That is, the relative clause in Chinese is pronominal (as opposed to English). The element *de* must be placed between the relative clause and the head noun.

2.1.3 The types of relative clauses

Gap vs. resumptive pronoun

Based on the nature of the relativization site (cf. Bianchi 2002), relative clauses can be classified into two types: those which contain a gap and those which contain a resumptive pronoun. Both types are available in Chinese. An example of the relative clause with a gap is shown below.

²⁰ The *shi...de* construction is arguably a headless relative clause. I will discuss this construction in the next section.

²¹ Some types of relative clause require resumptive pronouns. I will discuss the relevant examples later in the section.

- With a gap:

(11) Ta baifang t_i de ren_i
 he visit DE person
 ‘the person whom he visited’

The resumptive pronoun is required in the following types of relative clauses according to Li and Thompson (1981):

- With a resumptive pronoun:

Indirect object position

(12) wo song **gei** ***(ta)** yi-ben xiaoshuo de ren
 I give to he one-CL book DE person
 ‘the person to whom I gave a novel’

(Li and Thompson 1981, 584)

Following a coverb

(13) wo **gen** ***(tamen)** **da** qiu de yundong yuan
 I with they play ball DE exercise person
 ‘the athletes with whom I play ball’

(Li and Thompson 1981, 584)

The pivotal noun phrase position

(14) ni **qing** ***(ta)** **he** jiu de jiaoshou
 you invite him drink liquor DE professor
 ‘the professor whom you invited to drink’

(Li and Thompson 1981, 585)

The locative noun phrase position after *zai*:

- (15) Zhangsan **zai** ***(nar)** zhang da de cunzi
 Zhangsan at (there) grow big DE village
 ‘the village where Zhangsan grew up’

(Li and Thompson 1981, 584)

Argument gap vs. adjunct gap

Relative clauses with gaps can be further classified in terms of relativization strategies, namely, argument gap relative clauses and adjunct gap relative clauses. Examples are given in the following.

• *Argument gap relativization*

From the subject position:

- (16) t_i baifang ta de ren_i •
 visit he DE person
 ‘the person who visits him

From the object position:

- (17) ta baifang t_i de ren_i
 he visit DE person
 ‘the person whom he visits

• *Adjunct gap relativization*

Instrument:

- (18) ta xiuli che **de** **jiqi**
 he repair car DE machine
 ‘the machine with which he repairs the car’

(Li and Thompson 1981, 582)

Location:

- (19) ta kan-shu de fangjian
 he read-book DE room
 'the room where he reads books'

(Li and Thompson 1981, 582)

Time:

- (20) ta qu meiguo de shihou
 he went the States DE time
 'the time when he went to the States'

(Li and Thompson 1981, 583)

Reason:

- (21) ta qu meiguo de yuanyin
 he went the States DE reason
 'the reason why he went to the States'

(Li and Thompson 1981, 583)

Method:

- (22) ta xiu-che de fangfa
 he fix-car DE method
 'the way that he fixed the car'

(Li and Thompson 1981, 583)

In argument gap relativization, the gap in the relative clause which refers to the head noun, occupies the argument position (e.g. subject or direct object positions). However, in adjunct relativization, such a gap associated with the head noun is not seen because what is relativized is a PP or an AdvP. It is shown clearly in (23), the non-relative counterpart of (22), that the head noun is in fact the object of the preposition *with*.

- (23) ta yong na fangfa xiu che
 he with that method fix car
 ‘He fixed the car with that method.’

Gapless relative clauses vs. noun complement clause

Tsai (1992) refers to the following relative clause which does not contain any gap as a gapless relative clause:

- (24) ta chang ge de shengyin
 he sing song DE voice
 ‘the voice in which he sang the song’

(taken from Ning 1993, 97)

Another example is given by Aoun and Li (2003).

- (25) zhe jiu shi [[ta kao-shi de] jieguo]
 this exactly is he take-exam DE result
 ‘This is the result of his exam-taking.’

(Aoun and Li 2003, 186)

Aoun and Li (2003) argue that the structure of gapless relative clauses is similar to the English construction [Head noun + preposition + XP (a PP)] as in [*the result [of his exam-taking]*]. In other words, the head noun is related to the whole PP, not just a part of the PP. Therefore, the sentence in (24) can also be treated as *the voice of his singing*.

There is another construction which bears great resemblance to the relative clause construction on the surface. An example is shown below.

- (26) [women xiu hui de] tiyi
 we adjourn meeting DE motion
 ‘The motion that we adjourn the meeting’

(Li and Thompson 1981, 584)

Li and Thompson (1981) argue that the head noun of this type of construction, usually abstract, is associated with the entire relative clause, rather than any specific position within the relative clause. They refer it as a noun complement clause. It is clear that a noun complement clause such as (26) is different from the English construction [Head noun + preposition + XP (a PP)] (i.e. gapless relative clauses such as (25)). For instance, *the motion that we adjourn the meeting* cannot be treated as *the motion of our adjourning the meeting*.

Cha (1998) proposes a number of diagnoses tests to distinguish gapless relative clauses from noun complement clauses for Korean. He shows that an unbounded dependency construction is allowed in gapless relative clauses, but not in noun complement clauses. For instance, in a gapless relative clause as (27), the head noun *the smell* is still related to the clause *fish burning*, but not Susie's believing, after the attitude clause such as *Susie believe* is inserted.

(27) **The smell** which [Susie believes] comes from **fish burning**

(Cha 1998, 4)

However, in a noun complement clause such as (28), after *Susie believes* is inserted, the head noun *the fact* is related to *Susie believes*, rather than the original clause *John was late*.

(28) **The fact** that [Susie believes] that John was late

(Cha 1998, 4)

I adopt the above test to distinguish gapless relative clauses from noun complement clauses for Chinese in the following.

(29) **gapless relative clause:**

[Wo suo	xiangxin]	de	ta	chang ge	de	shengyin
I	SUO ²²	believe	DE	he	sing song	DE voice

'the voice which I believe is from his singing'

²² SUO is an element that optionally appears in the relative clause construction.

(30) **noun complement clause**

[wo suo xiangsin] de women xiu hui de tiyi
 I SUO believe DE we adjourn meeting DE motion
 'I believe the motion that we adjourn the meeting'

In (29), the gapless relative clause, the head noun *the voice* is related to *from his singing* whereas in the noun complement clause in (30), the head noun *the motion* is related to *I believe* as Cha predicts.

The types of relative clauses in Chinese discussed above are summarized in the chart below.

(31)

Types of relative clauses	Contains a gap inside the relative clause
argument gap relativization	Yes
adjunct gap relativization	Yes
relative clauses with resumptive pronouns	No
gapless relative clauses	No

In this thesis, I will concentrate on the syntactic structure of restrictive relative clauses containing a gap, namely, argument gap relative clauses and adjunct gap relative clauses. I will not discuss other types of relative clauses such as relative clauses with resumptive pronouns and gapless relative clauses. In the following section, I begin with a discussion of the distribution of the element *de*. As mention earlier, the presence of *de* is obligatory in forming a relative clause and it does not add on any interpretations to a relative clause.²³ As will be seen in the proposal, *de* plays a crucial role in analyzing the structure of relative clauses in Chinese.

²³ Despite that *de* does not add on any interpretations to the relative clause (or any phrase that it co-occurs with), it arguably has the semantic content in its lexical properties. I will return to this point in the next chapter.

2.2 The distribution of *de*

De has received much attention from Chinese linguists because of its wide distribution. In his descriptive account of the Chinese language, Chao (1968) lists as many as 19 constructions where *de* is used to introduce the modifier. These constructions are classified into the following three categories:

(32) Chao's classification of *de*:

Type 1: Nominal expressions with a nominal head: X de N (X: N, A, V, P, clause)

a) wo de mama (N *de* N)

I DE mother

'my mother'

b) da de guojia (A *de* N)

big DE country

'big country'

c) lai de ren (V *de* N)

come DE person

'the person who came'

d) wu-li de ren (P *de* N)

house-inside DE person

'the people who are in the house'

d) wo xie de xien (clause *de* N)

I write DE letter

'the letter that I wrote'

Type 2: Nominalizer without a following head: X de

a) ta shi cong chongguo lai de
 he is from China come DE
 'He is a man who comes from China'

b) zuo-fan de
 cook-rice DE
 'a cook'

c) wo shi zuotian qiu kanxi de
 I is yesterday go see-play DE
 'It was yesterday that I went to see a play.'

3. Adverbial: X de V

a) manman de zou
 slowly DE walk
 'walk good and slow'

b) yung-xin de
 use-mind DE
 'use mind, to be careful'

(Chao 1968, 289-300)

In this thesis, I only focus on the first type of *de*, which appears in the following phrase categories:

- (33) Possessive
 Wo de yifu
 I DE clothes
 'my clothes'

(34) Adjective phrase

meili de hua
 beautiful DE flower
 ‘beautiful flower’

(35) Relative clause (including V *de* N, P *de* N and clause *de* N)

Lisi xihuan de shu
 Lisi like DE book
 ‘the book which Lisi likes’

This type of *de* has received different treatments in the literature. They are summarized in the following chart:

(36) The treatments of *de*

Structure	Different <i>de</i> 's	Unified <i>de</i>
N <i>de</i> N (e.g. possessive phrase)	• association marker (Li & Thompson 1981) • Case marker (Li 1990)	• prenominal modification marker/subordination marker (Huang 1982)
A <i>de</i> N (e.g. adjective phrase)	• modification marker (Li & Thompson 1981)	• modification marker (Ross 1983)
clause <i>de</i> N (e.g. relative clause)	• nominalization marker (Li & Thompson 1981) • complementizer (Cheng 1986)	• NP clitic (C. Huang 1989) • determiner (Simpson 2001) • linker (Den Dikken & Singhapreecha 2004) • modification marker (Rubin, in prep.)

As shown in the chart above, some linguists analyze *de* differently depending on its distribution whereas other linguists argue for a unified analysis for *de*. In this thesis, I will

follow the latter position, arguing that there is only one *de* in (33)-(35). Moreover, while most studies of *de* are concerned about its syntactic status, I will also examine *de* from a prosodic perspective. The syntactic status of *de* will be discussed in Sections 4 and Section 5. The prosodic status of *de* will be presented in Chapter 5.

2.3 Summary

In this section, I first introduced the structure of Chinese relative clauses from a typological perspective. That is, Chinese has a prenominal relative clause, and the presence of the element *de* is obligatory. With regard to the types of relativization, I showed that there are four types of relative clauses in Chinese. In an argument gap relative clause, the gap which refers to the head noun, occupies the argument position (e.g. subject or direct object positions). However, in an adjunct gap relative clause, the gap associated with the head noun is not seen because what is relativized is a PP or an AdvP. The third type of relativization involves a resumptive pronoun that occurs in positions such as indirect objects in the relative clause. In contrast to the relative clause which contains a gap, gapless relative clauses are also possible in Chinese. I also summarized the distribution of the element *de*, which plays an important role in the structure of relative clauses. In the following sections, I first review the analyses of relative clauses in English (Section 3). It is followed by a discussion of the analyses for relative clauses in Chinese (Section 4).

3. Previous analyses of relative clauses in English

There are two main proposals in analyzing relative clauses (for English): the matching analysis (Chomsky 1977), on the one hand, and the promotion analysis (Schachter 1973; Vergnaud 1974; Kayne 1994), on the other. These two views differ in two important respects: in terms of structure and in terms of head movement (cf. Alexiadou et al 2000). Structurally, the traditional view about relative clauses is that they are CP adjoined to NP (Chomsky 1977). On the other hand, based on earlier proposals, Kayne (1994) argues instead that a relative clause is the complement of the determiner head (D) of DP. In terms of head movement, the traditional view is that the head NP is base-generated (the matching analysis), whereas, according to the promotion analysis, the head NP is raised from inside the relative clause.

Traditionally, the matching analysis goes hand in hand with the adjunction structure whereas the promotion analysis goes with the complementation structure. However, these can be independent issues. For instance, in an earlier version of the promotion analysis (e.g. Vergnaud 1985), relative clauses are regarded as adjuncts, but the head is raised from inside the relative clauses. Similarly, Smith (1964) argues that the head noun is based-generated, but it is the determiner (in the matrix clause) which selects the relative clause (see the detail in de Vries, 2002). Accordingly, we have the following logical possibilities based on the combinations of structure and head movement:

(37) **Four logical possibilities:**

	Head raising	Head base-generated
Adjunct	Vergnaud (1985)	Chomsky (1977)
Complement	Kayne (1994)	Smith (1964)

Previous studies show that relative clauses should receive only one of the above four analyses. However, in the recent literature, researchers argue that more than one strategy might be needed even in one language (Sauerland 1998; Bhatt 2002; Aoun and Li 2003). For instance, Aoun and Li (2003) argue that relative clauses in Chinese have an adjunction structure but that two types of relative clauses exist—one receives a promotion analysis (head-raising) and one a matching analysis (head base-generated).

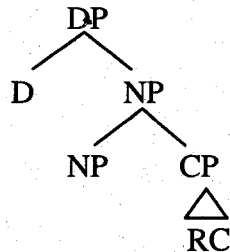
In the following, I will review the matching analysis based on Chomsky (1977), and the promotion analysis based on Kayne (1944) because they are the most relevant accounts of relative clauses for this thesis. These two accounts are discussed in terms of the structure of the relative clause (Section 3.1) and the derivation of the head (Section 3.2).

3.1 Adjunction structure versus complementation structure

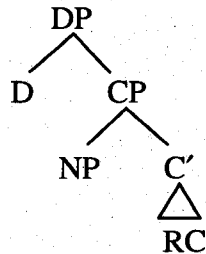
The first difference between the matching analysis and the promotion analysis is on the modification relationship between the relative clause and the relativized category (e.g. DP/NP) that contains it. On the adjunction structure view (Chomsky 1977), a relative clause is a CP adjoined to the head noun. The head noun in turn is selected by an external

determiner (i.e. D). However, in the complementation structure, relative clauses are complements of the determiner head of DP. The syntactic representations of the matching analysis and the promotion analysis are shown in (38) and (39) respectively.

(38) adjunction structure



(39) complementation structure



The matching analysis is based on the assumption that a relative clause is a modifier adjoined to a higher projection as seen in (38). However, as de Vries (2002) points out, in a restrictive relative clause such as (40), the relative clause is not simply a modifier of the head noun. It also restricts the meaning of the head noun (thus the relative clause cannot be optional).

(40) I hate men who drive cars.

(de Vries 2002, 71)

This is in fact the position taken by Kayne (1994), who argues that relative clauses should receive a complementation analysis. That is, the relative clause is the complement of the head (D) of the determiner phrase. Arguments supporting this view in the literature are summarized below.

First, there is a selection relation between D and CP. D and CP must co-occur in the following examples.

- (41) a. *the Paris
b. the Paris that I knew

(Vergnaud 1974, 265)

- (42) a. *the three books of John's
b. the three books of John's that I read

(Kayne 1994, 86)

Aoun and Li (2003) also points out that D is required with the presence of a relative CP in sentences such as (43).

- (43) a. *He is an [[actor that wants to do everything] and [producer that wants to please everyone]].
b. He is [[an actor that wants to do everything] and [a producer that wants to please everyone]].

(Aoun & Li 2003, 101)

Based on these examples, relative clauses are argued to have a complement structure, rather than an adjunct structure.²⁴ In the following, I will turn to the derivation of the head noun.

²⁴ It is noted that in the complementation structure, the definite determiner *the*, structurally, is outside the relative clause. The evidence is from the existential *there* construction given below.

- (i) a. *There were *the* men in the garden.
b. *The* men that there were *t* in the garden were all diplomats.

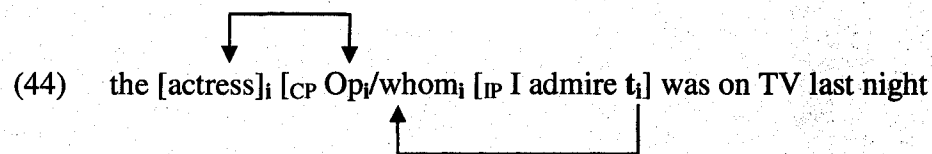
(Bianchi 1999, 43)

(ia) shows that the definite noun phrase is not allowed. Therefore, the trace in the relative clause of (ib) should be indefinite. In other words, what is relativized, at least for Kayne, is an NP.

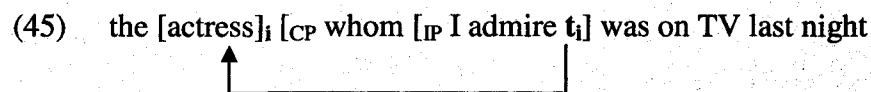
3.2 The derivation of the head: head-movement vs. base-generation

In addition to their different treatments of the modification relationship between the relative clause and the head noun, the matching analysis and the promotion analysis also differ with respect to the derivation of the head noun.

In the matching analysis, Chomsky (1977) argues that the derivation of relative clauses is similar to that of *wh*-interrogatives. Relative clauses are treated as CPs adjoined to the head noun they modify, with an operator element raised from inside the relative clause to the specifier CP position. This element can be an overt such as a relative pronoun, or it can be non-overt (i.e. an empty operator). Moreover, there is a matching relation between an empty operator/a relative pronoun and the head, as shown in (44).



In contrast, the head is raised from inside the relative clause in the promotion analysis. The structure is shown in (45).



The evidence supporting the promotion analysis is the observation that the head can (sometimes) be interpreted inside the relative clause, yielding reconstruction effects. This supports the view that the head is derived via movement. Reconstruction effects can be observed in terms of idiom chunks, binding properties and scope possibilities (Aoun and Li 2003).

In terms of idiom chunks, Schachter (1973) shows that the idiom *make headway* (that cannot normally be separated), is allowed to be split in a relative construction such as (46).

(46) The **headway** that Mel **made** was impressive.

(Schachter 1973, 31)

In (46), the head nominal *headway* is part of the external DP while *made* is the predicate inside of the CP (to make headway).

Reconstruction effects can also be observed in terms of binding possibilities. The following examples are taken from Schachter (1973).

- (47) a. John_i painted a flattering portrait of himself_i
 b. *Himself_i painted a flattering portrait of John_i.

(Schachter 1973, 32)

In (47), there is a binding relation between the reflexive *himself* and its antecedent *John*. That is, *himself* is c-commanded by *John*. (47b) is ungrammatical because *himself* cannot be c-commanded by *John* outside the binding domain.

Interestingly, (48a) is grammatical even though the reflexive is c-commanded by its antecedent outside the binding domain.

- (48) a. The portrait of himself_i that John_i painted is extremely flattering.
 b. *The portrait of John_i that himself_i painted is extremely flattering.

(Schachter 1973, 33)

This is the evidence for reconstruction effects. The head nominal *the portrait of himself* must have been raised from inside the relative clause so that *himself* can be bound by *John*. (48b) is ungrammatical because the reflexive *himself* is not c-commanded by the antecedent *John*.

The distribution of bound pronouns also exhibits reconstruction effects. This is illustrated in the following.

- (49) a. The picture of his_i mother that every student_i liked best was an old black and white.
 b. We admired the picture of his_i mother that every student_i painted in art class.

(Aoun & Li 2003, 99)

There is a binding relation between the bound pronoun *his* and its antecedent *every student* in (49a) and (49b). *The picture of his mother* must reconstruct so that *every student* can c-command *his*.

With respect to scope properties, reconstruction effects are also found in the following examples.

- (50) a. Every doctor will examine two patients.
 b. Every doctor will examine the two patients.
 c. I phoned the two patients that every doctor will examine tomorrow.

(Aoun & Li 2003, 98)

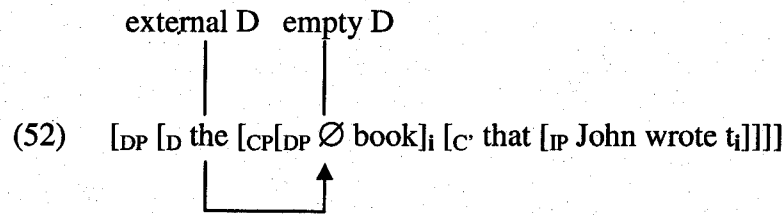
There are two possible readings for (50a). First, the object QP *two patients* can have a narrow scope interpretation over the subject QP *every doctor*. In other words, the number of patients is twice as many as doctors. Second, the subject QP *every doctor* can have a wide scope interpretation over the object QP *two patients*. As a result, only two patients will be examined by every doctor. However, only one reading is available for (50b)—only two patients will be examined by every doctor because of the presence of definite article *the*. It turns out that similar to (50a), a narrow scope reading can also be found in (50c) even though the definite article is present. This shows that the head is originated from inside the relative clause.

One of the problems in the promotion analysis, however, is the status of the moved element. For instance, Borsley (1997) argues that the moved element is a DP in contrast to Kayne's NP movement. Borsley's argument is based on the fact that the trace left behind by the moved element occupies an argument position. For instance, only a DP like *the apple* but not an NP *apple* can occupy an argument position as shown in (51).

- (51) *I ate apple.

Consequently, relativization in English involves DP movement rather than NP movement. Bianchi (2000) proposes a modification of Kayne's theory, arguing that the moved element is a DP with an empty D. In addition, there is an incorporation relation between the external

D, e.g. *the* in (52), and the head DP (with an empty D). This is achieved by incorporating the internal D to the external D. The empty D is first licensed by the external D, *the*, as shown in (52).



The external D can then be interpreted with the NP inside the head DP. Such incorporation is allowed because two Ds are adjacent to each other. As a result, the NP selected by the internal D (the empty D) has the same relation with the external D. In sum, in the promotion analysis, reconstruction effects are taken to be strong evidence in favor of the head movement analysis. However, the matching analysis is based on the assumption that reconstruction of the head is not available and the relative clause is an adjunct adjoined to the head.

As mentioned earlier, researchers have argued in recent literature that more than one strategy might be needed with regard to the derivation of the head noun, even within a single language. For instance, Aoun and Li (2003) propose that a language such as English can receive a complementation analysis but that two types of relative clauses exist—one receives a promotion analysis and one a matching analysis. The former analysis is adopted when a relative clause shows reconstruction effects as seen in (46) repeated in (53).

(53) The **headway** that Mel **made** was impressive.

In contrast, the matching analysis gives a more satisfying account when reconstruction effects are not available in a relative clause such as (54). Unlike (53) where *headway* is related to *made* inside the relative clause, the idiom chunk *the strings* is related to the verb *pull* in the main clause.

(54) John **pulled the strings** that got Bill the job.

According to Aoun and Li, an adjunction structure in Chinese is preferred and, similarly to English, relative clauses receive both a matching analysis (the head noun is base-generated) and a promotion analysis (the head is raised from inside the relative clause) depending on the presence of reconstruction effects. I will summarize their adjunction analysis for Chinese relativization in the following section.

4. Previous analyses of relative clauses in Chinese

In this section, I discuss two contrastive views of Chinese relative clauses built upon the two main approaches mentioned in the previous section. I begin with Aoun and Li's (2003) adjunction analysis in Section 4.1. It is followed by Simpson's (1997, 2001) complementation analysis in Section 4.2.

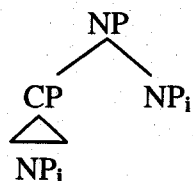
4.1 The adjunction analysis in Chinese: Aoun and Li (2003)

As discussed at the beginning of this chapter, Chinese is an SVO language like English, but has pre-nominal relative clauses as illustrated in (55).

- (55) wo kanjian de yenyuan.
 I saw DE actor
 'the actor that I saw.'

In contrast to their complementation analysis for English, Aoun and Li suggest that relative clauses in Chinese have the adjunction structure shown in (56); one that involves NP movement, rather than DP movement.

- (56) adjunction structure in Chinese



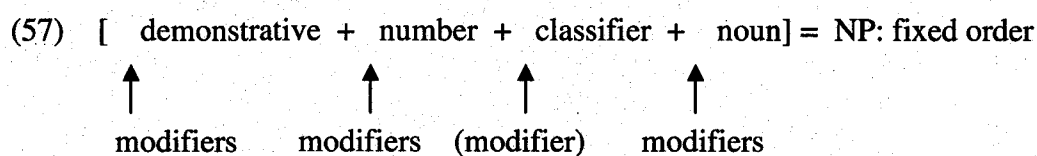
(Aoun & Li 2003, 157)

Aoun and Li argue that the difference between the adjunction analysis and the complementation analysis lies in the structure of relative clauses, namely, being head-initial in languages such as English, and being head-final in languages such as Chinese. With regard to the derivation of the head, Aoun and Li argue that both head base-generated and head-raising are possible depending on the availability of reconstruction effects.

The following subsections begin with a summary of Aoun and Li's evidence for the adjunction analysis in Section 4.1.1. The analysis of head base-generated clauses is shown in Section 4.1.2. Finally, I discuss Aoun and Li's proposal in Section 4.1.3.

4.1.1 Free ordering of modifiers

One piece of evidence that Aoun and Li put forward for the adjunction analysis is free ordering of modifiers, including adjectives and relative clauses.²⁵ Compared to the elements within a noun phrase that have a fixed ordering, modifiers can freely occur in various positions inside a noun phrase as illustrated in (57). *De* usually occurs immediately after modifiers—[modifier + *de* + NP].²⁶



(Aoun & Li 2003, 146)

Aoun and Li argue that free ordering can be expected if a relative clause, or an adjective with *de* (e.g. a reduced relative clause), is analyzed as an adjunct, that is, a sister of the modified element. They can freely adjoin to the heads they modify, for instance, before demonstratives, numbers or nouns.

Another piece of evidence for the adjunction analysis is that the ordering of relative clauses among themselves is free, as shown in (58):

²⁵ An adjective is regarded as a reduced relative clause when it occurs prenominally and behaves like a predicate according to Aoun & Li. A more detailed discussion of reduced relative clauses is shown in Section 3.3.2.

²⁶ As mentioned in the footnote (p.250), the status of *de* is still a matter of debate. Aoun and Li argue that *de* is not a functional category because it can form a constituent with the preceding XP as in the structure of [XP + *de* + NP]. I will discuss this view when reviewing the functional properties of *de* in next chapter.

- (58) a. wo kan-guo de [fang-zai ta jia de] shu.
 I see-ASP DE place-at he home DE book
 'books that are at his home that I have seen'

- b. [fang-zai ta jia de] wo kan-guo de shu.
 place-at he home DE I see-ASP DE book
 'books that I have seen that are at his home'

(Aoun & Li 2003, 150)

The relative clause [that are at his home] can be placed right before the head noun, as shown in (58a), or at the sentence initial position, as shown in (58b).

Another example showing that the free ordering between a relative clause and an adjective (not derived from a relative clause) is given in (59a).

- (59) a. wo kan-guo de zhuyao de xiangmu.
 I read-ASP²⁷ DE main DE item
 'the main items that I have read.'

- b. zhuyao de wo kan-guo de xiangmu.
 main DE I read-ASP DE item
 'the main items that I have read.'

(Aoun & Li 2003, 150)

The adjective *main*²⁸ can either follow the relative clause or precede the relative clause in (59b).²⁹

²⁷ ASP: aspect marker

²⁸ According to Aoun & Li, *zhuyao* (main) cannot be treated like a reduced relative clause because it does not function like a predicate.

²⁹ (59b) sounds odd to me as a native speaker of Chinese and other native speakers that I have consulted. My intuitions for such examples are confirmed by Li and Thompson's descriptive observations (1981)—according to them, all the elements in a noun phrase except the noun are optional. If more than one of these elements appear, their order is fixed based on one of the following schemas:

- i associative phrase + classifier/measure phrase + relative clause + adjective + noun
- ii associative phrase + relative clause + classifier/measure phrase + adjective + noun

Based on the above empirical evidence showing free ordering of relative clauses, Aoun and Li argue that relative clauses in Chinese have an adjunction structure.

4.1.2 The head base-generated analysis

In addition to the head-raising analysis, Aoun and Li argue that in the following types of relative clauses, the head can only be analyzed as base-generated.

Idioms

Reconstruction effects are not always available in idioms (compared to the examples in the previous section) such as (60).

- (60) ta laoshi ai **chi** [[rang ren shou-bu-liao de] **cu**].
 he always like eat let people receive-not-complete DE vinegar
 'Lit. He always likes to eat vinegar that cannot be put up with.'
 'He always likes to be jealous to such a degree that is beyond what can be put up with.'

(Aoun & Li 2003, 139)

In (60), *cu* (vinegar), part of the idiom *chi cu* (eat vinegar), can only be related to *chi* (eat) in the matrix verb position (as in *He pulled the strings that got him the job*).

Resumptive pronouns

As discussed in Section 2.3, there is a type of relative clause in Chinese which contains a resumptive pronoun. According to Aoun and Li, reconstruction effects are not possible with this type of relative clauses. That is, the head cannot be interpreted inside the relative clause. An example with an anaphor is given below.

In other words, *main* should have been placed in the position before a noun as in (59a), but not (59b) where it is separated from the noun *item* that it modifies. Therefore the word order between adjectives and relative clauses is not as free as Aoun and Li have claimed.

- (61) *wo xiang kan [[ni shuo meigeren_j hui dai ^{resumptive}ta_i]
 I want see you say everyone will bring him
 huilai de ziji_j de pengyou]_i]
 back DE self DE friend

‘I want to see self’s friend that you said that everyone would bring back.’

(Aoun & Li 2003, 169)

In (61), the fact that the head noun *self’s friend* cannot be bound by the QP *everyone* in the relative clause, shows that the head noun is not raised from inside the relative clause. Aoun and Li argue that the head noun and the resumptive pronoun are both based-generated as shown in the following schema.

- (62) [[CP.....pronoun_i...][Head_i]]

(Aoun & Li 2003, 171)

Adjunct relativization

As shown in Section 2.3, we do not see a gap associated with the head noun as in argument relativization because what is relativized is a PP or an AdvP. The example is repeated in (63).

- (63) ta xiu-che de fangfa
 he fix-car DE method
 ‘the way that he fixed the car’

(Li & Thompson 1981, 583)

It is shown clearly in (64), the non-relative counterpart of (63), that the head noun is in fact the object of the preposition *with*.

- (64) ta yong na fangfa xiu che
 he with that method fix car
 ‘He fixed the car with that method.’

Aoun and Li adopt Ning's (1993) proposal according to which adjunct relativization is derived by a null operator movement (Chomsky 1977). The operator, which equals the PP, is moved to the Spec Comp (of the relative clause) position. Like a wh-operator in English, there is an interpretative mechanism between the operator and the head noun. Therefore, for Ning (1993), the head noun in adjunct relativization is based-generated (not generated via movement). The structure of adjunction relativization showing the gap left by the operator is illustrated in (65):

$$(65) \quad [[_{CP} Op_i \quad [_{IP} \dots t_i \dots]] \quad Head_i]$$

(Aoun & Li, 174)

Based on the empirical evidence taken from idioms, resumptive pronouns and adjunct relativization, Aoun and Li argue that the use of a base-generated head is also possible in analyzing relative clauses in Chinese.

4.1.3 Discussion

I concur with Aoun and Li that relative clauses in Chinese should be treated as modifiers. However, in their adjunction structure, relative clauses are treated as head-final which is not consistent with other head-first phrase categories. With regard to the derivation, Aoun and Li adopt Kayne's (1994) Antisymmetry Theory according to which only left adjunction is allowed (recall that the relative clause in Chinese is adjoined to the head from the left). I will show in the following that such a derivation creates unnecessary complications.

Consequences of Kayne's Antisymmetry Theory

According to Kayne's (1994) Antisymmetry Theory, hierarchical structure should accord with linear word order. This is expressed by the Linear Correspondence Axiom (LCA):

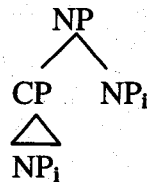
- (66) Let X, Y be non-terminals and x, y terminals such that X dominates x and Y dominates y. Then if X asymmetrically c-commands Y, x precedes y.

(Kayne 1994, 31)

Under the LCA, right-adjunction is banned. Y can only precede X when Y asymmetrically c-commands X after it adjoins to X. The adjunction analysis of relativization in languages such as English is thus ruled out because relative clauses are right-adjoined to DPs.

Returning to Aoun and Li's proposal, it must be noted that the Chinese structure in (56), repeated here in (67), is compatible with Kayne's theory because the relative clause is left-adjoined to the NP.

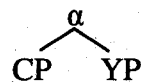
(67) adjunction structure in Chinese



(Aoun & Li 2003, 157)

However, in order for CP to appear on the left side, the NP cannot c-command the CP in (67) according to the Antisymmetry Theory (yet, in (67), CP c-commands NP but NP also c-commands CP). Following a definition of c-command incorporating the notion of segments (May 1985 and Chomsky 1986), Aoun and Li suggest that the CP is in fact not c-commanded by the NP because the NP is a two-segment NP. Under the notion of segment, the CP is not dominated by the NP because the CP is part of the NP (in sum, the dominance requirement for c-command is absent). Assuming this, the problem arises now is that the trace is not c-commanded by the NP. In order to solve the problem, Aoun and Li adopt the notion of *extension* (Chomsky 1995), suggesting that a sentence is built derivationally. That is, there is a stage before the tree structure in (67) as illustrated in (68).

(68)



(Aoun & Li 2003, 161)

At this point, α has not been labelled (in compliance with minimalist assumptions: Chomsky 2000). It will depend on whether CP or YP projects. If CP projects, YP is a complement. If YP projects, CP is an adjunct. Therefore, there is no distinction between CP and YP. CP can

be c-commanded by YP. Accordingly, the moved NP can c-command its trace in the CP at this stage but not in the later stage when labels have been added as seen in (67). As Aoun and Li conclude: 'this allows the Antisymmetry approach to linearization to remain intact but, at the same time, movement is licit' (p.162)

Aoun and Li's solutions seemingly resolve the problems of illicit movement within the framework of Kayne's Antisymmetry Theory. However, the added assumptions are unfortunate since they create unnecessary complications. But more importantly, the structure for Chinese relative clauses that Aoun and Li propose creates a head-final phrase category for Chinese. This is not only inconsistent with other head-initial phrase categories in that language, but it is also in contradiction with Kayne's very own head-initial principle underlying every language. Even if one rejects Kayne's hypothesis/generalization either on theoretical or empirical grounds, the fact remains that apart from RCs, Chinese categories are all head-first.

To summarize, Aoun and Li argue that relative clauses in Chinese have an adjunction structure. Their evidence is drawn from free ordering of relative clauses. However, I showed that Aoun and Li's head-final hypothesis for relative clauses is not consistent with the head-initial pattern observed in other phrase categories in Chinese. Furthermore, in order to comply with Kayne's Antisymmetry Theory, Aoun and Li create unnecessary complexities in deriving relative clauses in Chinese. In the following, I will summarize Simpson's (1997, 2001) proposal according to which relative clauses in Chinese should receive a complementation analysis.

4.2 The complementation analysis: Simpson (1997, 2001)³⁰

Simpson (1997, 2001) argues that the category DP is available in Chinese and relative clauses should receive a complementation analysis based on Kayne (1994). Under the DP hypothesis, a relative clause is headed by the element *de*, which is treated as a determiner by Simpson. The head-initial DP is thus consistent with other head-initial phrase categories in Chinese. One of the major problems faced by the complementation analysis, however, is the

³⁰ The article in 1997 was collected in the book *On the Formal Way o Chinese Language* which was published in 2002.

The second form of encoding definiteness agreement is expressed through the co-occurrence of two sets of elements—adjectives with determiners, and determiners with nouns. Similarly, only definite determiners are allowed. An example from Modern Greek is shown in (71).

- (71) a. **to meghalo to ghermaniko to piano** (Modern Greek)
 the big the German the piano
 ‘The big German piano’

- b. ***ena meghalo to piano**
 a big the piano

(Simpson 2001, 128)

As mentioned earlier, agreement systems are in fact a doubling of information. Therefore, they are redundant and will decay eventually if not used for other functions. This is the position taken by Simpson—he argues that *de* is a determiner that loses its definiteness value over time. Like Spanish, determiners and demonstratives co-occur to encode definiteness agreement in Chinese. However, in Chinese, a determiner has a [-definite] feature (i.e. the demonstrative *that* alone can encode definiteness). This is illustrated in (72).

- (72) [ta mai] **de nei-ben-shu**
 He buy **DE that-CL-book**
 ‘that book he bought’

(Simpson 2001, 128)

Simpson puts forward another argument for the idea that *de* is a determiner with a [-definiteness] feature. That is, determiners are commonly argued to have developed from demonstratives through grammaticalization. A well-known example is French determiners *le* and *la* which are derived from the Latin demonstratives *il-le* and *il-la*. Simpson also speculates that *de* is originated from the classical Chinese element *zhi* because of their similar properties. Crucially, *zhi* is seen as a demonstrative in (73).

- (73) **zhi** er chong you he zhi³¹
 these two worms again what know
 ‘And what do these two worms know?’

(Zhangzi 1.10, cited by Simpson 2001: 134)

According to Greenberg (1978), determiners derived from demonstratives usually lose their definiteness feature. In addition, determiners will decay like agreement systems mentioned above if they do not develop other functions. *De*, as argued by Simpson, lost its definiteness in the process of grammaticalization. However, the element itself does not completely disappear, since it develops another function—it introduces some kind of predication on a nominal.

Having argued that *de* is a determiner that has a [-definiteness] feature and heads a DP, the immediate question that arises is why *de* always appears in the second position in the surface word order. Simpson argues that this problem can be solved if *de* is treated as an enclitic determiner which needs to attract elements (e.g. IP) to its left for phonological support. This is in fact a common phenomenon in languages such as Romanian. (74) is an example taken from Giusti (1997) by Simpson.

- (74) a. baiat_i-ul acesta frumos t_i (Romania)
 boy-the this nice
 ‘this nice boy’
- b. frumosi-ul t_i baiat
 nice-the boy
 ‘the nice boy’

(Simpson 2001, 128)

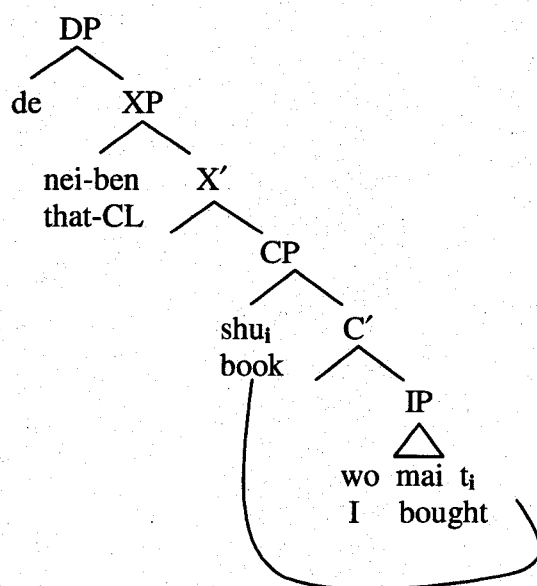
In (74), a noun and an adjective are attracted respectively for phonological support of the determiner *ul*. As seen earlier, *de* attracts elements such as IP, pronouns, adjectives or PP to

³¹ *Zhi* here (the last word) shares the same pronunciation/spelling as the target *zhi* (the first word). But they are totally different words.

de heads a DP, followed by numbers/demonstratives³³ and then relative clauses. Similar to the derivation proposed in English, relative clauses in Chinese are derived in the following two steps.

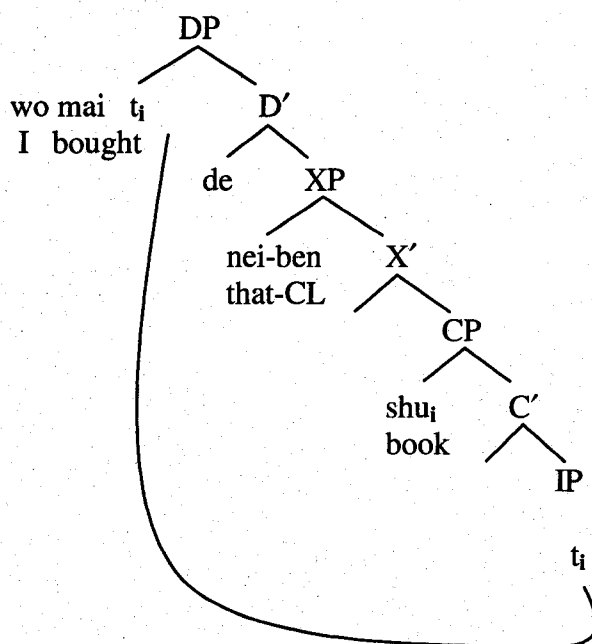
- (77) wo zuotian mai de nei-ben shu.
 I yesterday buy DE that-CL book
 'the book that I bought yesterday'

First step: the head noun is raised from the IP clause to the Spec CP due to reconstruction effects.



The second step: move the whole IP to the Spec DP. *De* behaves like an enclitic in languages like Romanian and enclitics tend to attract some elements (e.g. IP in Chinese) for phonological support.

³³ The order of the possible elements in a Chinese nominal: demonstrative + number + classifier + noun



To summarize, Simpson concludes that *de* is an enclitic determiner that has properties found in a number of languages. His argument of DP not only goes hand in hand with Kayne's theory of relativization, but also provides a unified headedness pattern in Chinese. This differs from previous views which treat relative clauses as exceptionally head-final among Chinese phrase categories.

4.2.3 Discussion

Simpson provides an interesting account from a cross-linguistic perspective, arguing that Chinese is no different from other languages in terms of the structure of DP. However, objections have been voiced in the literature, especially in the analysis of *de* as a determiner (Aoun & Li 2003; Tang 2005; Paul 2005; Sio 2006, among others). In addition, there are also questions about the structure of relative clauses, e.g. relative clauses vs. reduced relative clauses, and how the definiteness feature can be encoded if *de* has a [-definiteness] feature. I will discuss these problems in the following.

4.2.3.1 *De* as a determiner

One argument that *de* being a determiner is based on the similarities between *de* and the classical element *zhi* which carries the meaning of the demonstrative shown in (73), repeated in (78).

- (78) *zhi* *er* . *chong* you *he* *zhi*
 these two worms again what know
 ‘And what do these two worms know?’

(Zhangzi 1.10)

Tang (2005) points out that diachronically, *zhi* also behaves like a modification marker (rather than a demonstrative) and lacks (in)definiteness feature. Tang’s example taken from Zhangzi³⁴ is shown in (79).

- (79) [you *ren*] ***zhi*** *xing*, [wu *ren*] ***zhi*** *qing*
 have human **ZHI** appearance lack human **ZHI** feeling
 ‘(lit) with the form of a human being and yet without the substance of a human
 being’

(Tang 2005, 22)

Based on personal communication with Pei-chuan Wei who indicates that the non-demonstrative usage shown in (79) appears much later than the demonstrative usage of (78),³⁵ Tang casts doubts on Simpson’s argument according to which *de* is linked to the demonstrative *zhi* but not the non-demonstrative *zhi* diachronically (since the former in fact appears earlier than the latter). Moreover, it seems less convincing to argue that *de*, having a [-definiteness] feature, is not linked to the non-demonstrative *zhi* which synchronically seems to share more similar properties with *de*. Namely, it does not denote (in)definiteness and functions like a modification maker.

³⁴ It is the same author (Zhangzi) as Simpson’s example in (78), but these two sentences are quoted from different texts.

³⁵ Tang (2005) quotes Pei-chuan Wei who points out that the demonstrative usage of *zhi* only appears in oracle bone inscription. The case such as (78) is very rare (see Tang’s footnote 35).

4.2.3.2 Non-predicative attributing adjectives

In Chinese, a noun phrase can usually be modified by two types of adjective phrases: one with *de*, and one without. An example is illustrated in (80).

- (80) a. yi-ben hao shu
 one-CL good book
 ‘a good book’
- b. yi-ben hao de shu
 one-CL good DE book
 ‘a good book’

There has been disagreement on treating (80b) as a simple attributive adjective phrase, or a (reduced) relative clause (because of the presence of *de*) (Paul 2005, among others). Simpson takes the position that attributive adjectives (with *de*) can be analyzed as relative clauses. An example given by Simpson (2001) is shown below:

- (81) a. [DP de [CP [IP huaping lü]]]
 DE vase green
- b. [DP de [CP huaping_i [IP t_i lü]]]
 DE vase green
- c. [DP [IP t_i lü]_m [D de [CP huaping_i t_m]]]
 green DE vase

(Simpson 2001, 148)

In (81a), *de* heads a DP and takes a CP as its complement, following Kayne (1994). Similar to the two-step derivation shown in (77), the noun is first raised to the Spec CP in (81b). The remaining IP is moved to Spec DP because *de* requires some elements preceding it for phonological support. The underlying assumption of this view is that the adjective such as *lü*

(green) in (81) can function like a predicate. However, as Paul (2005) points out, there are many non-predicative adjectives that can only function like modifiers, but not predicates on their own.³⁶ Moreover, they can appear with or without *de*. An example is illustrated in (82).

- (82) benlai (de) yisi
 original DE meaning
 ‘the original meaning’

(Paul 2005, 5)

This amounts to saying that not every adjective phrase with *de* can be treated as a (reduced) relative clause. Paul (2005) therefore argues against Simpson’s proposal because it cannot explain modification (with or without *de*) that involves non-predicative adjectives (see more counter examples in Paul (2005)).

4.2.3.3 Definiteness encoding

The next issue that Simpson needs to deal with is how definiteness is encoded if *de* is assumed to have a [-definiteness] feature. Following Szabolcsi (1994), Simpson (1997) suggests that definiteness is the result of specification of a low position hosting demonstratives and certain quantifiers. Moreover, there is some sort of concord/agreement between the lower position (the demonstrative) and the determiner head (cf. Section 4.2.1). In Chinese, Simpson argues that it is the position where demonstratives and indefinite quantifiers occur that encodes the definiteness specification. For instance, Simpson suggests that it is the demonstrative and the numeral that encode the meaning of definiteness of the noun phrase in (83).

³⁶ One way to test a predicative adjective, indicated by Paul (2005) who adopts Paris (1979), is to see whether it goes with the structure of *shi....de* (is....DE) (cf. Section 2.2.1). For instance, *hao* (good) can be used with ‘*shi....de*’ in the following sentence.

- (i) na-ge-zhong shi hao de.
 that-CL-clock is good DE
 lit: that clock is good
 ‘that clock is working.’

- (83) a. wo de nei ben shu
 I DE that CL book
 ‘that book of mine’

- b. wo de liang ben shu
 I DE two CL book
 ‘two books of mine’

However, as shown in the previous section, modifiers are free to appear in various positions such as (84), where the demonstrative appears before *de*. In such cases, the encoding of definiteness can no longer be attributed to demonstratives/quantifiers in lower positions (see Sio (2006) for a similar argument).

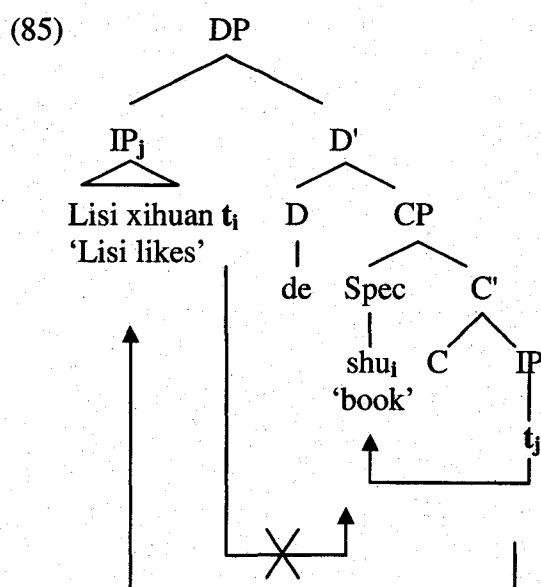
- (84) na ben wo de shu
 that CL I DE book
 ‘that book of mine’

In his later paper, Simpson (2001) only mentions that definiteness can be encoded through word order in Chinese, following Wu (1996). However, he does not provide further explanation of how definiteness is derived through word order.

4.2.3.4 Problems with the derivation

Recall that in Simpson’s proposal, a relative clause is derived in two steps. The first step is to raise the head noun from the IP clause to Spec CP (i.e. reconstruction effects). The second step involves the movement of the remaining IP to Spec DP. According to Simpson, the motivation behind the raising of the IP, is that *de* behaves like an enclitic in languages like Romanian. Enclitics tend to attract some elements (e.g. IP in Chinese) for phonological support. However, such an analysis raises a series of problems. First, under minimalist assumptions movement in the syntax must be triggered (an EPP feature on D could be postulated, but it would be *ad hoc*). Another problem is the fact that after the IP is raised to

Spec-DP, the trace of the nominal is no longer c-commanded by its antecedent (this is a well-known problem for this type of analysis). This problem is shown in the tree structure below.



⇒ the trace is not c-commanded by its antecedent after the IP is moved

Finally, it is more natural to think of the element *de* as the element that attaches to its host rather than the other way around. Being weak, *de* is the guest and it is the entity that goes to its host.

To summarize, Simpson's proposal provides a unified analysis with regard to the headedness in Chinese phrase categories. However, his analysis also raises several problems, including the status of *de*, the treatment of reduced relative clauses, definiteness encoding and the derivation. One of the important differences between the adjunction analysis and the complementation analysis is the treatment of the element *de*. In Aoun and Li's adjunction analysis, *de* is simply postulated as modification marker attached to the preceding XP, e.g. [XP *de* NP]. They do not provide any discussion with regard to the syntactic status of *de*. On the complementation view, in contrast, *de* is analyzed as a determiner heading a relative clause. However, as discussed earlier, this argument still remains controversial in the literature.

5. Conclusion

In this chapter, I first reviewed the structure of relative clauses in Chinese from a typological perspective and various types of relative clauses available in Chinese. I also illustrated the wide distribution of the element *de*. I then proceeded to the two main analyses of relative clauses in English, namely, the matching analysis and the promotion analysis. These two analyses have led to the development of the proposals for analyzing relative clauses in Chinese: the adjunction analysis and the complementation analysis. On the adjunction view, relative clauses are analyzed as modifiers and are exceptionally head-final among otherwise head-initial phrasal categories in Chinese. In contrast, the complementation analysis yields a desirable head-initial pattern for relative clauses, but it is problematic to generate a complement structure for relative clauses and treat *de* as a determiner.

In the next chapter, I present a proposal aiming at solving the problems raised by these analyses. I argue that *de* heads a modifier phrase, in the spirit of Rubin (in prep.), and takes an XP (e.g. IP, AP) as its complement. In deriving the surface word order, the head noun is raised from inside the relative clause and *de* is lowered to attach to a relevant phonological phrase—a movement operation at the syntax-phonology interface.

Chapter 4 Ordering at the Syntax-Phonology Interface

1. Introduction

In the previous chapter, I reviewed the two main analyses of relative clauses in Chinese. I also concluded that a correct analysis of relative clause in Chinese should include the following:

- (i) The phrase structure is head-initial in Chinese.
- (ii) The relative clauses are adjuncts in Chinese.

In this chapter, I put forward a proposal based on the above conditions, arguing that (i) relative clauses in Chinese receive a head-initial modifier phrase analysis, following Rubin (in prep.); (ii) *de* is a clitic-like element that lowers to the first relevant XP it finds, a special movement operation at the syntax-phonology interface.

This chapter proceeds as follows. In section 2, I review Rubin's (in prep.) proposal which provides an alternative analysis for the status of *de*. In section 3, I present the first part of the proposal based on Rubin's modifier phrase hypothesis. The second part of the proposal which shows that *de* is a clitic and undergoes a prosodically-conditioned movement will be discussed in the next chapter. I conclude in section 4.

2. An alternative analysis

2.1 The modifying *de*

Rubin's (in prep.) proposal is built upon the syntactic status of *de*. Therefore I will start with the review of the functional properties of *de*.

As mentioned in the previous chapter, the main concern of the present study is on Chao's (1968) first type of *de*, namely, nominal expressions with a nominal head, repeated below:

(1) *Possessive phrase*

Wo de yifu
 I DE clothes
 'my clothes'

(2) *Adjective phrase*

meili de hua
 beautiful DE flower
 'beautiful flower'

(3) *Relative clause* (including V de N, P de N and clause de N)

Lisi xihuan de shu
 Lisi like DE book
 'the book which Lisi likes'

The major issues concerning the syntactic status of *de* include the following: whether it is a functional category and if it is, what kind of functional category *de* is. In Aoun and Li's (2003) adjunction analysis, *de* is not considered as a functional category. The evidence is drawn from the following coordination sentence shows that *de* forms a constituent with the preceding XP:

(4) [Gontong de] erqie [meiren keyi dai hui-qu de] dongxi
 common DE and nobody can take back-go DE thing
 'things that are shared and nobody can take back'

(Aoun and Li 2003: 150)

Following Li and Thompson (1981), Aoun and Li (2003) argue that *de* is an associative marker which indicating some relation between the XP and the N in the structure of [XP *de* N] (p.250). *De* being an associative marker does not explain too much its syntactic status of *de*. Moreover, the fact that *de* can form a constituent with the preceding XP does not prevent it from being a functional category, as will be shown in Rubin's modifier phrase hypothesis.

In fact, there is little dispute in the literature with the analysis of *de* as a functional category (Li 1985; Tang 1990; Simpson 2001; Den Dikken and Singhapreecha 2004, Rubin (in prep.), among others). To support this view, Rubin (in prep.) examines Abney's (1987) definition of a functional category shown in (5):

(5) Characteristics of Functional Categories:

- a. Functional elements constitute closed lexical classes.
- b. Functional elements are generally phonologically and morphologically dependent. They are generally stressless, often clitics or affixes, and sometimes even phonologically null.
- c. Functional elements are usually inseparable from their complement.
- d. Functional elements lack "descriptive content". Their semantic contribution is second-order, regulating or contributing to the interpretation of their complement. They mark grammatical or relational features, rather than picking out a class of objects.

(Abney 1987:64-5)

In terms of the first characteristic, Rubin argues that it is not clear as to whether *de* constitutes closed lexical classes. However, as will be shown in the next chapter, *de* may form a closed class if it is considered as a clitic (van der Leeuw 1997). With respect to the second characteristics, Rubin suggests that *de* might not be a morphologically or phonologically dependent element such as clitics or affixes since words in Chinese are considered as independent morphemes. Nevertheless, some linguists argue that *de* behaves like a clitic since it cannot stand alone, e.g. it always attaches to the previous word/phrase (C. Huang 1989; Sun 2006). Moreover, in terms of intonation, *de* always receives a neutral tone which is only used in unstressed syllables. I will argue that *de* is in fact a clitic based on these prosodic properties in the next chapter. As for the third characteristics, *de* can be seen as a functional category because it always appears with a phrase (e.g. an NP), which is the complement of *de*, as I will show later. Finally, *de* does not add any descriptive content to the phrase/word it co-occurs with. It again coincides with another characteristic of a functional category that Abney argues.

With the idea of *de* being a functional category, let's now proceed to Rubin's modifier phrase hypothesis.

2.2 The modifier phrase hypothesis: Rubin (in prep.)

Rubin (in prep.) proposes a Modifier Phrase Hypothesis, aiming at providing a unified structure to heterogeneous categorization of modifiers as illustrated below.

- (6) a. ... the very young child ... (AP)
- b. ... the child playing checkers ... (VP)
- c. ... the child under the table ... (PP)
- ... the debate at noon ...
- d. ... these stone benches ... (NP)
- e. ... the book that you are holding ... (CP)
- ... a movie to see ...
- g. I certainly will think about it. (AdvP or AP)
- He often reads that magazine.
- John quickly learned Chinese.
- h. He left the stage shaking his head. (VP or SC)
- i. They will meet each other in a restaurant. (PP)
- They will meet each other in an hour.
- j. He left that day to seek his fortune. (NP)
- k. I'll leave when John arrives. (CP)
- l. ... unusually cold ... (AdvP or AP)
- ... precisely on time ...
- ... remarkably cleverly ...
- m. etc.

(Rubin, in prep. ch. 1, p.2)

The structure of the Modifier Phrase (ModP, henceforth) is shown in (7).

- (7) [ModP Mod [XP...]]

In (7), the head Mod selects an XP, which can be an AP, PP, NP, CP, VP, etc. Rubin further argues that the head Mod, which is a functional category like D, is null in languages like English as shown in (6). However, in other languages, Mod can be realized by independent words such as *de* in Chinese, or morphology such as attributive agreement in German. Examples are illustrated below.

- (8) Yi-zhi [ModP [AP xiao] de] gao (Chinese³⁷)
 One-CL small DE dog
 ‘one small dog’

- (9) a. Der Hund ist klein. (German)
 b. Der kleine Hund

(Rubin, in prep. ch. 2, p.3)

In (9a), the adjective is a predicate and there is no agreement marking in it. However, when *klein* is a modifier (attributive) as in (9b), morphology agreement is required in order to match to its related noun *hund*. Rubin argues that the differences between (9a) and (9b) can be accounted for by the Mod Hypothesis—when Mod selects the adjective, it agrees. In contrast, when Mod does not select the adjective, it does not agree.

2.2.1 The structure of modifier phrase in Chinese

Returning to Chinese, Rubin argues that the element *de* in Chinese is a functional category which heads a ModP. His evidence is drawn from the following distribution of *de*. First, when adjectives occur with *de*, they function like adverbs modifying the verb as shown in (10) (cf. Chapter 3: Section 2.2). In contrast, *de* is absent when the same adjectives appear in a non-modifier position. This is shown in (11).

³⁷ According to Rubin, ModP in Chinese is head-final. That is, *de* selects an XP to its left.

Adjectives:

- (10) a. Ni keyi [manman de] zou.
 you can slow DE walk
 'You can walk slowly.'

- b. Zhangsan [congming de] jiejie neige wenti.
 Zhangsan intelligent DE solve that-CL problem
 'Zhangsan will intelligently solve that problem.'

(Rubin, in prep. ch. 2, p.25)

- (11) a. Ni hen man.
 You very slow
 'You are slow.'

- b. Zhangsan zhen congming.
 Zhangsan really intelligent
 'Zhangsan is really intelligent.'

(Rubin, in prep. ch. 2, p.26)

With regard to prepositions, the presence of *de* (following the preposition) is compulsory when the preposition is in the modifier position as shown in (12). However, when the same preposition appears as a predicate in (13), *de* is absent.

Prepositions:

- (12) a. na yiben [zai zhuozi-shang] *(de) shu
 that one-CL at table-top DE book
 'that book (on the table)'
- b. zhexie [zai wuzi-li] *(de) zhanglang
 those-CL at house-inside DE cockroach(es)
 'those cockroaches (in the house)'

(Rubin, in prep. ch. 2, p.27)

- (13) a. Na yiben shu zai zhuozi-shang
 that one-CL book at table top
 ‘That book is on the table’

- b. Zhexie zhanglang zai wuzi-li
 those-CL cockroaches at house-inside
 ‘Those cockroaches are in the house.’

(Rubin, in prep. ch. 2, p.27)

Finally, *de* is compulsory after the relative clause as shown in (14a). *De* is not required in a similar clause shown in (14b).

- (14) a. [Ni zui xihuan *de*] neiben shu mai-wan le
 you most like DE that-CL book sell-out Perf
 ‘That book that you like most has been sold out.’

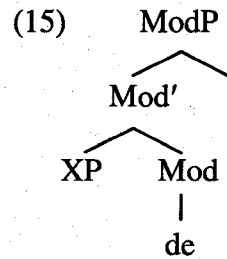
- b. Ni zui xihuan neiben shu
 you most like that-CL book
 ‘You like that book most.’

(Rubin, in prep. ch. 2, p.28)

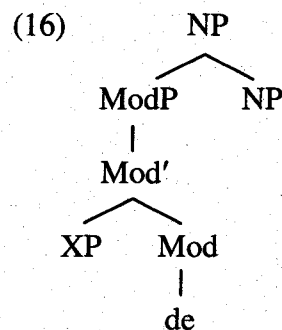
For Rubin, the above examples have clearly indicated that *de* is functional, rather than lexical because *de* always appears in the structures involving modification.

2.2.2 The derivation

According to Rubin, Chinese has the following modifier phrase structure:



In (15), *de* is the head of the ModP, and it selects an XP (can be AP, PP, or relative clause) to its left. Following the minimalist program (Chomsky 2001), Rubin analyzes ModP as an adjunct which is integrated into the tree by the operation of pair-merge. This is shown in (16).



The reason to apply the operation of pair-merge rather than set-merge to adjuncts, according to Chomsky, is to preserve strict cyclicity. In the operation of set-merge, two independent elements such as {a} and {book} are integrated to create a new set {a book}. This set can be merged with another set, thus creating the cyclicity of derivations. These derivations are constrained by c-commanding relations. The operation of set-merge cannot apply to adjuncts because adjuncts do not trigger Principle C effects (resulting from c-commanding relations) under reconstruction in sentences such as (17).

(17) [_{wh}- which [[_{NP} picture [of Bill_i]] [_{ADJ} that John_j liked]]] did he_{j/*i} buy t_{wh}.

After reconstruction, it would have been ungrammatical for *John*, which is embedded in the adjunct, to co-index with the pronoun *he* due to the c-commanding relation between them. One solution to preserve Condition C effects in (17) is to cancel the derivation when they are violated and insert adjuncts to the *wh*-phrase after it is raised to the initial position. This is clearly not desired for the notion of strict cyclicity. To solve this problem, Chomsky suggests

that pair-merge should be adopted because this operation involves a complex structure, e.g. {a, <good book>}, which is different from a simple structure created by set-merge, such as {a, book}. In this complex structure, the adjunction (good) will not change the properties of a NP (book), including c-commanding relations related to this NP. Nevertheless, c-commanding relations do not necessarily extend to the adjoined element. In short, only the simple structure induced by set-merge is constrained by c-commanding relations. The next question is how Narrow Syntax determines which operation to take (set-merge or pair merge) at the point of derivation (before merging an adjunct with another independent element). Rubin suggests that it is the head of ModP—Mod, which signals to Narrow Syntax to undergo pair-merge. Therefore, the mechanism which triggers the operation of pair-merge for Rubin is at the syntactic level.

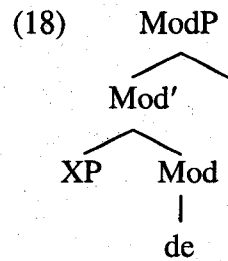
To summarize, Rubin proposes a new phrase category, namely ModP, in an attempt to unify heterogeneous categorization of modifiers. In the structure of a ModP, the head Mod selects an XP, which can be an AP, PP, IP, etc, as its complement. He further suggests that Mod, similar to D in the DP, is a functional head which establishes the modifying relation and invokes the operation of pair-merge. A ModP is adjoined to the noun phrase it modifies when the head signals to Narrow Syntax to carry out the operation of pair-merge.

2.2.3 Discussion

I would like to follow Rubin's Modifier Phrase Hypothesis in which *de* is analyzed as the head of the ModP. This analysis provides a unified account to the wide distributions of *de*. In addition, it also accounts for the functional properties of *de*, where *de* is associated with modifying relations. However, I like to raise some problems in Rubin's analysis with regard to the relativization in Chinese. They are discussed in the following.

Head-final modifier phrase

In the structure of Rubin's modifier phrase, *de* appears head-final which selects an XP on its left. It is repeated below.



Rubin does not specially discuss the issue as to why the ModP in Chinese is head-final while the ModP in other languages he discussed (e.g. English, Romanian and Tagalog) are head-initial. He postulates it simply because of the surface word order of *de*. However, it is not clear why head-initial languages such as English and Chinese would have different head directions in the same phrase category. Moreover, the head-final phrase structure is not theoretically desirable for Chinese.

Reconstruction effects in Chinese

For Rubin, the head noun of a relative clause is base-generated and the modifier phrase (the relative clause) is adjoined the head noun by pair-merge. However, as discussed in Aoun and Li's adjunction analysis, there is evidence showing that in some cases, the head noun is raised from inside the relative clause in Chinese. An example from an idiom expression is illustrated below.

- (19) [[ta **dai** de] lü-mao] bi shei dou duo.
 he wear DE green-hat compare who all more
 'Lit. The green hats he wore are more than anyone else's.'
 'The number of affairs his wife has had is more than anyone else's'.

Since the idiom *wear green-hat* cannot usually be separated, *green-hat* must have been raised from inside the relative clause in order to derive the correct meaning. The example as such cannot be accounted for by Rubin's modifier phrase where the head noun is base-generated.

To summarize, Rubin's modifier hypothesis provides a unified analysis for heterogeneous categorization of modifiers, including relative clauses. It also accounts for the functional properties of *de*. That is, *de* is the functional head of the modifier phrase which

invokes modifying relations and signals to Narrow Syntax to carry out the operation of pair-merge. However, the modifier phrase is head-final for an SVO language like Chinese, but head-initial for other SVO languages such as English. It raises the same question as seen in the adjunction analysis—the phrase structure in Chinese should be consistently head-initial.

3. The proposal (part I): the head-initial modifier phrase hypothesis

In this section, I would like to present the first part of my proposal built upon Rubin's (in prep.) modifier hypothesis according to which the relative clause belongs to a new phrase category, namely, the modifier phrase. The modifier phrase hypothesis provides a unified analysis of *de* which has shown a wide range of distribution in Chinese phrase structure. Moreover, this proposal defines the functional properties of *de*. That is, *de* is the head of the modifier phrase, triggering modifying relations. However, as discussed in the last section, some aspects of Rubin's modifier phrase hypothesis for Chinese need to be revised. Specially, I argue for the following:

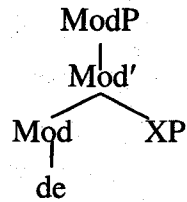
- (i) Rubin argues that the modifier phrase is head-final in Chinese. Instead, I will argue that the modifier phrase in Chinese is head-initial, headed by *de*.
- (ii) In terms of the derivation of the head noun, Rubin argues that the head noun is base-generated. However, I will show that in argument gap relativization, the head noun is in fact raised from inside the relative clause.

I will begin with the structure of the modifier phrase in the following section.

3.1 The structure

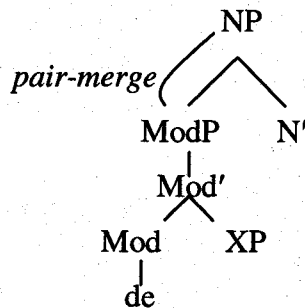
Following Rubin (in prep.), I argue that *de* is a functional category heading the modifier phrase. This is based on the observation in which *de* always appears in the structures involving modification relations. In addition, *de* also matches the description of Abney's (1987) definition of a functional category. However, rather than head-final shown in Rubin's hypothesis, I argue for a head-initial modifier phrase structure as illustrated below:

(20) The structure of the modifier phrase



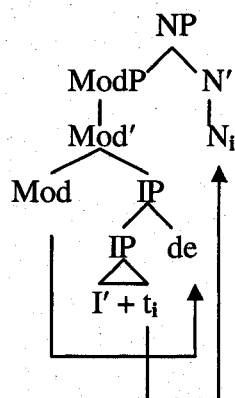
The modifier phrase is headed by *de*, which selects an XP, e.g. IP, NP or AP, as its complement. Next, the modifier phrase is adjoined to the noun phrase it modifies by the operation of pair-merge following Rubin (in prep.). The structure is shown in (21).

(21) Adjunction of the modifier phrase



With regard to the derivation of the head in the relative clause, I argue that both the head-raising analysis and the head base-generated analysis are possible in Chinese, following Aoun and Li (2003). In other words, the head is raised from inside the relative clause when reconstruction effects are exhibited, i.e. in argument relativization. In contrast, the head is base-generated in adjunct relativization when reconstruction effects are not available. To derive the surface word order, I propose a derivation involving two movement operations for argument relativization. First, the head noun is raised from inside the relative clause. Second, *de* is lowered to attach to the relevant phrase category at the syntax-phonology interface. For adjunct relativization, the head is base-generated and only the lowering of *de* is involved. The two-step derivation is shown below.

(22) Two-step derivation



In the following section, I will discuss the predictions made by the modifier phrase structure.

3.2 The predictions

In this section, I show that the head-initial modifier phrase can account for the distribution of *de* discussed in the previous chapter. Specifically, I argue that the complement of *de*—the XP, can only be IP, AP or NP.

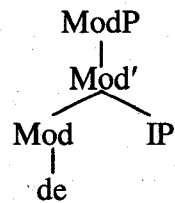
3.2.1 Relative clauses

Under the modifier phrase hypothesis, relative clauses in Chinese have the following structure. That is, *de* is the head of the modifier phrase, selecting an IP (a relative clause) to its right. This is shown in (23).

- (23) ta xihuan de shu
 he like DE book
 ‘the book that he likes’

The structure of the modifier phrase for the relative clause:

[_{ModP} [de [_{IP} ta xihuan shu]]]
 DE he like book

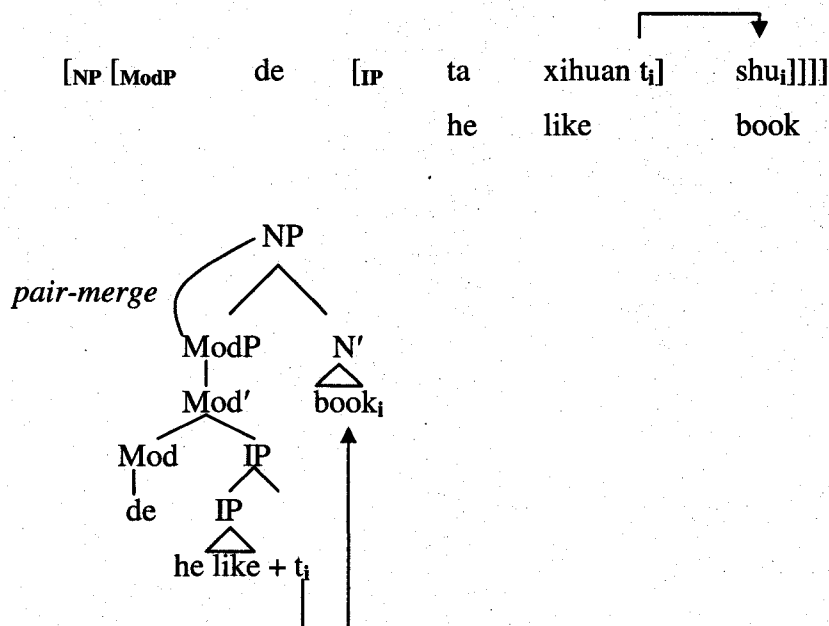


To derive the surface word order, the head noun is first raised from inside the IP to the surface position (when there are reconstruction effects, e.g. argument relative clauses). The ModP is adjoined to the NP by the operation of pair-merge. Finally, *de* is lowered to attach to the IP—a movement operation at syntax-phonology interface. This movement is motivated by the prosodic properties of *de*, namely, it is toneless and appears in the weak syllable position. The argument of lowering of *de* will be discussed in the next chapter. The two-step derivation is shown in the following.

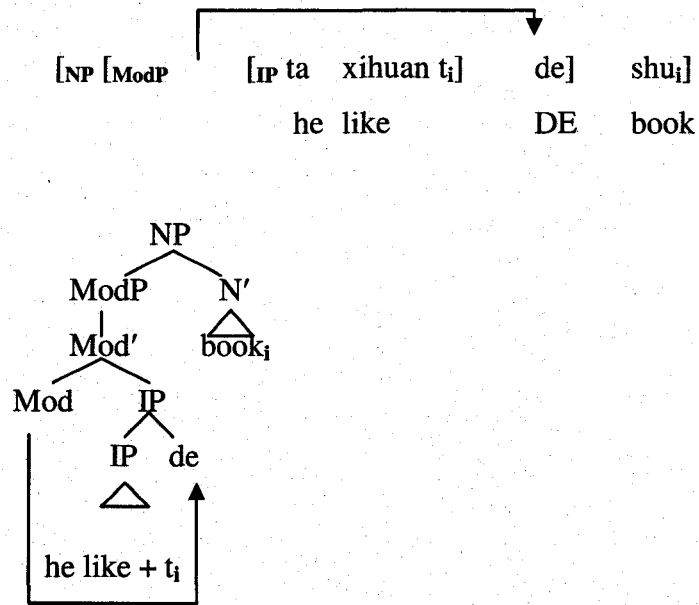
The derivation of argument gap relative clauses:

- (24) ta xihuan de shu
 he like DE book
 ‘the book that he likes’

First step in derivation: pair-merge and head-raising



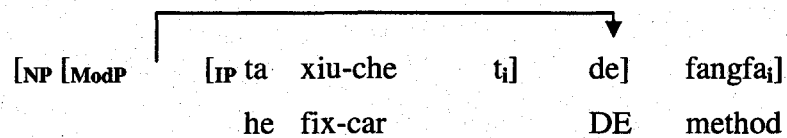
Second step in derivation: lowering of de

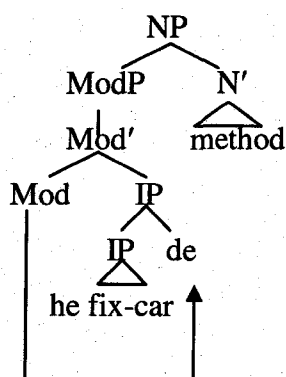


The derivation for adjunct relative clauses in which the head is base-generated is shown below.

The derivation of adjunct relative clauses:

- (25) ta xiu-che de fangfa
 he fix-car DE method
 'the way that he fixed the car'





The derivation for adjunct relative clauses is only involved with the lowering of *de* because no reconstruction effects are found in this type of relative clause. I will show the evidence in the next section.

As discussed earlier, *de* also co-occurs with adjectives and prepositions in Chinese. These structures are discussed in the following.

3.2.2 Adjective phrases

Recall that attributive phrases in Chinese are sometimes treated as reduced relative clauses because of the presence of *de*. An example is given in the following.

- (26) congming de xuesheng
 intelligent DE student
 'intelligent student(s)'

This type of adjectives can function like a predicate without the presence of the copula. It is illustrated in (27).

- (27) xuesheng (hen)³⁸ congming
 student very intelligent
 'student(s) is/are intelligent'

³⁸ In my dialect, it sounds more natural to add *hen* (very) in this simple sentence (but not necessarily in a relative clause). The meaning of *hen* here is bleached. In fact, *hen* is often used to test whether an adjective can function like a predicate or not, i.e. only predicate adjectives can co-occur with *hen*.

Following Ning (1993), I argue that the structure in (26) is in fact derived from the structure in (27). In other words, the head noun *student* in (26) is raised from inside the IP in (27). The derivation is shown in (28).

- (28) [IP t_i congming] de xuesheng_i
intelligent DE student

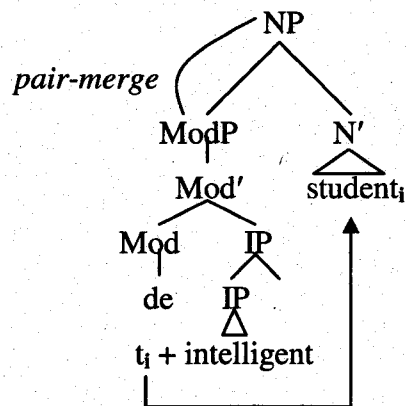
The sentence in (28) can be integrated into the modifier phrase structure in the following.

The structure of the modifier phrase for the predicate adjective:

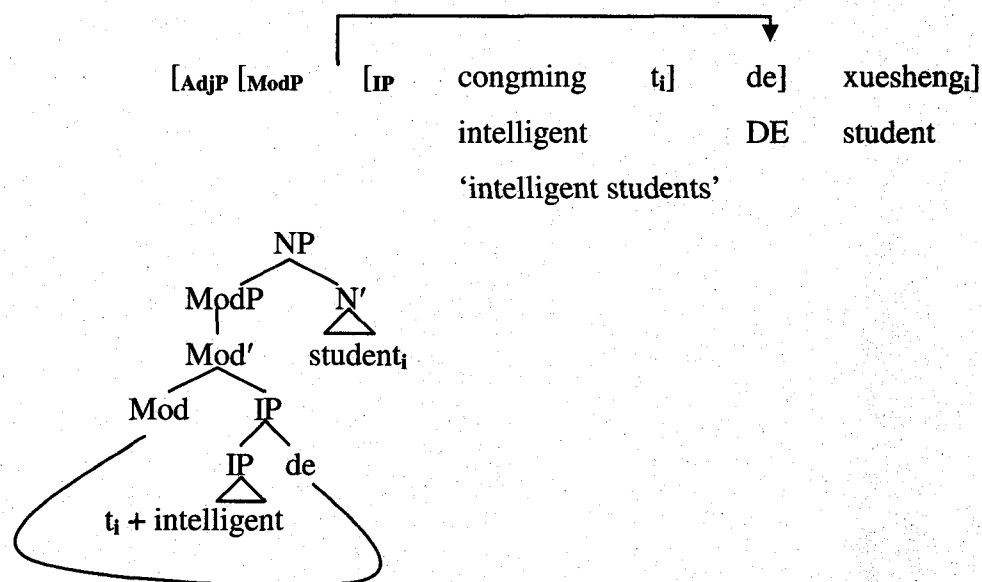
- (29) [ModP [de [IP xhesheng congming]]]
DE student intelligent

First step in derivation: head-raising

- [NP [ModP de [IP xuesheng congming t_i]]]
DE student intelligent



Second step in derivation: lowering of de



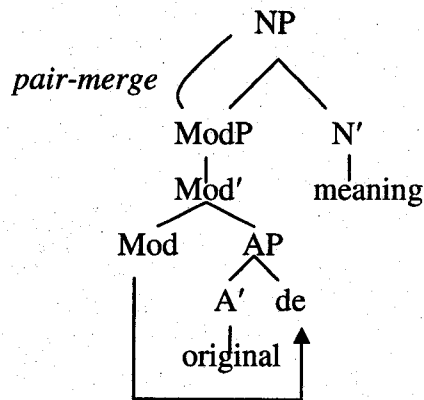
There is another type of adjectives in Chinese which can only function like modifiers as pointed out by Paul (2005).³⁹ In other words, they cannot function like predicates like the adjective in (28). An example of this type of adjectives is shown below.

- (30) benlai de yisi
 original DE meaning
 'the original meaning'

I argue that this type of adjectives has the following structure:

³⁹ See the discussion in Chapter 3, Section 4.2.3.2.

(31)



That is, the Mod head selects an AP as its complement, and the noun (*meaning*) is modified by the ModP (*original de*).

3.2.3 Preposition phrases

Similar to predicate adjectives, some prepositions can function like predicates⁴⁰. Therefore the relative clause in (32) can also be seen as the derivation of (33).

- (32) zai jiaoshi de xuesheng
 in classroom DE student
 ‘students who are in the classroom’

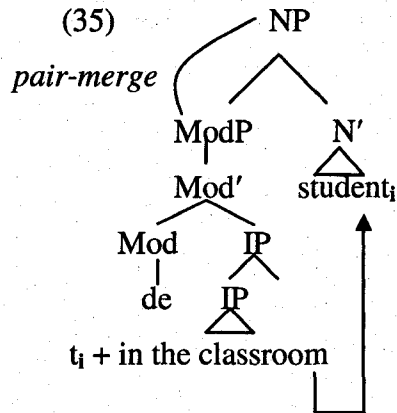
- (33) [IP xuesheng zai jiaoshi]
 student in classroom
 ‘Students are in the classroom.’

The structure of the modifier phrase for the PP is shown below.

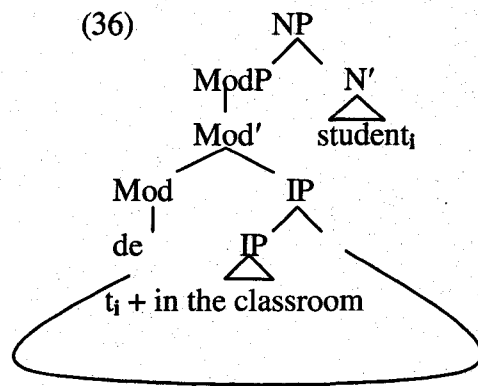
- (34) [ModP [de [IP xuesheng zai jiaoshi]]]
 DE student in classroom

⁴⁰ According to Huang (1994), prepositions in Chinese are derived from verbs historically.

First step in derivation: head-raising



Second step in derivation: lowering of de

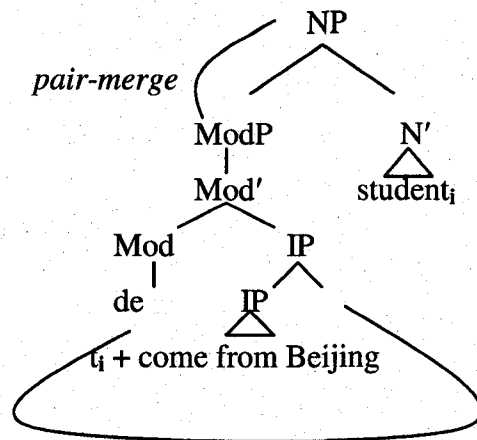


There are also prepositions which cannot function like predicates. This type of prepositions must co-occur with verbs (so called co-verbs). An example is given below.

- (37) **cong** Beijing **lai** de xuesheng
from Beijing **come** DE student
 'students who are from Beijing'

The derivation of (37) is therefore as same as the argument relative clause in (24), which involves the head-raising and lowering of *de*. The structure is shown below.

(38)



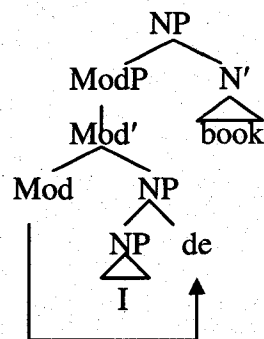
3.2.4 Possessives

De is required in a possessive construction as shown below:

- (39) Wo de shu
 I DE book
 'my book'

Under the modifier phrase hypothesis, (39) has the following structure:

(40) Possessive:



In a possessive construction, only lowering of *de* is required as shown in (40). Despite that the modifier phrase hypothesis can account for the structure of possessive constructions,

Rubin (in prep.) however points out a potential problem in the interpretation of the possessive construction. I will summarize it below.

The interpretation of modification structure, under the standard treatment, can be derived through predicate intersection as shown in the following template (adopted from Maienborn (2001)):

(41) Mod: $\lambda Q \lambda P \lambda x [P(x) \& Q(x)]$

(Rubin (in prep.): ch.5, p20)

The template in (41) can apply at any time to two categories denoting predicates. Rubin takes one step further, attributing the interpretation of modification structure (such as (41)) to Mod itself (the head of the ModP). He argues that Mod serves the function of predicate intersection by creating a function from predicates to properties of predicates (e.g. the semantic type of $\langle\langle e,t \rangle, \langle\langle e,t \rangle, \langle e,t \rangle \rangle\rangle$). Taking the following sentence for instance, the preposition *on the table*, which is the complement of Mod, has the semantic type of a property, and Mod shifts it to a function from properties (i.e. the modifier) to more complex properties (i.e. the modifier plus the modified element) (Rubin 2003: 666).

(42) [zai zhuo-shang] de shu
 at table top DE book
 'the book on the table'

The Mod *de* first forms a modifier with its complement modifier *zai zhuo-shang de* 'on the table'. An intersective reading is then derived after the modifier combines with the noun *zai zhuo-shang de shu* 'the book on the table'. The interpretation of the constructions discussed above, including relative clauses and predicative AP, is derived through such predicate intersection. However, the possessive construction and non-intersective modifiers as shown in (30) do not involve predicate intersection. Rubin maintains that such an observation about the possessive construction does not undermine the argument in which a modifier phrase is functional in nature.⁴¹ Without giving further discussion, I would like to suggest that the

⁴¹ Rubin does not discuss non-predicative adjectives in his paper.

possessive construction and non-predicative adjectives might involve different semantic interpretations. However, as what Rubin argues, the functional nature of a modifier phrase will not be affected.

Summary

I showed that the modifier phrase is able to predict the distribution of *de*, namely, its co-occurrence with relative clauses, adjectives, prepositions and possessives. The modifier phrase structure of Chinese can be summarized as the following: *de* is the head and selects an XP, which can be an IP, an AP or an NP. To derive the surface word order in relativization, I argued that a two-step derivation, including the head-raising and the lowering of *de* after syntax, is necessary to derive argument relative clauses. However, only the lowering of *de* is required for deriving adjunct relative clauses. I also showed that the modifier phrase hypothesis is able to account for the structural differences between two types of adjectives, namely, predicative adjectives and modifying adjectives. A predicative adjective phrase is treated as a reduced relative clause because the head noun is shown to be raised from inside the phrase. In a modifying adjective phrase, however, the modifier phrase simply modifies the noun which is base-generated. Similar to predicative adjectives, preposition phrases which function like predicates are the IP complements of *de* under the modifier phrase hypothesis. The surface word order is derived by the same two-step movement: head-raising and lowering of *de*. With regard to the prepositions which cannot function like predicates, they are part of the VP because they have to co-occur with verbs. As a result, the derivation is similar to that of relative clauses. Finally, despite the fact that the possessive construction does not involve the same predicate modification as other modifier phrases do, the functional nature of a modifier phrase should be maintained for these constructions.

In the following section, I will discuss the evidence supporting the modifier phrase hypothesis in relative clauses.

3.3 Evidence from reconstruction effects

In the derivation of relative clauses, I argued that the head noun in argument relativization is raised from inside the relative clause. The evidence supporting the head-raising analysis is

Binding properties: Principle A

The binding properties of reflexives also exhibit reconstruction effects as illustrated below.

- (45) Zhangsan qing **Lisi_i** chuli **ziji_i** de shi
 Zhangsan ask Lisi handle self DE matter
 ‘Zhangsan asks Lisi to handle self’s matter.’
- (46) [[Zhangsan qing **Lisi_i** chuli de] **ziji_i** de shi]
 Zhangsan ask Lisi handle DE self DE matter
 ‘Self’s matter that Zhangsan asks Lisi to handle’

In the declarative sentence (45), *ziji* (self) is bound by *Lisi* in its local domain. Compared with the relative clause in (46), the reflexive *ziji* (self) must have been raised from the relative clause in order to be bound by its antecedent *Lisi*.⁴⁴

Binding properties: Disjunction Effects

Another example showing reconstruction effects with respect to binding properties is bound pronouns.

- (47) wo xiwang **mei-ge** **xuesheng_i** dou neng ba
 I hope every-CL student all can BA
 wo gei **ta_i** de shu dai lai.
 I give he DE book bring come
 ‘I hope every student_i can bring the book that I gave to him_i.’

(Aoun & Li 2003, 139)

⁴⁴ (48) is in fact ambiguous because *ziji* (self) can also be bound by Zhangsan. However, it does not affect the fact in (49) where *ziji* (self) has to be bound by either the embedded subject or the embedded object. See the discussion of reconstruction and the structure of VP in Huang (1993).

- (48) ni hui kandao [[wo xiwang mei-ge xuesheng;
 you will see I hope every-CL student
 dou neng dai t lai de] wo gei ta_i de shu].
 all can bring come DE I give him DE book
 ‘You will see the book that I gave to him_i that I hope every student_i will
 bring.’

(Aoun & Li 2003, 133)

The bound pronoun *ta* (him) contained in the head (the book that I gave to him) in (48) is bound by its antecedent *mei-ge xuesheng* (every student) inside the relative clause, yielding reconstruction effects.

To summarize, I have shown that reconstruction effects are observed with respect to idioms and binding properties in Chinese in argument relative clauses. This lends support to the argument that the head noun is raised from inside the relative clause. However, with regard to scope interpretations, reconstruction effects do not seem to be triggered. I will discuss them based on Aoun and Li (2003) in the following.

3.4 Scope interpretations

Reconstruction effects do not always occur in terms of scope interaction when the element *dou* (all) occurring with the QP in the relative clause is involved. For instance, there are no reconstruction effects with the presence of *dou* as illustrated in (49).

- (49) a. wo hui zhengli [[mei-ge-ren dou hui kan t de] yi-ben⁴⁵ shu].
 I will arrange every-CL-person all will read DE one-CL book
 ‘I will put the one book that everyone will read in order.’ (same book)

⁴⁵ *Three books* is replaced by *one book* in Aoun and Li’s examples for the ease of processing.

- b. [[**mei-ge-ren** **dou** hui kan t de] **yi-ben** **shu**], wo hui zhengli.
 every-CL-person all will read DE one-CL **book**, I will arrange
 ‘The one book that everyone will read, I will put in order.’

(same book)

(Aoun & Li 2003, 133)

In (49), if reconstruction effects are exhibited (*one book* is inside the relative clause), *every* would have had a wide scope interpretation over *one book* (different book). In contrast, reconstruction effects are available when *dou* is absent. This is illustrated in (50) in which *everyone* takes scope over *one book* (different books).

- (50) wo hui zhengli [[**mei-ge-ren** hui kan t de] **yi-ben shu**].
 I will arrange every-CL-person will read DE one-CL-book
 ‘I will put the one book that everyone will read in order.’

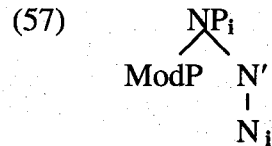
(different book)

(Aoun & Li 2003, 134)

Reconstruction effects are not available in (49) because the QP *everyone* cannot be raised out of the RC. This is due to the domain requirement of *dou*. Consequently, *everyone* cannot c-command the head QP *the one book* and it will not have a wide scope reading. In contrast, the QP *everyone* can be raised out of the relative clause in the absence of *dou* in (50). Accordingly, *everyone* has a wide scope interpretation over the head QP.

Aoun and Li (2003) argue that the reconstruction effects discussed above are in fact the result of scope interactions between the QP in the head and the QP in the relative clause. In other words, the wide scope interpretation shown in (50) is due to the raising of quantifiers (*everyone* raised out of the relative clause), but not reconstruction. If the head QP is reconstructed inside the relative clause, (49a) should have the same interpretation as (51) (with the presence of *dou* in these two examples).

Return to the modifier phrase hypothesis, I have only discussed the examples whose head nouns are bare nouns (e.g. not involved with quantifiers or classifiers). Under the modifier phrase hypothesis, the modifier phrase is adjoined to the modified noun by pair-merge. According to the definition of pair-merge (Chomsky 2001), it is the modified noun that projects. The structure is repeated below.



Therefore, in terms of the element being projected, the modifier phrase hypothesis has reached a similar conclusion as Aoun and Li's adjunction hypothesis. In other words, when the bare NP is involved, it is NP which is being reconstructed and projected.

4. Conclusion

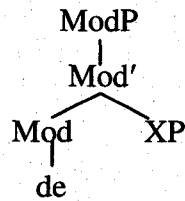
In this chapter, I first discussed Rubin's (in prep.) modifier phrase hypothesis. According to Rubin, heterogeneous categorization of modifiers can be analyzed as a single phrase category, namely, modifier phrase. Moreover, the element *de* is analyzed as the function head of the modifier phrase which invokes modifying relations and signals to the Narrow Syntax to carry out the operation of pair-merge. However, one problem with Rubin's analysis is that the head finality of the modifier phrase is inconsistent with other head-initial phrase categories in Chinese. To solve the problems in Rubin's analysis, I argued for a head-initial modifier phrase hypothesis. This hypothesis not only provides a unified structure of the wide distribution of *de*, it also shows that relative clauses are head-initial consistent with other phrase categories in Chinese. In the next chapter, I will present the second part of my proposal, which argues for a movement at the syntax-phonology interface.

5. Chapter 5 Ordering at the Syntax-Phonology Interface: Part II

1. Introduction

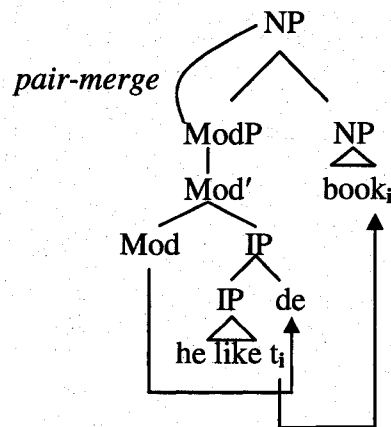
In the previous chapter, I showed that *de* is a functional category heading the Modifier Phrase. The head directionality of the ModP is consistently head-initial paralleling other phrase categories in Chinese. The structure of the ModP is repeated below.

(1) Modifier Phrase:



I proposed a two-step movement in deriving the surface word order of structures involving *de*, namely, relative clauses, adjective phrases, etc. An example of deriving a relative clause is repeated below:

- (2) ta xihuan de shu
 he like DE book
 'the book that he likes'



In the first step of the derivation, the head noun is raised from IP (with potential reconstruction effects), and the ModP is merged into the dominant NP. The second step of derivation requires *de* to lower to the IP. This chapter will be devoting to the justification for lowering *de*. I have shown that lowering *de* at the syntactic level would create a serious problem for binding principles according to which, a trace must be c-commanded by its antecedent. However, this problem can be solved if the movement takes place at the syntax-phonology interface. The main argument for the proposal is built on the evidence that *de* is a clitic-like element. The motivation of lowering *de* is to fulfill the prosodic requirement encoded in clitics (Klavans 1982; Zwicky 1983; Zwicky and Pullum 1985, among others).

Clitics have been studied extensively at various levels of grammar, namely, syntax, phonology, morphology, and the respective interfaces. They have posed challenges to many analyses because of their complex nature. Taking syntax for instance, on the one hand, they are not considered as independent words because they are not subject to syntactic processes such as deletion, replacement or movement (Zwicky 1985). On the other hand, they can be arguments and functional heads like independent words do (Kayne 1975). The prosodic status of clitics also remains controversial in the prosody/phonology literature. The fact that clitics always need to 'lean' to some prosodic word/phrase shows that they are prosodically deficient, namely, they do not have pitch accent like morphosyntactic words do. However, whether a clitic should form its own prosodic group—the clitic group, as proposed by Nespor and Vogel (1986), or whether a clitic should be part of a prosodic word/phrase (Zec and Inkelas 1990; Selkirk 1996; Zec 2002, among others) is still much debated in the literature. Since clitics cannot seem to be analyzed by a single component of the grammar, some attempts have been made from the interface perspective. For instance, Zwicky and Pullum (1983) argue that clitics should be analyzed by post-syntactic rules. Recent studies have also shown that neither a purely syntactic account nor a phonological approach is able to account for every aspect of clitics (Halpern 1995; Boskovic 2001; Franks 2000, among others). My proposal will follow this line of research, suggesting that *de* is best accounted for from both syntactic and phonological perspectives. This is not surprising considering that *de* has been independently argued to be inserted at PF (Huang 1982), or to undergo a special syntactic insertion rule (Kitagawa and Ross 1982).

The organization of this chapter is as follows. In Section 2, I discuss the general issues concerning clitics, and argue that *de* is a clitic, following C. Huang (1989). In Section 3, I present my proposal of lowering *de* at the syntax-phonology interface. In Section 4, I show that the prosodic account of *de* is also supported by the ordering of some functional categories in Chinese. I conclude in Section 5.

2. The clitic *de*

De has been argued to be a functional category because of the two salient features as discussed in the previous chapter. First, *de* cannot occur alone. In other words, it always appears in the structure of [XP *de* NP/DP]. Second, *de* is toneless and never receives stress. In this section, I will discuss these properties from a prosodic point of view, arguing that *de* is in fact a clitic.

2.1 What is a clitic?

A clitic is traditionally defined as a phonologically weak element that needs to ‘lean’ to the adjacent word. It has drawn much attention because of their ‘analytical difficulties’ (Zwicky 1985). On the one hand, they behave like affixes, whose occurrence depends on the adjacent words; on the other hand, they can be heads and arguments as independent words do (Kayne 1975).

To distinguish clitics from affixes, Zwicky and Pullum (1983) propose several diagnostic tests. One observation is that any phrase category can be the host of clitics, while affixes are more selective with regard to the phrase category of their hosts. Examples of clitics in English are shown below:

- (3) a. The person I was talking **to’s** going to be angry with me. [preposition]
- b. The ball you **hit’s** just broken my dining room window. [verb]
- c. Any answer not entirely **right’s** going to be marked as an error. [adjective]
- d. The drive home **tonight’s** been really easy. [adverb]

(Zwicky and Pullum 1983: 504)

As shown in (3), the auxiliary verbs such as *is* and *has* are cliticized to their preceding words which belong to various lexical categories. In contrast, the inflectional affixes are sensitive to the lexical category of their stems. For instance, plural affixes can only attach to noun stems while the past affixes only to verb stems.

The difference between a word and a clitic from a syntactic perspective is that words as syntactic constituents, are subject to syntactic processes such as deletion, replacement and movement. However, clitics are not subject to these rules. For instance, a noun can be replaced by a pronoun in the following examples:

- (4) Does John have a car? Yes, he does.

However, clitics such as *'ve* (e.g. in *I've*) cannot be replaced in the same way.

The weak forms of pronouns, determiners, auxiliaries, negation particles and question particles are usually considered as clitics. Zwicky (1977) categorizes these clitics into two types: simple clitics and special clitics. The former is usually 'prosodically deficient' and derived from their corresponding full forms (they appear in the same syntactic position) whereas the latter has unusual syntactic status in which they do not appear in the same position as their full forms do. The reduced form of the pronoun *him* in English shown below is an example of simple clitics.

- (5) a. She saw him.⁴⁶
b. She saw 'm.

In contrast to weak pronouns in English, weak pronouns in French appear in different positions from their full forms. This is illustrated below.

- (6) a. Paul le voit.
Paul it sees
'Paul sees it.'

⁴⁶ *Him* is stressed here.

*b. Paul voit le.

Zwicky refers the examples shown in (6) to special clitics. Special clitics have been argued as 'affixes' of phrases (i.e. phrasal affixes) by Anderson (1992, 1996). Paralleling the view in which a word's functional properties are realized by affixes (inflectional markers or derivational markers), a special clitic serves to reflect the functional properties of a phrase. I will come back to Anderson's view in Section 3.

2.2 *De* is a phrasal clitic

Chinese is known as an analytical language, which relies mostly on the use of word order to express the meaning. In contrast to a synthetic language that adopts inflectional morphology to mark relations among words in a sentence, Chinese uses a vast number of free morphemes (sometimes treated as independent words) and so-called particles to do so. It has been argued that clitics do not usually occur in analytical languages such as Chinese. However, a number of studies have shown that several elements in Chinese should be analyzed as clitics. They include the object pronoun *ta* (Zhou 1999), a special type of pronoun *ta* (Lin and Zhang 2006), the particle which sometimes occur in the relative clause—*suo* (Chiu 1995), locative particles (Liu 1998), the negation marker *bu* (Huang 1988), the adverbial marker *hen* (Chui 2000), sentence final particles (C. Huang 1985), etc. In fact, C. Huang (1989) argues that *de* should be treated as a clitic.⁴⁷ His proposal based on Zwicky (1985), Zwicky and Pullum (1983) and Klavans (1982) is summarized below.

2.2.1 *De* is a clitic

C. Huang (1989) argues that *de* is a clitic by showing that it is neither a word nor an affix. The observations that *de* is not a word are based on its toneless nature (as compared to the full tone in words) and the dependence on the adjacent word. The argument that *de* is not an affix is built on the following three aspects. First, as shown in Zwicky and Pullum (1983), affixes tend to be very selective to the phrase category of their hosts while clitics are not. In

⁴⁷ C. Huang categorizes *de* into five types: cliticized word, adverbial affix, verbal affix, noun phrase clitic and verb phrase clitic (p.24). The type discussed here is noun phrase *de* (which is the main concern of the present study).

this respect, *de* is clearly a clitic because it follows different types of phrase categories, repeated below:

(7) *Follow a pronoun*

Wo de yifu
I DE clothes
'my clothes'

(8) *Follow an adjective phrase*

meili de hua
beautiful DE flower
'beautiful flower'

(9) *Follow a verb phrase*

Lisi xihuan de shu
Lisi like DE book
'the book which Lisi likes'

(10) *Follow a preposition phrase*

zai jiaoshi de xuesheng
at classroom DE students
'the students who are in the classroom'

Second, there is an arbitrary gap between an affix and its host, but not between a clitic and its host. Examples in Chinese are given in (11).

(11) *zi: nominal suffix*

a. ya-zi
 duck-ZI
 'duck'

- b. hou-zi
 monkey-ZI
 'monkey'

- (12) a. mao
 'cat'
 b. *mao-zi
 cat-ZI

(C. Huang 1989: 30⁴⁸)

The gap between the affix and its host in (11) and (12) is arbitrary because the affixation of the nominal suffix *zi* cannot be predicted by grammatical rules (i.e. one does not know why *zi* can be affixed to (11) but not (12)). In contrast, there are always some morphological or syntactic reasons for *de* not being able to attach to its host.

Finally, C. Huang argues that *de* behaves like a typical clitic, forming a syntactic unit with a host phrase, but it does not form a syntactic unit with the host word like an affix does. Taking the following simple sentence for example, *de* forms a syntactic unit with the host phrase [yesterday come].

- (13) [zuotian lai=de] ren shi Sanbai
 yesterday come=DE person is Sanbai
 'the person who came yesterday is Sanbai'

In a topicalization construction, the fronted element must be a syntactic constituent. However, examples below show that *de* cannot form a syntactic unit with the preceding word as in (14), nor the following word as in (15).

⁴⁸ C. Huang's examples are presented in the Mandarin Phonetic Symbols II (MPS II). For consistency, I changed his examples to *Pinyin*.

- (14) *lai=de, zuotian e ren shi Sanbai
 come=DE yesterday person is Sanbai

- (15) *de ren, zuotian lai e shi Sanbai
 DE person, yesterday come is Sanbai

(C. Huang 1989: 30)

Another piece of evidence showing that *de* cannot form a syntactic constituent with a host word is the observation that *de* can be attached to an affix, but not the other way around. Examples are given below.

- (16) a. zuotian lai-guo=de ren
 yesterday come-PERF=DE person
 'the person who came yesterday'

- b. *zuotian lai-de-guo ren
 yesterday come=DE -PERF person

(C. Huang 1989: 31)

C. Huang argues that *de* in (16a) is attached to the whole phrase [who came yesterday], therefore the preceding affix *-guo* does not affect the attachment of *de*. In contrast, the fact that the affix *-guo* cannot attach to *lai-de* in (16b) shows that *de* does not form a syntactic constituent (a morphological word) with the verb [came] (i.e. the affix requires a morphological word as its host). Based on the evidence in which *de* is neither a word nor an affix, C. Huang concludes that *de* must be a clitic. The clitic-like properties of *de* are summarized below:

- (17) The properties of clitic *de*:
- a. is toneless
 - b. cannot appear alone
 - c. is not selective to the type of the phrase category that it is attached to

- d. has no arbitrary gaps between the host and itself
- e. can only form a syntactic constituent with a host phrase, not a host word

In addition to C. Huang's evidence showing *de* is neither a word nor an affix, I will show that *de* is always attached to a syntactic constituent in the relevant domain. It is noted that clitics sometimes refer to phrasal affixes (Klavans 1982). In this thesis, I do not treat *de* as an affix to a phrase. Rather, I argue that *de* is a phrasal clitic. A detailed discussion is shown in Section 3.

2.2.2 The placement of *de*

C. Huang adopts Klavans' (1985) proposal for the placement of *de*. Before discussing C. Huang's argument, it is necessary to understand the details of Klavans' argument.

The crucial aspect of Klavan's argument is that a clitic is not necessarily linked to its neighboring constituent prosodically (contrary to Zwicky's argument discussed in the previous section). Taking the object noun phrase clitics *xa* and *sa* in Kwakw'ala for instance, syntactically, they form the syntactic constituents with the elements following them as shown in [the house] and [the rock]. However, they are prosodically dependent on the prosodic words before them.

- (18) nəp'idi-da ɡənanəm=[xa ɡuk^w]=[sa t'isəm]
 throw-DEIC child=OBJ house OBL rock
 'The child hit the house with a rock by throwing.'

(Kwakw'ala, Klavans 1985: 106, citing Levine 1980)

Klavans argues that the cross-linguistic placement of clitics can be determined by setting the values of the three parameters:

- (19) a. P1 (domain): [INITIAL/FINAL]
 b. P2 (precedence): [BEFORE/AFTER]
 c. P3 (phonological liaison): [SUFFIXAL/PREFIXAL]

P1 states that a clitic is either attached to the initial or the last element of the host phrase. In other words, the domain of cliticization is determined by P1. (20) is an example of [INITIAL]:

(20) P1: INITIAL

Taj **mi** **je** pesnik napisao knjigu
 that me is poet wrote book
 'That poet wrote me a book.'

In (20), the clitics *mi* and *je* are attached to the first element *taj* 'that' of the host phrase *taj pesnik* 'that poet'. An example of [FINAL] taken from Nganhcara is shown below:

(21) P1: FINAL

Nhila pama-ng nhingu pukpe-wu ku?a **wa: =ngu.**
 he.NOM man-ERG him.DAT child-DAT dog g give=DAT.3sg
 'The man gave the dog to the child.'

(Nganhcara, Klavans 1985: 104)

In (21), the enclitic *=ngu* is attached to the final element of the host. P2 specifies that a clitic can be attached to either before or after the host phrase.

(22) P2: BEFORE

nəp'idi-da gənanəm=[**xa** guk^w]=[**sa** t'isəm]
 throw-DEIC child=OBJ house OBL rock
 'The child hit the house with a rock by throwing.'

(Kwakw'ala, Klavans 1985: 106, citing Levine 1980)

In (22), the object noun phrase clitics *xa* and *sa* form the syntactic constituents with the words following them as in [the house] and [the rock], but phonologically, they are attached to the prosodic words preceding them. Below is an example of [AFTER] in the possessive construction of English

- (23) P2: AFTER
[the king of Sweden's] pancake

(Klavans 1982: 19)

Finally, P3 states that the direction of phonological attachment—whether clitics are prefixes or suffixes. Examples of [SUFFIXAL] and [PREFIXAL] are illustrated below:

- (24) P3: SUFFIXAL
[the king of Sweden's] pancake

(Klavans 1982: 19)

- (25) P3: PREFIXAL
Poezžaj [NE · v Moskvu] (a v Omsk).
GO_{IMPER} NEG. to MOSCOW_{ACC} (but to Omsk_{ACC})
'Don't go to Moscow (but rather to Omsk).'
More archaically: 'Go not to Moscow (but to Omsk).'

(Russian, Billings 2002: 61)

The interaction between these three parameters, according to Klavans, generates eight possible positions for cross-linguistic clitics placement:

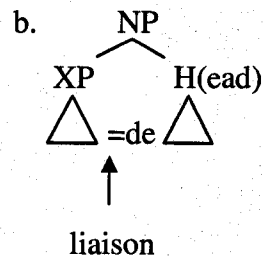
(26) Possible clitic types:

	Parameter 1	Parameter 2	Parameter 3	Examples
Type 1	Initial	Before	Suffixal	Kwakw'ala NP markers
Type 2	Initial	Before	Prefixal	Greek article
Type 3	Initial	After	Suffixal	Ngiyambaa enclitics
Type 4	Initial	After	Prefixal	Tepecano =an
Type 5	Final	Before	Suffixal	Nganhcara clitics
Type 6	Final	Before	Suffixal	Sanskrit pre-verbs
Type 7	Final	After	Suffixal	Spanish pronominal clitics
Type 8	Final	After	Prefixal	Classical Greek negative ou=

(Klavans 1985: 103)

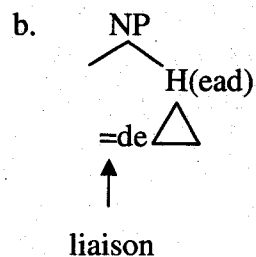
Let's now turn back to Chinese. C. Huang discusses the following two sets of values for the three parameters, and argues that (28) is the correct representation for *de*:

(27) a. P1: Initial, P2: After, P3: Enclitic



(C. Huang 1989: 33)

(28) a. P1: Final, P2: Before, P3: Enclitic



(C. Huang 1989: 33)

The argument against (27) which has a string of [(XP=*de*) Head] is mainly from a semantic perspective. C. Huang first refers to Montague semantics according to which, the co-occurrence of different categories (i.e. [XP=*de*] and [Head]) is governed by their semantic types. In general, an NP has the type of $\langle\langle e, t \rangle, t \rangle$. In order to match the same semantic type of the NP, [XP=*de*] should be the type of $\langle\langle e, t \rangle, \langle\langle e, t \rangle, t \rangle\rangle$. Recall that the presence of *de* is obligatory in a possessive phrase, an adjective phrase, a relative clause and an appositional phrase (the XP in the string [XP=*de*]), Huang argues that the semantic types of them are $\langle\langle e, t \rangle, t \rangle$, $\langle\langle e, t \rangle, \langle\langle e, t \rangle, t \rangle\rangle$, t , and $\langle\langle e, t \rangle, t \rangle$ respectively. Consequently, *de* requires at least three semantic types so that the string [XP=*de*] can have the same semantic type as the NP.

Second, he shows that *de* does not receive a uniform translation in the following examples:

- (29) a. nongchang de niu
 farm DE cow
 ‘cattle on a farm’
- b. Zhangsan de qian
 Zhangsan DE money
 ‘Zhangsan’s money’
- c. buxiougang de chazi
 stainless DE fork
 ‘stainless forks’

(C. Huang 1989: 33)

It is difficult for *de* to map from a NP denoting a location in (29a), to a NP denoting an individual to the set of entities belonging to that individual in (29b), and to a NP denoting to the set of entities made from that material in (29c) (p.35).

Finally, C. Huang argues that the following examples show that *de* is not marking the preceding XP as a modifier.

- (30) a. taikongsuo baozha de shi
 space-shuttle explode DE matter
 (the event of) the explosion of the Space Shuttle.'

- b. *taikongsuo baozha shi
 space-shuttle explode matter
 'the explosion of the Space Shuttle'

- (31) a. taikongsuo baozha de neijian shi
 space-shuttle explode DE that-CL matter
 '(the event of) the explosion of the Space Shuttle.'

- b. taikongsuo baozha neijian shi
 space-shuttle explode that-CL matter
 '(the event of) the explosion of the Space Shuttle'

(C. Huang 1989: 37)

The only difference between (30) and (31) is the head noun (event vs. that event). However, omitting *de* will result in ungrammaticality in (30) but not (31). Thus, C. Huang argues that the difference can be deduced as the evidence of *de* interacting with the following head noun, rather than the preceding XP.

Similarly, the first two problems can be solved if *de* has the set values of the parameters shown in (28) (i.e. [XP=(*de* Head)]). Under this analysis, the preceding XP does not need to be of the same semantic type as the head noun.⁴⁹ Accordingly, the phrase categories of XP can vary as shown in (7)-(10). In terms of the translation problem, C. Huang suggests that *de* can be assigned a semantic function that does not need to change the semantic type of the head noun, if it is treated as a head marker. In other words, *de* does not need to carry the burden of mapping various semantic types of the XP to the head noun.

⁴⁹ According to C. Huang, the string [(XP=*de*) H] implies that [XP=*de*] and [H] is in a modifying relation; therefore the former needs to be in the same semantic type as the latter.

However, C. Huang still needs to appeal to Chierchia's (1982, 1985) type-shifting theory to make sure that the XP has the same semantic type as [*de* Head]. To explain the difference between (30) and (31), C. Huang assumes the head NP is the semantic type of $\langle e, t \rangle$ and an NP is always assigned the simplest type. Therefore *that event* in (31) is assigned to the type $\langle e \rangle$ (the simplest type). However, in (31a) (a relative clause including a head noun), the semantic type of the head noun should be $\langle e, t \rangle$. A type-shifting mechanism (Chierchia (1985)) is thus called for to change $\langle e, t \rangle$ to $\langle e \rangle$ for *that event*. In contrast, *event* in (30) has the type $\langle e, t \rangle$ because it cannot occur alone (unlike most Chinese lexical nouns). The semantic type of *event* works for (30a) where *de* is present; however, the mismatch of the semantic type in (30b) ($\langle e \rangle$ is required for an NP) results in ungrammaticality. C. Huang argues that the above approach only works under the condition in which *de* marks the head noun and licenses the type-shift.

To summarize, C. Huang rejects the traditional view according to which *de* is syntactically attached to the preceding XP. The problem with this view is that the semantic type of the head noun cannot be accommodated if *de* forms a syntactic constituent with the preceding XP. However, if *de* is syntactically attached to the head noun, it can license the type-shift so that syntax and semantics can match. C. Huang's approach places great emphasis on semantics. However, his arguments are problematic from a syntactic point of view. I will discuss them below.

C. Huang argues that the difference between (30) and (31) is the syntactic evidence of *de* interacting with the following head noun. Specifically, he shows that *de* can be optional when the head noun is *that event* but it is not the case (it would result in ungrammaticality) when the head noun is *event*. This is due to different semantic types (i.e. $\langle e \rangle$ vs. $\langle e, t \rangle$) interacting with the presence (or absence) of *de*. However, *that* in *that event* can also appear before *space-shuttle explosion* as shown in (32):

- (32) **neijian** taikongsuo baozha de shi
 that-CL space-shuttle explode DE matter
 '(the event of) the explosion of the Space Shuttle'

The meaning of the sentence in (32) is exactly the same as that of (31a). It is not clear whether the semantic type of *that event* ($\langle e, t \rangle$) is still maintained under this situation. Moreover, *that* cannot occur between *space shuttle explosion* and *de* as shown in (33):

- (33) *taikongsuo baozha neijian de shi
 space-shuttle explode **that-CL** DE matter
 ‘(the event of) the explosion of the Space Shuttle’

It is difficult to explain why *that* is not allowed to appear before *de* if *de* is syntactically attached to the head. In contrast, if *de* is attached to the preceding XP as a modifier phrase, it is natural to disallow *that* to interfere the phrase. Finally, the following pair of sentences shows that *de* cannot be omitted in (34b) even though the head noun is also *that event*:

- (34) a. zhuyao de erqie women yijing taolun-guo de neijian shi
 main DE and we already discuss-ASP DE that-CL matter
 ‘the main event that we have discussed’

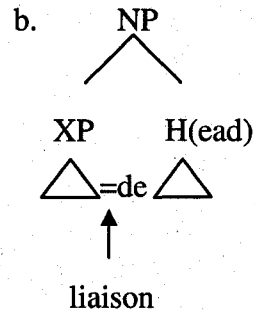
(adapted from Aoun and Li (2003): 150)

- b. *zhuyao de erqie women yijing taolun-guo (de) neijian shi
 main DE and we already discuss-ASP that-CL matter
 ‘the main event that we have discussed’

This is contrary to C. Huang’s argument according to which *that event* has the semantic type of $\langle e \rangle$, and *de* does not have to be present in order to license the type-shift. Aoun and Li (2003) in fact argue that *de* forms a constituent with the preceding XP (*main*) based on the coordination fact shown in (34a). The connective *erqie* is used to connect two non-nominal categories, including clauses, adjective phrases and verb phrases not expressing dual properties/activities of one individual (Aoun and Li 2003: 143). If *de* forms a syntactic constituent with the head, *erqie* cannot occur between *de* and the head noun.

To summarize, C. Huang argues against the previous studies in which *de* is both phonologically and syntactically attached to the preceding XP, repeated below:

(35) a. P1: Initial, P2: After, P3: Enclitic



(C. Huang 1989: 33)

The main concern for C. Huang is that it is difficult for *de*, a modification marker, to map the semantic type of the XP to the Head (because XP can be an adjective phrase, a possessive phrase, a clause, etc) if *de* is syntactically attached to the XP. In contrast, if *de* is attached to the head syntactically, it can license the type-shift. However, C. Huang still needs to appeal to Chierchia's (1982, 1985) type-shifting theory to ensure the XP to have the same semantic type as [*de* H]. C. Huang's account might be able to solve the problem of mismatching between syntax and semantics; however, it is problematic for sentences such as (34). Moreover, his approach is not less complicated considering that the XP needs to be type-shifted (to match with the head) and *de* must be assigned some sort of semantic functions to keep the semantic type of the head unchanged.

To summarize, C. Huang presents convincing evidence showing that *de* is a phrasal clitic. However, his proposal in which *de* forms a syntactic constituent with the following head noun is not attested empirically. I will follow C. Huang, arguing that *de* is a phrasal clitic from a prosodic perspective. Nevertheless, I will show that *de* should form a syntactic constituent with the preceding element.

3. The proposal: lowering *de* at the syntax-phonology interface

In this section, I spell out the second part of my proposal, namely, lowering *de* at the syntax-phonology interface. Specifically, I argue that lowering of *de* is motivated by the prosodic properties of *de*. The proposal is built on two theories of cliticization within Optimality Theory (OT, henceforth). The first theory deals with the prosodic structure of clitics while

the second one involves the placement of clitics. The section is organized as follows. I will first discuss the theoretical background in Section 3.1. The proposal is presented in Section 3.2.

3.1 Theoretical Background

3.1.1 The syntax-phonology mapping: Selkirk (1996)

The first relevant theory is Selkirk's (1986, 1996) end-based theory. Since the first part of the theory is built upon prosodic phonology, I will briefly discuss prosodic phonology based on Nespor and Vogel (1986). Phonology consists of several interacting subsystems, including the metrical grid, lexical phonology, autosegmental phonology and prosodic phonology. Being one of these subsystems, prosodic phonology is concerned about the domain where phonological rules can apply. Under this view, prosodic structure of a sentence is composed of a sequence of hierarchically ordered prosodic categories, known as the Prosodic Hierarchy⁵⁰:

(36) The Prosodic Hierarchy:

syllable → foot → prosodic word → phonological phrase → intonational phrase → utterance

Each prosodic category in (36) serves as a domain for the application of phonological rules. Some of the prosodic categories bear great resemblance to syntactic constituents. However, they have been argued not to be isomorphic to syntactic constituents (Selkirk 1980, 1984). The motivation for prosodic structure lies on the evidence that morpho-syntactic constituents cannot form the domain of application for phonological rules (see Nespor and Vogel 1986 for cross-linguistic evidence). Despite that syntax and phonology may have contact with each other, the interaction between these two components is localized and constrained (Selkirk 1984, 1996; Truckenbrodt 1999, among others). Prosodic structure is thus called for as a mediator between these two components (Inkelas and Zec 1990).

⁵⁰ Nespor and Vogel (1986) propose an additional prosodic constituent, namely, clitic group, between the levels of prosodic word and phonological phrase. Since this level receives much criticism in the literature (Booij 1988, Jacobs 1991, among others), I will not include it in this study.

Selkirk (1996) defines prosodic structure through the following constraints within the Optimality Theory:

(37) Constraints on prosodic domination (where C^n = some prosodic category)

a. LAYEREDNESS

No C^i dominates a C^j , $j > i$

e.g. 'No σ dominates a Ft.'

b. HEADEDNESS

Any C^i must dominate a C^{j-1} (except if $C^i = \sigma$)

e.g. 'A PWd immediately dominates a σ .'

c. EXHAUSTIVITY

No C^i immediately dominates a constituent C^j , $j < i-1$

e.g. 'No PWd immediately dominates a σ .'

d. NON-RECURSIVITY

No C^i dominates C^j , $j = i$

e.g. 'No Ft dominates a Ft.'

(Selkirk 1996: 188)

Among these constraints, Selkirk suggests that Layeredness and Headedness are universal prosodic properties that cannot be violated cross-linguistically. In contrast, Exhaustivity and Non-recursivity are found violated in some languages.

Selkirk's proposal aims at capturing the relation between syntax and phonology. Specifically, she proposes a set of edge-alignment constraints, arguing that either the right or the left edge of a syntactic constituent should coincide with that of a prosodic constituent:

(38) Edge-based theory of the syntax-prosody interface

Right/Left edge of $\alpha \rightarrow$ edge of β ,

α is a syntactic category, β is a prosodic category

(Selkirk 1996: 191)

Selkirk shows how these constraints work by examining the prosodic structure of function words, including clitics. It is common cross-linguistically that a lexical word such as a verb or a noun always receives stress or pitch accent. Nevertheless, a function word such as a determiner does not always do so. Selkirk categorizes English function words into four types based on their prosody and syntactic positions:

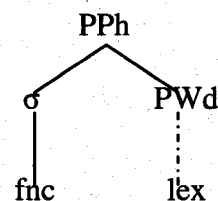
(39) Four types of function words:

- a. Stressed, with focus: Bettina CAN speak, but refuses to.
- b. Stressed, in isolation: HOW?
- c. Stressed, phrase-final: I can eat more than Sara CAN.
- d. Unstressed, non-final:

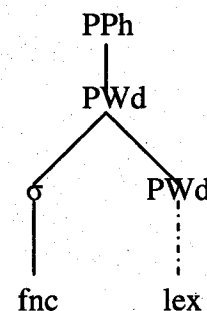
Diane CAN paint HER portrait OF Timothy AT home.

The first three types of function words are classified as prosodic words because they receive stress. Clitics belong to the last type of function words which are unstressed. Each type of function word has its own prosodic structure. For instance, Selkirk shows that a function word such as a clitic which does not receive stress, has the following three possible prosodic structures⁵¹:

(40) a. free clitic

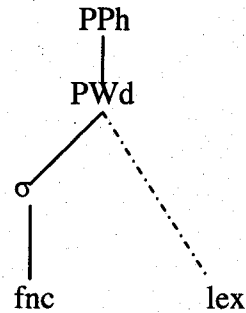


b. affixal clitic



⁵¹ The clitics shown in (40) are proclitics which appear before lexical words. The prosodic structures are the same for enclitics, which appear after lexical words.

c. internal clitic



PPh: prosodic phrase

PWd: prosodic word

Lex: lexical word

Fnc: function word

(Selkirk 1996: 196)

In (40a), the clitic is attached to a phonological phrase, while in (40b) and (40c), the clitic is attached to a prosodic word. Selkirk argues that non-final function words in English such as (41), has the prosodic structure of free clitics shown in (40a). That is, the clitic is directly attached to a phonological phrase.

(41) Diane cǎn paint hēr portrait ǒf Timothy ăt home.

The argument that the free clitic (e.g. (40a)) is attached to a phonological phrase is both empirically and analytically justified. The empirical evidence shows that non-final function words in English cannot be attached to a prosodic word because they are never associated with phonetic realization of segments which usually occur in the word-initial position. For instance, an aspirated voiceless stop in English is applied to initial position in a lexical word as shown in (42a), but not in a non-final function word shown in (42b).

- (42) a. Grow t^homatoes
b. They grow *to* sky.

If a non-final function in English were to attach to a prosodic word, it would have been initiated the segmental phenomenon as seen in the word-initial position in (42a). Based on this evidence, Selkirk suggests that non-final function words in English are attached to phonological phrases, as shown in the prosodic structure of free clitics in (40a).

In addition to the empirical evidence, the prosodic structure of non-final function words is analytically justified. Selkirk's argument is based on Optimality Theory according to which the correct phonological representation (the output) is derived by evaluating all possible candidates (e.g. free clitics, affixal clitics and internal clitics). Each candidate is evaluated by ranking the constraints on prosodic domination shown in (37) and the following constraints on the alignment:

(43) Word Alignment Constraints (WdCon)

- i. Align (Lex, L; PWd, L)
- ii. Align (Lex, R; PWd, R)

(44) Prosodic Word Alignment Constraints (PWdCon)

- i. Align (PWd, L; Lex, L)
- ii. Align (PWd, R; Lex, R)

(Selkirk 1996: 192)

According to the general alignment constraints in (38), the constraints at the word level requires that the left (or the right) edge of a lexical word must coincide with the left (or the right) edge of a prosodic word shown in (43). On the other hand, the left (or the right) edge of a prosodic word must coincide with the left (or the right) edge of a lexical word, as shown in (44).

The optimal candidate is determined on two conditions: the ordering of constraints and the number of constraint violations. The first condition can be explained in the following scenario. Assuming that there are two constraints A and B, their ordering is $A \gg B$ (A is ranked higher than B). The candidate X violates the constraint A and the candidate Y violates the constraint B. After the evaluation, the candidate Y is the optimal candidate because the candidate X violates the highest-ranked constraint A. When ordering of constraints cannot determine the optimal candidate, the second condition—the number of constraint violations is called for. The optimal candidate will be the one which receive the least number of constraint violations.

Now let's turn to the evaluation for the optimal output of non-final function word in English. Each of the three candidates violates various constraints as shown below:

(45) Output representation	Constraint violated
i. (fnc [lex]): free clitic	Exh _{PPh} [since PPh immediately dominates σ (fnc)]
ii. ([fnc [lex]]): affixal clitic	NonRec _{PWd} [since PWd dominates PWd]
iii. ([fnc lex]): internal clitic	WdCon, PwdCon [WdCon since L edge of Lex not aligned with Ledge of some PWd; PWdCon since L edge of PWd not aligned with L edge of some Lex]
	[]: prosodic word
	(): prosodic phrase
	(adopted from Selkirk 1996: 198)

Among the three possible candidates, internal clitic is the least optimal one because it violates more constraints than the other two candidates. The difference between free clitic and affixal clitic is that the former is attached to a phonological phrase while the latter is attached to a prosodic word. As shown earlier, non-final function words have the prosodic structure of free clitics. This amounts to saying that the constraint NonRec_{PWd} must be ranked higher than Exh_{PPh}:

(46) NonRec_{PWd} >> Exh_{PPh}

Therefore, free clitic is the optimal output for non-final function words because it does not violate the highest ranked constraint NonRec_{PWd}.

Selkirk argues that the above prosodic structures for function words are attested cross-linguistically. In her view, prosodic structure of function words is strongly related to syntactic structure (i.e. the positions of final and non-final results in different prosodic structures). However, Selkirk does not discuss the placement of clitics, i.e. why some clitics

must appear in certain positions (i.e. second-position clitics). In the following, I will discuss a study that deals with the placement of second position clitics, and as well, the study remains within the tenets of Optimality Theory.

3.1.2 The placement of phrasal clitics: Billings (2002)

Billings (2002) proposes a typological account for the placement of phrasal clitics within Optimality Theory. He first defines phrasal clitics as clitics which ‘appear at or near one or the other edge of a syntactic phrasal domain, adjacent to words which do not necessarily share any semantic properties with’ (p.55). Taking Serbo-Croatian for example, phrasal clitics appear at the positions following ‘the first element’ of the clause. The first element can be a prosodic word shown in (47a) or a prosodic phrase shown in (47b).

- (47) a. *Taj* **MI** **JE** pesnik napisao knjigu
 that_{MASC.NOM} me_{DAT} is poet_{NOM} wrote_{MASC} book_{ACC}
- b. *Taj* *pesnik* **MI** **JE** napisao knjigu
 that_{MASC.NOM} poet_{NOM} me_{DAT} is wrote_{MASC} book_{ACC}
 ‘That poet wrote me a book.’

(Serbo-Croatian, Billings 2002: 55)⁵²

Billings further categorizes four types of phrasal clitics based on Klavans (1980/1982, 1985). As mentioned in Section 2.2.2, the crucial aspect of Klavan’s argument is that a clitic is not necessarily linked to its following constituent prosodically, namely, it depends prosodically on the preceding element, but syntactically it forms a constituent with the following element.⁵³ The possible positions of clitics are repeated below:

⁵² Billings’ examples are taken from Browne (1974:41) .

⁵³ Klavans’ proposal which has been discussed in Section 2.2, is not repeated here.

(48)

$\triangle$		$\triangle$		$\triangle$
Phrase _{N-1} ⁵⁴		Phrase _N		Phrase _{N+1}
...=a		b=1=c d=2 ... 3=e f=4=g ⁵⁵		h=...
a. INITIAL	BEFORE	SUFFIXAL	Kwakw'ala	
b. INITIAL	BEFORE	PREFIXAL	Articles in Modern Greek	
c. INITIAL	AFTER	SUFFIXAL	Ngiyambaa =ndu	
d. INITIAL	AFTER	PREFIXAL	Tepecano =an	
e. FINAL	BEFORE	SUFFIXAL	Nganhcara	
f. FINAL	BEFORE	SUFFIXAL	Sanskrit pre-verbs	
g. FINAL	AFTER	SUFFIXAL	Spanish pronominal clitics	
h. FINAL	AFTER	PREFIXAL	Classical Greek negative ou=	

(Billings 2002: 62)

Billings points out two problems in Klavan's typology. First, Klavan does not distinguish phrasal clitics from head-adjacent clitics. In contrast to phrasal clitics which are not necessarily adjacent to any particular element in a clause, head-adjacent clitics must be adjacent to the head such as to the verb in a clause, or the noun in a nominal expression. Examples from Bulgarian are shown in (49).

- (49) a. Ti SI MU (GI) vzel parite.
 You_{NOM} 2.S MASC/NEUT3.IO 3PL.DO taken_{MASC} money_{(PL)DEF}
 'You_{TOPIC} have taken his money [I hear].'
- b. Vzel SI MU (GI) vzel parite.
 'You have taken his money [I hear].'

(Bulgarian, Billings 2002: 56, from Tomić 1996:831)

⁵⁴ Phrase_N is the relevant domain (a clause or a nominal phrase) over which the clitic takes scope (p.62).

⁵⁵ 1-4 are possible anchor elements within Phrase_N (p.62)

The clitic in (49a) is adjacent to the head—the verb *vzel*. However, when the subject *ti* is absent, the clitic must follow the verb in (49b). This type of clitics is also known as Tobler-Mussafia clitics, which can appear in any position (second, third...etc.) except the initial position. In Klavan's typology, head-adjacent clitics can be seen in the types d-g. However, except the type g, the rest of the types do not distinguish head-adjacent from phrasal clitics. Another objection that Billings has regarding Klavan's typology is the accuracy of her data. Some of her data are taken from extinct languages such as Sanskrit in the type f, and Classical Greek in the type h. They have been criticized in the literature about the use of these languages.

In order to distinguish phrasal clitics from head-adjacent clitics, Billings proposes a more limited typology for phrasal clitics based on Klavans:

- | | | | |
|------|-------------------------|------------------------------|-------------|
| (50) | a. Initial, suffixal | Kwakw'sala determiners | (cf. (48a)) |
| | b. Initial, prefixal | Russian constituent negation | (cf. (48b)) |
| | c. Peninitial, suffixal | Serbo-Croatian | (cf. (48c)) |
| | d. Final, suffixal | English possessive 's | (cf. (48g)) |

(Billings 2002: 65)

To account for the placement of each type of clitic in the above typology, Billings adopts Optimality Theory that deals with the formation of a correct phonological representation (the output), as mentioned in Section 3.1.1. In order to generate a correct output, the underlying form of a phonological representation (the input), first enters the generation algorithm, known as GEN, producing all possible outputs (candidates). EVAL, an evaluating mechanism then analyzes each candidate by ranking a set of universal constraints. These constraints may be ranked differently among languages. The optimal candidate is the one that receives the least violations of the constraints.

Following Anderson (1996) and Franks (2000), Billings proposes three constraints that reflect the interaction among grammatical components—semantics, syntax, the lexicon, morphology and prosody, to account for the placement of phrasal clitics.

- (51) a. SCOPE: Elements precede the domain over which they take scope.

- b. ALIGN (clause L, intonation phrase L): A clause's leading edge must coincide with the leading edge of an intonation phrase.⁵⁶
- c. SUFFIX: Morphemes marked as suffixes must follow some PWd (prosodic word).

(Billings 2002: 72)

The SCOPE constraint is proposed from a semantic point of view in which an element inside of a phrase must move to the beginning in order to take the scope over the entire phrase. The ALIGN constraint, taken from the syntax-phonology interface theory, requires that the leading edge (i.e. the left edge) of a clause coincide with that of an intonation phrase. The last SUFFIX constraint requires a clitic to follow at least one PWd. Billings argues that these three constraints cannot be satisfied simultaneously because they require conflicting outputs. For instance, the SCOPE constraint requires the clitic to be at the initial position. However, the SUFFIX constraint disallows the clitic to appear initially. Therefore, Billings suggests that depending on the language, at least one of these three constraints will be violated.

The evidence supporting Billing's proposal is drawn from several languages, including Russian, Czech, Tagalog and Waripiri. I will only discuss the clitics from the first two languages because they are more related to the structure of *de* in Chinese.

The yes/no-question marker *li* in Russian is considered as a Wackernagel clitic (i.e. second position clitic) because it always follows the first prosodic word of its intonation phrase. The possible candidates are presented in accordance to the violated constraint:

(52) Violate SCOPE while satisfying the other two constraints:

- a. Ne znáju, bylá =LI oná tám.
 Not know₁ [{was_{FEM} Q} she_{NOM}there]

- b. * Ne znáju, bylá oná =LI tám.
 Not know₁ [was_{FEM} {she_{NOM} Q} there]

⁵⁶ The leading edge refers to the left edge (p.c.).

- c. * Ne znáju, bylá oná tám =LI.
 Not know_I [was_{FEM} she_{NOM} there Q]]

Violate ALIGN while satisfying the other two constraints:

- d. * Ne znáju =LI. bylá oná tám
 {Not know [Q] was_{FEM} she_{NOM} there]

Violate SUFFIX while satisfying the other two constraints:

- e. *Ne znáju, LI= bylá oná tám.
 Not know_I [{Q was_{FEM} she_{NOM} there]
 'I don't know whether she was there.'

{ }: the PWD domain

[]: the phrase domain

(Billings 2002: 65)

When the SCOPE constraint is violated (e.g. *li* does not precede the clause over which it has scope), there are in fact three positions available for *li*, namely, after the first, second and last prosodic word in the phrase (*whether she was there*) as shown in (52a)-(52c). The ALIGN constraint is violated in (52d) because the suffixation (i.e. cliticization) crosses the clausal boundary. Finally, the SUFFIX constraint is violated in (52e) because the clitic is prefixed rather than suffixed. The competition among these five candidates can be seen clearly in the tableau below:

(53)

	ALIGN	SUFFIX	SCOPE
a. [PrWd [PrWd =cl PrWd PWd]]			*
b. [PrWd [PrWd PrWd =cl PWd]]			* *!
c. [PrWd [PrWd PrWd PWd =cl]]			* *! *
d. [PrWd [=cl PrWd PrWd PWd]]	*!		
e. [PrWd [cl= PrWd PrWd PWd]]		*!	

(Billings 2002: 78)

(53d) and (53e) are eliminated because they violate the two ‘superordinate’ constraints. The remaining three candidates are compared by the number of times they violate the SCOPE constraint. (53a) is the optimal candidate since it only violates the constraint once. Billings argues that neither ALIGN nor SUFFIX is violated by *li* constructions, therefore it is impossible to rank between these constraints. He concludes the final ranking (of constraints) for Russian is:

(54) Final ranking for Russian: {ALIGN, SUFFIX} >> SCOPE

(Billings 2002: 78)

In contrast to *li* that follows a prosodic word, there is another type of second position clitic which follows a phrase as shown below:

(55) *Tohle stare kolo SE TI jednour ozpadne.*
 This_{NEUT} old_{NEUT} bike_{NEUT} REFL you_{DAT} once fall-apart
 ‘This old bicycle will fall apart on you one day.’

(Czech, Billings 2002: 79, taken from Toman 1986: 124)

Billings adopts Anderson’s (1996) INTEGRITY-family constraints to account for such variation between languages like Russian and Czech (i.e. the clitic follows a prosodic word in the former and a prosodic phrase in the latter). The relevant constraints in INTEGRITY

family are INTEGRITY(Word) and the INTEGRITY(XP). The former states that a word cannot be interrupted by any phonological element that is not part of the word. The latter, on the other hand, disallows a phrase to contain any elements that are not part of that phrase. Billings argues that for Russian, INTEGRITY(Word) is the relevant one. The constraint INTEGRITY(XP) is ranked lower than SCOPE. In contrast, both INTEGRITY(Word) and INTEGRITY(XP) should be ‘superordinate and unviolated’ for Czech.

To summarize, Billings proposes an account within Optimality Theory for the placement of phrasal clitics. Specifically, he argues that the constraints of SCOPE, ALIGN and SUFFIX which reflect the interaction of various grammatical components correctly predict the placement of phrasal clitics.

In this section, I discussed two proposals about cliticization. On the one hand, Selkirk’s proposal is concerned with the prosodic structure of clitics. For instance, a clitic has three possible structures depending on its syntactic distribution. To determine the correct prosodic structure (i.e. the output), two sets of constraints are proposed: the constraints on prosodic domination and the constraints on the alignment. Each output is evaluated by the ranking of constraints and the number of constraint violations within the OT framework. On the other hand, Billings proposes a typological account for the placement of phrasal clitics. He argues that by ranking the constraints SCOPE, ALIGN, and SUFFIX which reflect the interaction of semantics, syntax, the lexicon, morphology and prosody, the placement of phrasal clitics can be derived cross-linguistically. In the following section, I will present my proposal based on these two studies, arguing that *de* is lowered at the syntax-phonology interface to satisfy the prosodic requirement of a phrasal clitic.

3.2 Lowering *de* at the Syntax-Phonology Mapping

3.2.1 Motivation: why *de* moves

In this section, I argue that lowering of *de* is motivated by its toneless property. I show that *de* being toneless, must appear in the enclitic position. This contrasts with a novel observation in which a tone-bearing clitic consistently appear in a domain-initial position (i.e the proclitic position). This subsection is organized as follows. In Section 3.2.1.1, I argue that the differential behavior of toneless clitics and tone-bearing clitics is triggered by their

prosodic structure. In Section 3.2.1.2, I show that the placement of the two types of clitics can be formalized in Optimality Theory.

3.2.1.1 Toneless clitics vs. tone-bearing clitics

Toneless clitics

In addition to *de*, a number of elements in Chinese have been argued to be clitics. The first one is *ta*, a non-referential, third-person inanimate pronoun. Examples taken from Lin (2006) are illustrated in (56).

(56) **ta**—Lin (2006)

a. Zamen (haohao-de) [he **ta**] liang-bei piju ba
 we to-one's satisfaction drink it two cups beer PAR⁵⁷
 'Lit. Let's drink two cups of beer (to our satisfaction).'

b. Xian [shui **ta**] yi huir, zai shuo
 first sleep it a while then talk
 'Lit. I'll have some sleep first before doing anything.'

(Lin 2006: 1)

The above examples show that *ta* always appears in a postverbal position. Specifically, it must follow the preceding verb (i.e. 'drink' in (56a)) within the VP. When *ta* is separated from the verb, it results in ungrammaticality as shown in (57a).

(57) a. *kan nei-bu dianying **ta** liang ci
 see that-CL movie it two times
 'I saw that movie twice.'

⁵⁷ PAR: (sentence-final) particle.

b. kan **ta** liang ci nei-bu dianying
 see it two times that-CL movie
 'I saw that movie twice.'

(Lin 2006: 17)

Based on the above observations, Lin (2006) argues that *ta* is a clitic, i.e. *ta* always appears after a verb. Lin further suggests that *ta* is a non-referential determiner clitic, heading the DP. This is not surprising since cross-linguistically, determiners are sometimes argued to be derived from pronouns, and they also share the same phonetic form. One piece of evidence put forward by Lin is that *ta* is always followed by a nominal which can be the argument of the verb (i.e. 'movie' in (57b)), a temporal-denoting nominal or a nominalized state or property-denoting expression. In addition, *ta* cannot be followed directly by a bare noun as shown below:

(58) *zu ta wuxia xiaoshuo
 Rent it chivalry novel
 'rent chivalry novels'

(Lin 2002: 14)

The fact that *ta* cannot be followed by a bare noun parallels to the observation in which a demonstrative in Chinese always follows the sequence of [demonstrative + (numeral) + classifier + bare noun].⁵⁸ To derive the surface word order, Lin argues that *ta* which heads the DP projection must be raised to attach to the host (the preceding verb).

Another type of elements that have been argued to be clitics is so-called locative particles. Examples are shown in (59).

⁵⁸ Please see Lin (2006) for more arguments of treating *ta* as an indefinite determiner.

(59) **locative particles**⁵⁹—Liu (1998)

- a. [dao hu-**bian**] sanbu
 to lake-side take:a:walk
 ‘take a walk to the lake’

(Liu 1998: 48)

- b. ta fang-le yi-ben shu [zai neizhang zhuozi **shang**]
 he put-ASP one-CL book at that-CL table on
 ‘He put a book on that table.’

(Liu 1998: 63)

Locative particles such as *bian* and *shang* always occur in locative phrases (e.g. *to the lake* in (59a)). A locative phrase typically consists of a preposition (e.g. *to*), an NP denoting the location (e.g. *lake*) and a locative particle (e.g. *side*) indicating the spatial relationship. Liu (1998) argues that locative particles are NP clitics based on their two salient features. First, they are phonologically dependent. In other words, they cannot appear alone and the tones that these particles bear are reduced to neutral tones. Second, they must attach to an NP phrase such as *that table* in (59b). To account for the placement of NP clitics, Liu adopts Klavans’ (1980, 1985) three parameters for clitic placement, repeated below:

(60) Parameters of clitic placement:

- a. Scope: the clitic is located in the scope of some constituent which constitutes its domain
- b. Anchor: the clitic is located by reference to the {first vs. last vs. head} element of the constituent in which it occurs.
- c. Orientation: the clitic {precedes vs. follows} its anchor.

(Liu 1998: 62)

She argues that NP clitics in Chinese have the following values for each of the parameter:

⁵⁹ According to Chao (1968), there are 19 locative particles, including (in English) on/top, front/before, back/after, in, left, by/side, between, west, north, there, below/under, before, in, out/outside, right, middle/in, east, south and here.

- (61) Scope: NP
 Anchor: last
 Orientation: follow

(Liu 1998: 62)

The values of the three parameters correctly predict the placement of NP clitics—they appear in an NP domain, are located by reference to the last element of the NP, and follow that element (p.63).

To summarize, the three clitics—*de*, *ta*, and locative particles share the following similarities. First, they are neutral tone (toneless), and cliticized to the preceding word/phrase (i.e. enclitics). The observation that enclitics tend to have a neutral tone has been mentioned in Chao (1968: 35-36). According to him, a neutral tone carries weak stress and in most cases, weak stress occurs enclitically, i.e. following a stressed syllable.⁶⁰ He also observes that the four regular tones can be in the neutral tone under certain conditions. Nevertheless, a small number of morphemes must always be the neutral tone. They include suffixes, pronouns in object position, final particles and one of an ‘unlistable’ open class of syllables (p.149).⁶¹ The first three types of toneless morphemes are in fact the three clitics discussed above. It is noted that the final particles that Chao mentions include *de* and *le*. These two unstressed final syllables are ‘in constructions with a preceding phrase or sentence, though phonetically closely attached to the syllable immediately preceding it’ (p.149).⁶² Since a final particle can follow a phrase, clause or sentence, Chao argues that it is therefore not part of a word (i.e. a suffix). Chao’s observation on neutral-tone syllables is reflected on the structure of *de* that has been built so far. Namely, *de* takes an XP as its complement, and it must be lowered to attach to the XP because of its toneless nature. In the following, I will introduce another group of clitics, which behaves differently than the clitics discussed above.

⁶⁰ Chao mentions that unstressed syllables, in a few rare conditions, precede a closely following stressed syllable, usually a pronoun or one of a few conjunctions such as *huozhe* ‘or’ (p.36). However, he does not provide any examples illustrating this view. As will be shown shortly, only tone-bearing clitics are allowed to appear in the proclitic position.

⁶¹ The last types of neutral-tone syllables form polysyllabic words with one or more preceding syllables (Chao 1968: 150).

⁶² According to Chao, an unstressed syllable (which has a neutral tone) needs to follow a stressed syllable, so that the tone of the stressed syllable can determine the pitch of the unstressed syllable.

Tone-bearing clitics

Suo is a particle optionally occurring before a transitive verb in a relative clause as shown below:

(62) **suo**—Chiu (1995)

wo	suo	xihuan	de	ren
I	SUO	like	DE	person
'the person whom I like'				

Chiu (1995) observes the following properties of *suo*:

- (63)
- a. *Suo* occurs in relative clauses derived by syntactic wh-movement.
 - b. *Suo* occurs in the clause containing the extraction site.
 - c. Only relativization of an accusative NP licenses *suo*.
 - d. *Suo* occupies the following position sentence-internally:

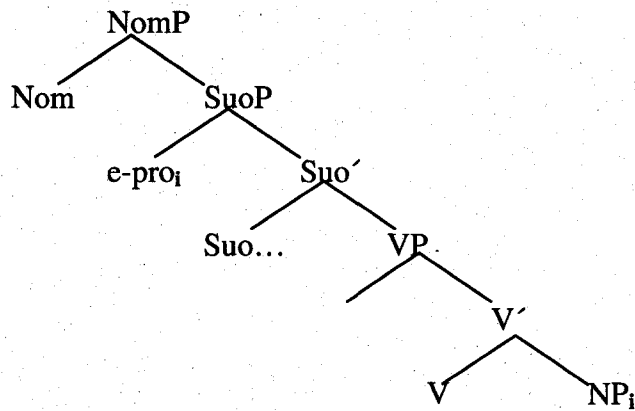
NP-subject S-level-Adv *SUO* Neg VP-level-Adv Verb

(Chiu 1995: 88)

Based on these properties, Chiu argues that *suo* behaves like Romance clitics, which is not 'a complex expression and cannot be modified or stressed even in contrastive situations' (p.89). Following Kayne (1975), Chiu argues that *suo* is an object clitic, heading its own function projection (*SuoP*). The main function of *SuoP* is to assign accusative Case to its spec via spec-head agreement. The way that the object NP receives the accusative Case is illustrated in the following tree structure:

(64) *SuoP*: before relativization (the tree structure is 'I SUO like the person')

wo	suo	xihuan	de	ren	
I	SUO	like	DE	person	
'the person whom I like'				⇒	I like the person



(Chiu 1995: 92)

The NomP in (64) is a nominative Case projection (where the subject is moved to in order to receive the nominative Case). It is assumed that verbs are not raised in Chinese (Cheng 1989). In order for the object NP to receive accusative Case assigned by *suo* to SpecSuoP, Chiu first argues that an expletive pro (*e-pro*) receives the accusative Case from SpecSuoP, and then *e-pro* forms a Case chain with the object NP, similar to *there*-expletive constructions in English:

(65) There are three men in the room.

(Chiu 1995: 92)

Chiu further claims that the object NP is raised to SpecSuoP at LF to obey the principle of Full Interpretation (Chomsky (1989)). The object NP cannot be raised at S-structure, according to Chiu, because it must stay in the governing domain of the verb. In short, Chiu argues that Chinese inflectional structure contains two Case projections: NomP for assigning nominative Case and SuoP for assigning accusative Case. The object clitic *suo* is triggered because of the (covert) syntactic movement of an accusative NP.

Another clitic-like element is the negation particle *bu*, first proposed by Huang (1988)⁶³ and expanded upon by Yuan (2004). An example is given in (66).

⁶³ Huang (1988) does not explicitly discuss the clitic status of *bu*. However, I will follow Yuan (2004) who based on Huang's observation of *bu*, arguing *bu* as a clitic-like element.

c. Tamen bu huxiang bangzhu. (bu + reciprocal)

They not each other help

‘They do not help each other.’

(Yuan 2004: 177)

According to the above examples, Yuan argues that *bu* is not only attached to the head of VP but also the head of AP, AdvP and PP.

The last clitic-like element, as argued by Chui (2000), is *hen* as shown in the following:

(69) **hen**—Chui (2000)

ta **hen** congming

he very/HEN smart

‘He is (very) smart.’

There are in fact two *hens*. The first one is a degree adverb meaning *very*. Therefore (69) could mean ‘he is VERY smart’. The second *hen*, which Chui claims to be developed from the first *hen*, loses morphosyntactic autonomy and develops into a clitic. That is, *hen* does not have any semantic content (i.e. it does not mean *very* in (69)). Moreover, the clitic *hen* cannot be stressed or lengthened. Rather, it forms a single accentual unit with the following host. Following Klavans’ (1985) proposal, Chui argues that *hen* is a phrasal clitic. As a phrase clitic, *hen* subcategorizes for a phrasal host, namely, a VP phrase.

To summarize, the properties shared by the second group of clitics such as *suo*, *bu* and *hen*, include the following. First, they all appear in the proclitic position. For instance, *suo* heads the SuoP which assigns accusative Case to the object of the verb, and *bu* and *hen* are procliticized to a verb and a verb phrase respectively. Second, these clitics have full tones.⁶⁵ An interesting generalization can be established accordingly—toneless clitics are enclitics while tone-bearing clitics are proclitics.

⁶⁵ See the discussion in (72)–(74).

The prosodic structure of toneless clitics and tone-bearing clitics

As mentioned earlier, Chao (1968) argues that the pitch of a toneless clitics relies on the tone of its preceding stressed syllable. As a result, a toneless clitic must be an enclitic. An immediate question is why tone-bearing clitics appear as proclitics. The answer may be best explained from the perspective of prosodic structure in Chinese.

As shown in Section 3.1, the prosodic structure of a sentence is composed of a sequence of hierarchically ordered prosodic categories known as the prosodic hierarchy, repeated below:

(70) The Prosodic Hierarchy:

syllable → foot → prosodic word → phonological phrase → intonational phrase → utterance

The relevant prosodic constituents in this section are syllable, foot and prosodic word. I will discuss their properties below.

According to Duanmu (2000), Chinese has two types of syllables. The first type, full syllables which mostly consist of monosyllabic content words, have tone and stress. They have the structure of CVX, where C represents a consonant, V a vowel and X a nasal or the offglide of a diphthong. The second type, weak syllables which are mostly grammatical words, do not have stress and generally no tone. They have the structure of CV.

The next level within the prosodic hierarchy is foot. According to prosodic phonology theory (Nespor and Vogel 1986), syllables are not grouped into words directly. Rather, they are grouped into an intermediate-sized constituent, namely foot. This argument is supported by the evidence of stress assignment (i.e. the placement of stressed and unstressed syllables). The structure of a foot may be binary which is composed of two syllables, unbounded which consists of any number of syllables, ternary which consists of three syllables, or 'degenerate' which consists of only one syllable. Duanmu (2000) argues that in Chinese, a full syllable which has two moras⁶⁶ (therefore heavy) can form a foot and has stress. In contrast, a weak syllable which has only one mora (therefore light) cannot form

⁶⁶ A mora is a segment slot in the rhyme. Taking English for instance, a light syllable contains only one mora, as in [ba] whereas a heavy syllable contains two moras as in [ban]. Moreover, a heavy syllable tends to attract stress but a light syllable does not do so (based on Duanmu 2000: 128).

a foot and does not have stress. In addition to monosyllabic feet, disyllabic feet are also used in Chinese. In fact, a minimal expression in Chinese should be disyllabic according to Duanmu.⁶⁷ Moreover, he argues that the syllable combination of a disyllabic noun or compound (including verb compound, adjective compound, etc.) can only be heavy-heavy (two full syllables), or heavy-light (a full syllable and a weak syllable), but never be light-heavy.

The last prosodic constituent discussed in this section is prosodic word, which contains one or more than one foot (other prosodic constituents will be discussed in the next section). According to Nespor and Vogel (1986), a prosodic word can never be bigger than a terminal syntactic node (i.e. a morpho-syntactic word). It can only be the same size or smaller. In Chinese, a prosodic word may contain a foot or two feet in a compound word.⁶⁸ However, to define a word in Chinese is unexpectedly difficult. According to Duanmu (2000), the closest term to 'word' in English is *zi* 'character' which refers to 'a monosyllabic written graph that in most cases is also a morpheme'. This leads to an impression that Chinese is a monosyllabic language (i.e. each morpheme/syllable has a meaning). However, in many cases, a monosyllable cannot occur alone. For instance, the character *hong* means the colour *red*. Nevertheless, it is always accompanied by another character *se*, which means colour, or *de* which does not have any semantic meaning, to form a disyllabic unit. Examples are illustrated in (71):

- (71) Wo xihuan hong-se/hong de che.
 I like red-colour/red DE car
 'I like red cars.'

There are also examples in which more than one syllable is needed to form a minimal meaningful unit. For instance, the syllables *mei* and *guei* do not carry any semantic meaning. A meaningful unit is formed only when they are combined together as a disyllabic word *meigui* 'rose'. As will be shown shortly, the tendency to form a disyllabic unit in Chinese also influences the prosodic structure of clitics.

⁶⁷ Examples are given in (71).

⁶⁸ In less frequent cases, a prosodic word can contain a tri-syllabic or quadra-syllabic foot.

In terms of clitics, a toneless clitic is clearly a weak syllable because it lacks tone and stress (recall that a heavy syllable must have tone and stress). Therefore it must attach to a heavy syllable.⁶⁹ Since a toneless clitic is not a heavy syllable, it can neither form a foot nor a prosodic word. In contrast, I will show that clitics such as *suo*, *hen* and *bu*, bear a full tone. The evidence is from the tone sandhi phenomenon.

The three clitics *suo*, *hen* and *bu* are constrained by various tone sandhi rules. Examples are given below.

(72) **Suo**

Ta	suo	xiang	de	ren	
He	SUO	miss	DE	person	'the person who he missed'
	3	3			Underlying tone
	2	3			Surface tone

(73) **Bu**

a.	Ta	bu	xiang	de	ren	
	He	not	like	DE	person	'the person who he did not miss'
		4	3			Surface tone
b.	Ta	bu	yao	de	ren	
	he	not	want	DE	person	'the person who he did not want'
		2	4			Surface tone

(74) **Hen**

Ta	hen	hao	
He	HEN	nice	'He is nice.'
	3	3	Underlying tone
	2	3	Surface tone

⁶⁹ This is similar to Chao's (1968) position according to which the pitch of a toneless clitic is in fact dependent on the preceding syllable.

Third tone sandhi (3TS, henceforth) refers to the phenomenon in which a third tone becomes a second tone when it is followed by another third tone. The effect of 3TS is shown in (72) and (74). The underlying third tone of *suo* and *hen* is changed to the second tone because they are followed by a third tone. In other words, 3TS effects show that both *suo* and *hen* carry a full tone. For *bu*, as mentioned earlier, it is a falling tone (T4) when the following morpheme has a level tone (T1), a rising tone (T2) or a rising-falling tone (T3). This is another type of tone sandhi phenomenon. Examples are given in (73a) and (73b) above. Toneless clitics, in contrast, are not constrained by tone sandhi rules because they do not have any tones.

In addition to tone-bearing, a full syllable also carries stress according to Duanmu. However, whether a tone-bearing clitic receives stress remains questionable. In fact, the two tone-bearing clitics *suo* and *hen* discussed earlier have been argued by Chiu (1995) and Chui (2000) not to carry stress. According to the discussion so far, a tone-bearing clitic cannot be a weak syllable because it has tone. Nevertheless, it cannot be a full syllable either since it does not carry stress⁷⁰. I like to suggest that the properties of tone-bearing clitics in fact explain why it appears in the proclitic position. Namely, they do not appear in the weak syllable position as toneless clitics do (i.e. an enclitic position) because they bear tone. The only possible position for them now is the one preceding their host. The reason why a tone-bearing clitic still needs to be procliticized to the host may be resulted from the observation that it does not have stress. In other words, in addition to full syllables and weak syllables, there may be another type of syllables which only carry tone but not stress. I refer to it as a tone-bearing syllable. Based on the interaction of stress, tone and the need for a host, the three possible types of syllables are illustrated in (75):

⁷⁰ The conclusion that an unstressed syllable may carry tones is against Duanmu's (2000) Tone-stress syllable principle:

(1) Tone-Stress Principle

A stressed syllable can be accompanied by an underlying tone pattern. An unstressed syllable is not accompanied by an underlying tone pattern.

(Duanmu 2000: 230)

The Tone-Stress Principle states that a stressed syllable can be optionally accompanied by tone. However, there is no optionality between an unstressed syllable and an underlying tone—an unstressed syllable is not accompanied by an underlying tone pattern. I have shown earlier that unstressed syllables such as *hen* and *suo* can in fact carry tones. Therefore, I do not follow Duanmu's Tone-Stress Principle.

(75) Three types of syllables:

	full syllable	tone-bearing syllable	weak syllable
Stress	✓	x	x
Tone	✓	✓	x
needs a host	x	✓	✓
prosodic status	foot / prosodic word	foot (not prosodic word)	no prosodic status
examples	content words	proclitics	Enclitics

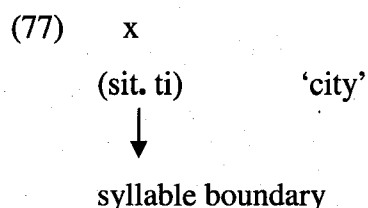
The above table shows that a full syllable which has stress and tone can be a prosodic word. Content words usually consist of full syllables. A tone-bearing syllable which has tone but not stress, can only form a foot, but not a prosodic word.⁷¹ Therefore it needs a host. Proclitics are examples of this type of syllable. A weak syllable which does not have stress and tone can form neither a foot nor a prosodic word. It needs a host in order to be prosodically licensed. Logically, there should be another type of syllable which has stress but does not bear tone. However, such a syllable does not exist in Chinese. Based on the cross-linguistic observation in which heavy syllables attract stress, Prince (1990) proposes the following principle:

(76) Weight-to-Stress Principle (WSP): If heavy, then stressed.

(Prince 1990: 357)

Prince (1990) argues that the converse of the WSP does not hold. That is, a stressed syllable is not necessarily heavy. Duanmu (2000) explains this view from English words such as *city*. The first syllable of *city* is light but it carries stress. However, Hammond (1997) argues that *city* should receive the following analysis:

⁷¹ This idea is from Yip (1980) who argues that a foot contains only one tone-bearing syllable.



With this analysis, a stressed syllable is heavy. When a stressed syllable is heavy/full in Chinese, it must carry tone as well (c.f. under Duanmu's (2000) definition). Therefore, the fourth logical possibility in which a syllable has stress but not tone is ruled out.

To summarize, both a full syllable and a tone-bearing syllable can form a foot, but weak syllables cannot. Moreover, when a foot contains more than one syllable, only a full syllable or a tone-bearing syllable, but never a weak syllable, can appear in the first syllable position (of a disyllabic foot/word). In other words, the differential behavior between toneless clitics and tone-bearing clitics is triggered by the absence of a foot in toneless clitics. There are three possible options to account for the relationship between foot and tone. First, the tone projects a foot. Second, the foot forces the realization of a tone. Third, the tone and the foot have a common source.⁷² Regardless which option is chosen, the observation in which toneless clitics are enclitics and tone-bearing clitics are proclitics still holds.

In the following section, I will show that the differential behavior between toneless clitics and tone-bearing clitics can be formalized in Optimality Theory.

3.2.1.2 An OT analysis

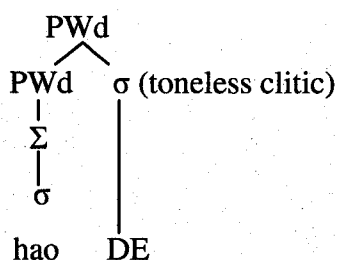
The goal of this subsection is to account for the generalizations of toneless clitics and tone-bearing clitics shown above. As discussed in the previous section, a prosodic word in Chinese contains at least one foot, and this foot can be either monosyllabic or disyllabic.⁷³ Their structures are shown below:

⁷² They are suggested by Professor Marc Brunell.

⁷³ It is possible for a foot to contain three or four syllables, but they are less common than disyllabic feet.

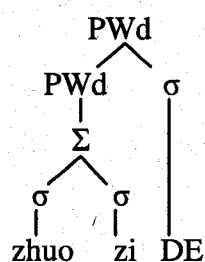
- (78) A toneless clitic joins a monosyllabic foot:

hao de
 Good DE
 'good'



- (79) A toneless clitic joins a disyllabic foot:

[Zhuo-zi de] yense
 table DE color
 'the color of the table'



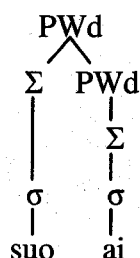
Recall that Chao (1968) argues that the pitch of a weak syllable depends on the preceding stressed syllable, his statement is supported in (78), where *hao* has stress and tone. However, in (79), the syllable preceding *de—zi*, is a weak syllable which does not have tone and stress⁷⁴. Therefore, I argue that a weak syllable such as a toneless clitic should follow a prosodic word which may contain a stressed monosyllabic foot or a disyllabic foot.

In terms of tone-bearing clitics, it always precedes a prosodic word. The following examples illustrate this structure:

⁷⁴ *Zi* is a nominal suffix, as shown in Section 2.

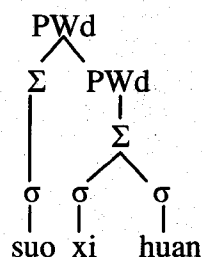
- (80) A tone-bearing clitic joins a monosyllabic foot:

ta [suo ai] de yanse
 he SUO love DE color
 'the colour that he loves'



- (81) A tone-bearing clitic joins a disyllabic foot:

ta [suo xi-huan] de yanse
 he SUO like DE color
 'the color that he likes'



The syllable that a tone-bearing clitic is proclitized to is always a full syllable (i.e. *ai* in (80), and *xi* in (81)) because a prosodic word in Chinese never begins with a weak syllable. In addition, a tone-bearing clitic can form a foot itself, following Yip (1995) who argues that a foot should contain a tone-bearing syllable. However, since a tone-bearing clitic does not carry stress, it cannot be a prosodic word. Therefore it must join another foot (equivalent to a prosodic word) in order to be prosodically licensed.

In the following section, I propose a theory to account for the distinction between these two types of clitics.

The formalization

As discussed earlier, Optimality Theory is concerned about how a correct phonological representation (the output) is formed. The correct output of toneless clitics and tone-bearing clitics can be formalized by the following constraints:

- (82)
- a. PARSE-PWd: parse every word into a prosodic word.
 - b. ALIGN (PWd, L; Ft, L): the left edge of a PWd is required to coincide with the left edge of a Foot.
 - c. SCOPE: Elements precede the domain over which they take scope.
 - d. *PWd: No prosodic word.

The first constraint PARSE-PWd belongs to a family of PARSE constraints, demanding that each segment be prosodically licensed (Prince and Smolensky 2004). This constraint requires that all words (including function words such as clitics) must be parsed into prosodic words.

The second constraint ALIGN (PWd, L; Ft, L) belongs to the alignment constraints family proposed by Selkirk (1996), as discussed in last section. This constraint requires left-alignment of the prosodic word with a foot. In other words, this constraint prevents a toneless clitic from appearing in the left edge of a prosodic word, namely, a toneless clitic which lacks tone and stress cannot be a foot. A tone-bearing clitic, in contrast, is allowed to appear in the left edge of a prosodic word since it can form a foot.

The third constraint SCOPE adopted from Billings (2002) requires that elements such as clitics, precede the domain over which they take scope⁷⁵. This constraint is based on the syntactic view according to which an element can only take scope over the domain by appearing/moving to the initial position (of the domain). It reflects on the observation that clitics always starts out in the domain-initial position (i.e. *de* as the Mod head). They only move after certain prosodic requirement (such as the first constraint).

Finally, the constraint *PWd which is the member of the family of constraints *STRUC (Prince and Smolensky 2004), aims at minimizing structure (i.e. an economy constraint). The following tableau formalizes the correct output for toneless clitics (taking *de* as an example):

⁷⁵ The domain that Billings (2002) refers to is the phrasal domain.

- (83) [Lisi xihuan de] shu
 Lisi like DE book
 'the book which Lisi likes'

Toneless clitics:

Input: de [X]	PARSE-PWd	ALIGN-L	SCOPE	*PWd
a. de [X] _ω	*!			*
b. [X] _ω [de] _ω			*	**
c. [de X] _ω		*!		*
d. [X de] _ω			*	*

ω: prosodic word

The input [XP de] contains one prosodic unit, namely a prosodic word and a toneless clitic. The candidate (a) violates the constraint PARSE-PWd because *de* is not prosodically licensed. Since this constraint is ranked the highest among all the constraints, the violation of it is considered as fatal. In other words, the violations of the rest of the constraints do not need to be considered anymore. The candidate (b) violates the constraint SCOPE because the clitic appears after X. Finally, the candidate (b) violates the constraint *PWd twice because it contains two prosodic words. The candidate (c) violates the constraint ALIGN-L because the left edge of a prosodic word is occupied by *de*, which cannot be a foot. It also violates the constraint *PWd once because it contains a prosodic word. The candidate (d) violates the constraint Scope because *de* follows X. It also violates the constraint *PWd because it contains a prosodic word. Comparing the four candidates, the candidates (a) and (c) are eliminated because they violate the two higher-ranked constraints. This leaves the candidates (b) and (d) as the final candidates. Both candidates violate two constraints. Nevertheless, the candidate (b) violates the last constraint twice while the candidate (d) only violates it once. Therefore, the candidate (d) is the optimal output.

With respect to tone-bearing clitics, the following tableau shows the formalization of constraints:

- (84) ta [suo xi-huan] de yense
 he SUO like DE color
 'the color that he likes'

Tone-bearing clitics

Input: [suo X] _ω	PARSE-PWd	ALIGN-L	SCOPE	*PWd
a. suo [X] _ω	*!			*
b. [X] _ω [suo] _ω			*	**
c. [suo X] _ω				*
d. [X suo] _ω			*	*
e. [suo] _ω [X] _ω				**

The input shows that there are two prosodic units, namely, a tone-bearing clitic which can be a foot, and a prosodic word. The candidate (a) violates the constraint PARSE-PWd because *suo* is not parsed into a prosodic word. It also violates the last constraint *PWd because it contains one prosodic word. The candidate (b) violates the constraint SCOPE because *suo* does not appear in the domain-initial position. It also violates the constraint *PWd twice because it contains two prosodic words. The candidate (c) violates the constraint *PWd once because it contains a prosodic word. The candidate (d) violates the constraint SCOPE because *suo* does not precede the prosodic word X. It also violates *PWd once because it contains a prosodic word. Finally, the candidate (e) violates *PWd twice because it contains two prosodic words. Comparing the five candidates, the candidates (a), (b) and (d) are eliminated because they violate more constraints than the candidates (c) and (e) do. Between the candidates (c) and (e), the candidate (c) wins out because it only violates the constraint *PWd once.

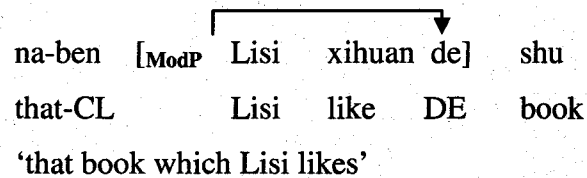
To summarize, I showed that the different behavior of toneless clitics and tone-bearing clitics is motivated by the absence of a foot in toneless clitics. It is this absence that triggers the lowering of toneless clitics out of the left edge of the first PWd of the ModP through the action of the constraint ALIGN-L. Tone-bearing clitics, in contrast, do not

require lowering because they can form a foot. I also showed that the placement of toneless clitics and tone-bearing clitics can be accounted for by ranking the proposed constraints—PARSE-PWd, ALIGN-L, SCOPE, and *PWd.

3.2.2 Prosodically-conditioned movement: where *de* moves to

I have shown that lowering of *de* is motivated by the prosodic properties of a toneless clitic. That is, a toneless clitic does not form a foot and is forced out of the left edge of the PWd. However, it is not the case that *de* can be lowered to attach to any prosodic word. I would like to suggest that actual landing site of *de* is after an intonational phrase⁷⁶, which is related to the syntactic IP⁷⁷. I argue that the relation between the intonational phrase and the syntactic IP can be captured by the three constraints within Optimality Theory. The first constraint ALIGN (IP, L, intonation phrase, L) requires that the left edge of the intonational phrase align with that of the IP. Recall that *de* starts out as the head of the modifier phrase and is lowered to attach to an IP in a relative clause shown below:

(85) Relative clause:



With the ALIGN (IP, L, intonation phrase, L) constraint, *de* is forced to move out so that the left edge of the intonational phrase can align with that of the IP. In other words, both the ALIGN (IP, L, intonation phrase, L) constraint and the ALIGN (PWd, L; Ft, L) constraint discussed in the previous section prevents *de* from attaching to the preceding prosodic word/phrase (i.e. *na ben* ‘that + classifier in (85)). The alignment constraint together with the constraint INTEGRITY (IntP) which specifies the status of the host (i.e. an intonational

⁷⁶ Structurally, *de* appears to follow an intonational phrase. But it acquires the pitch from the preceding heavy syllable/prosodic word.

⁷⁷ See Truckenbrodt (2005) who observes that an embedded clause such as a relative clause in German forms an intonational phrase, in contrast to previous analysis according to which an intonational phrase boundary is inserted only after a root clause (see the following discussion). Bošković (2001) also argues that a CP in Serbian-Croatian is an intonational phrase.

phrase) and the constraint SUFFIX that determines the direction of the attachment, correctly predict the placement of *de*.

In the following subsection, I discuss the structure of an intonational phrase and the empirical evidence showing that *de* is attached to an intonational phrase. The placement of *de* within the framework of Optimality Theory is shown in Section 3.2.2.2.

3.2.2.1 The landing site of *de*

According to Nespor and Vogel (1986), an intonational phrase is the domain of an intonation contour and the end of an intonational phrase coincides with the position where pause is inserted. For instance, parenthetical expressions, nonrestrictive relative clauses, tag questions, vocatives, expletives and certain moved elements usually form their own intonation domains. An example of nonrestrictive relative clauses is given below:

- (86) My brother [who absolutely loves animals]_{IntP} just bought himself an exotic tropical bird.

(Nespor & Vogel 1986: 188)⁷⁸

Root clauses are another type of syntactic unit that form intonation phrases, as defined by Truckenbrodt (2000) (who adopts Downing (1970)) below:

- (87) Root clauses (but not embedded clauses) are bounded by obligatory intonation phrases boundaries.

(Truckenbrodt 2005: 275)

The following pair of sentences illustrates the above definition:

- (88) a. [Billy thought his father was a merchant]_{IntP} [and his father was a secret agent]_{IntP}

⁷⁸ I changed IP to IntP (intonational phrase) in Nespor and Vogel's examples, so it will not be confused with the syntactic IP.

- b. [Billy thought his father was a merchant and his mother was a secret agent]_{IntP}

(Nespor & Vogel 1986: 189, cited from Downing (1970))

The coordinated root clauses in (88a) form two intonational phrases whereas coordinated embedded clauses in (88b) do not need to do so (but they could). Root clauses, however, may be interrupted by the specific constructions (i.e. parentheticals as shown above) which obligatorily form intonational phrases. An example is give below.

- (89) [Isabelle]_{IntP} [as you know]_{IntP} [is an artist]_{IntP}

(Nespor & Vogel 1986: 189)

The root sentence in (89) forms three intonational phrases (rather than one) because of the insertion of the parenthetical expression.

The formation of an intonational phrase also varies with speech rate, length of constituents, prominence, etc. For instance, a long intonational phrase shown in (90a) can be broken into several intonational phrases as in (90b) and (90c).

- (90) a. [My friend's baby hamster always looks for food in the corners of its cage]_{IntP}

- b. [My friend's baby hamster]_{IntP} [always looks for food in the corners of its cage]_{IntP}

- c. [My friend's baby hamster]_{IntP} [always looks for food]_{IntP} [in the corners of its cage]_{IntP}

(Nespor and Vogel 1986: 194)

Contrastive prominence can also affect the division of an intonational phrase. Examples are given in (91).

- (91) a. [Paul called Paula before Carla called Carl] _{IntP}
 b. [Paul called Paula before she called him] _{IntP}
 c. [Paul called Paula] _{IntP} [before *she*] _{IntP} [called *him*] _{IntP}

(Nespor & Vogel 1986: 196)

(91a) is assigned one intonational phrase. (91b) is also assigned one intonational phrase because it has the same syntactic structure as (91a). However, (91b) needs to be broken into three intonational phrases shown in (91c) in order to get the interpretation which is expressed by placing prominence on the pronouns.

The discussion above shows that an intonational phrase can be restructured into several smaller intonational phrases because of length of constituents and contrastive prominence. It has also shown that intonational phrases may be isomorphic to syntactic constituents shown in (90) or may not be, as shown in (91).

Returning to Chinese, the following example shows that an intonational break is always inserted after *de*:

- (92) [Chu-nian wo chu-guo de] _{IntP} [weizai niuyue
 Last year I go-ASP DE located New York
 xiangxia de] _{IntP} [hen youming de] _{IntP} fandian
 countryside DE very famous DE hotel
 'the very famous hotel that I have been to last year that is in the New
 York countryside'

An NP can be modified by an indefinite number of modifier phrases. It is shown in (92) where the NP is modified by three modifier phrases. A pause is always required after *de*. Consequently, each modifier phrase is assigned an intonational phrase.⁷⁹ I conclude that *de* must be attached to an intonational phrase from the above observation.

⁷⁹ *De* can be omitted in the first two clauses in (93) (but not in the last clause) as shown below:

(i) [Chu-nian wo chu-guo] _I [nage weizai niuyue xiangxia] _{IntP} [hen youming de] _{IntP} fandian
 Last year I go-ASP that located New York countryside very famous DE hotel
 'that hotel that I have been last year that is located in the countryside of New York that is very famous'

In the following section, I show that the placement of *de* can also be justified from a theoretical perspective.

3.2.2.2 The placement of *de*

To account for the placement of *de*, I propose the following constraints:

- (93)
- a. INTEGRITY (IntP): Intonation phrase cannot be interrupted.
 - b. SUFFIX: toneless clitics must follow an intonation phrase
 - c. ALIGN (IP, L, intonation phrase, L): An IP's left edge must coincide with the left edge of an intonation phrase.
 - d. LINEARITY: S_1 is consistent with the precedence structure of S_2 , and vice versa.

The constraint INTEGRITY (IntP) is adopted from the constraints of INTEGRITY family proposed by Anderson (1996, 2005). The INTEGRITY family serves to describe the nature of the anchoring element (e.g. the host). Specifically, they are constraints 'to the effect that material cannot be entirely contained within a domain of a certain sort unless it represents a member or element of that domain' (Anderson 2005: 145). Therefore the constraint INTEGRITY (IntP) would prevent any element (i.e. *de*) from interrupting the IntP. The second constraint SUFFIX adopted from Billings (2002), states that a toneless clitics must follow an intonational phrase. This constraint, as noted by Billings, is in fact similar to previous proposed constraints such as Anderson's (1996) NON-INITIAL constraint which prevents clitics from appearing in the clause-initial position, and Franks' (2000) PROSODIC SUPPORT constraint which requires that elements pronounced at PF to be 'prosodically parsed' (Billings 2002: 70). The ALIGN constraint requires that an IP's left edge coincide with the left edge of an intonation phrase. Finally, the constraint LINEARITY adopted from McCarthy and Prince (1995: 123) states that when an element precedes another in the input, that precedence relation should be preserved by the corresponding elements in the output. In other words, this constraint prevents the elements in the input from scrambling around in the

This said that without *de*, the clause is also assigned an intonational phrase. The clause (i.e. the IP) with the insertion of *de*, becomes a modifier phrase (syntactically). However, prosodically, the clause with the insertion of *de* remains the same—it is still an intonational phrase.

output. This constraint is ranked lower than the above constraints (i.e. it will not prevent *de* from lowering, but will keep other words stay where they are.)

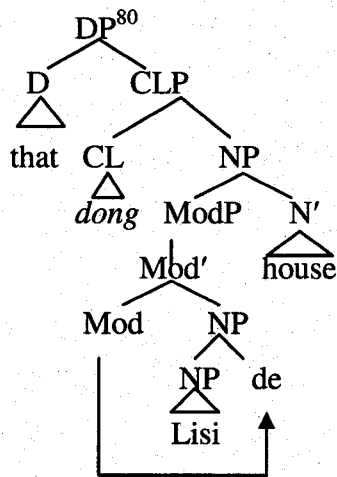
I argued that the XP in the modifier phrase can be an NP (possessive) or an AP (non-predicative adjectives). They can be formalized in the following tableaux:

(94) Possessive: when the possessor NP contains one XP

na-dong [Lisi de] fangzi

that-CL Lisi DE house

‘that house which is Lisi’s’



input: XP ₁ [de XP ₂] [XP ₃]	INTEGRITY (IntP)	SUFFIX	ALIGN-L	LINEARITY
a. XP ₁ =[de] (XP ₂) [XP ₃]			*!	
b. XP ₁ [(de=XP ₂)] [XP ₃]		*!		
c. XP ₁ [(XP ₂ = de)] [XP ₃]				*
d. XP ₁ [(XP ₂) de=] [XP ₃]		*!		

The possessor NP in (94), which forms an intonational phrase, only contains one XP (*Lisi*). As a result, the constraint INTEGRITY (IntP) is not violated by all the candidates. The

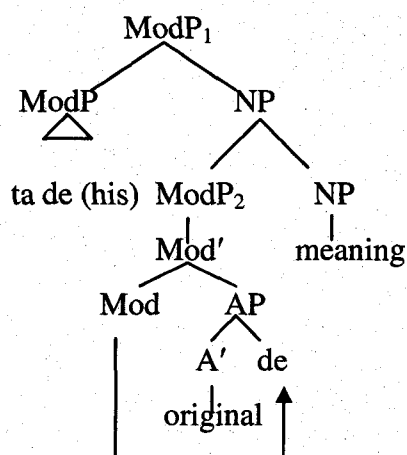
⁸⁰ Following Aoun and Li (2003), *na-dong* (that + classifier) project their own functional categories, namely DP and CIP.

candidate (a) violates the constraint ALIGN-L because *de* appears in the left edge of the intonational phrase. The candidate (b) violates the constraint SUFFIX because *de* is prefixed to an XP. The candidate (c) violates the constraint LINEARITY because *de* violates the precedence relation as shown in the input. The candidate (d) violates the constraint SUFFIX because *de* is prefixed to an XP. The first round of the competition shows that the candidate (d) is eliminated because it violates more constraints than the other candidates. The result shows that the candidate (c) is the optimal output because it only violates the lowest-ranked constraint.

I have also shown that the XP can also be an AP (non-predicative adjectives). The formalization is shown below:

(95) AP (non-predicative adjectives):

ta	de	benlai	de	yisi
he	DE	original	DE	meaning
'his original meaning'				



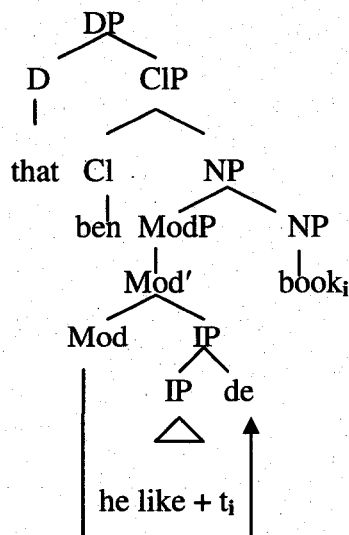
input: XP_1 [de XP_2] [XP_3]	INTEGRITY (IntP)	SUFFIX	ALIGN-L	LINEARITY
a. $XP_1=[de] (XP_2)] [XP_3$			*!	
b. $XP_1 [(de=XP_2)] [XP_3$		*!		
c. $XP_1)[(XP_2 = de)] [XP_3$				*
d. $XP_1)[(XP_2) de=][XP_3$		*!		*

The input of an AP contains three main phrases: Mod_1 , Mod_2 , and NP. They correspond to $[XP_1]$, $[de\ XP_2]$ and $[XP_3]$. Mod_1 goes through the same process as the possessive construction shown above. The focus here is Mod_2 . The tableau shows the four possible candidates generated by the input. Similar to the analysis of the possessive construction, the candidate (c) wins out because it violates the lowest-ranked constraint.

In addition to the possessive phrase and non-predicative adjective phrase, the XP in the modifier phrase can also be a relative clause. The following tableau formalizes the correct output for a relative clause:

(96) Relative clause:

na-ben [Lisi xihuan de] shu
 that-CL Lisi like DE book
 ‘that book which Lisi likes’



input: XP ₁] [de XP ₂ XP ₃] [XP ₄	INTEGRITY (IntP)	SUFFIX	ALIGN-L	LINEARITY
a. XP ₁ =[de] (XP ₂ XP ₃) [XP ₄			*!	
b. XP ₁ [(de=XP ₂ XP ₃)] [XP ₄		*!		
c. XP ₁)] [(XP ₂ =de XP ₃)] [XP ₄	*!			
d. XP ₁)] [(XP ₂ XP ₃ = de)] [XP ₄				*
e. XP ₁)] [(XP ₂ XP ₃) (de=)] [XP ₄		*!		

[]: an intonation phrase domain

(): in intonation phrase

The input of the relative clause reflects the tree structure shown above. That is, it consists of the three main phrases: DP⁸¹ (XP₁), ModP (de XP₂ XP₃) and NP (XP₄). The tableau shows five of the possible outputs generated by the input.

Candidate (a) violates the constraint ALIGN-L because *de* appears as a constituent in the left edge (*de* cannot form a constituent).⁸² Candidate (b) violates the constraint SUFFIX because *de* is prefixed to XP₂. Candidate (c) violates the constraint INTEGRITY (IntP) because the IntP (which consists of XP₂ and XP₃) is interrupted by *de*. It also violates the constraint LINEARITY because the precedence relation of *de* and other elements are not preserved in the output. Candidate (d) also violates the constraint LINEARITY for the same reason. Candidate (e) violates the constraint SUFFIX because *de* does not suffix to the IP. It also violates the constraint LINEARITY because *de* violates the precedence relation. Comparing the four candidates, the candidates (c) and (e) are eliminated first because they violate more constraints than the other candidates. The rest of the candidates only violate one constraint; however, the result shows that the Candidate (d) wins out because it violates the lowest-ranked constraint.

Finally, there is another type of the possessor NP which contains more than one XP, as shown in (97):

⁸¹ To simplify, DP here contains CIP as well.

⁸² The ALIGN-L constraint in fact forces *de* to stay within the ModP (i.e. *de* is the head of the ModP). Therefore, it is not possible for *de* to appear with XP₁ or XP₄.

(97) Possessive: when the possessor NP contains two XPs

na-dong [Lisi he Zhangsan de] fangzi
 that-CL Lisi and Zhangsan DE house
 ‘that house which is Lisi and Zhangsan’s’

input: XP ₁] [de XP ₂ Con. ⁸³ XP ₃] [XP ₄	INTEGRITY (IntP)	SUFFIX	ALIGN-L	LINEARITY
a. XP ₁] [=de] (XP ₂ Con. XP ₃)] [XP ₄			*!	
b. XP ₁] [(de=XP ₂ Con. XP ₃)] [XP ₄		*!		
c. XP ₁] [(XP ₂ =de Con. XP ₃)] [XP ₄	*!			*
d. XP ₁] [(XP ₂ Con. XP ₃ = de)] [XP ₄				*
e. XP ₁] [(XP ₂ Con. XP ₃) de=] [XP ₄		*!		*

In (97), the possessor NP (which consists of two XPs, namely, Lisi and Zhangsan) forms an intonational phrase. Similar to the possessor NP shown above, the optimal candidate is (d) because it violates the lowest-ranked constraint.

To summarize, I argued that lowering of *de* is prosodically-conditioned movement. That is, *de* needs to attach to an intonational phrase. The INTEGRITY (IntP) constraint that specifies the status of the host (i.e. an intonational phrase), the SUFFIX constraint that sets that direction of the attachment, the ALIGN constraint that requires an IP’s left edge to coincide with the left edge of an intonation phrase, and the LINEARITY constraint that prevents the elements in the input from scrambling around in the output, correctly predict the placement of *de*.

4. The syntax-phonology mapping in other function categories

In the previous section, I showed the prosodic differences between two types of clitics, namely, one being toneless and another being tone-bearing. The distinctive prosodic properties of these clitics are responsible for their placement in a sentence. In this section, I would like to show a similar prosodic pattern in other functional categories in Chinese. In other words, the placement of functional words is determined by their prosodic properties.

⁸³ Con: conjunction

4.1 Aspectual markers

The first type of functional categories is Aspect. According to Li and Thompson (1981), there are four Aspect categories in Chinese. They are shown below (T0: toneless, T4: the fourth tone):

(98) Perfective (PFV): *-le* (T0)

Ta chi-**le** yi-ge pingguo.

He eat-PFV one-CL apple

'He has eaten an apple.'

(99) Imperfective (durative: DUR): *zai* (T4), *-zhe* (T0)

a. Ta **zai** chi pingguo.

he DUR eat apple

'He's eating an apple.'

b. Ta chi-**zhe** pingguo.

he eat-DUR apple

'He's eating an apple.'

(100) Experiential (EXP): *-guo* (T0)

Ta chi-**guo** pingguo

He eat-EXP apple

'He has eaten an apple.'

(101) Delimitative: reduplication of verb (T0)

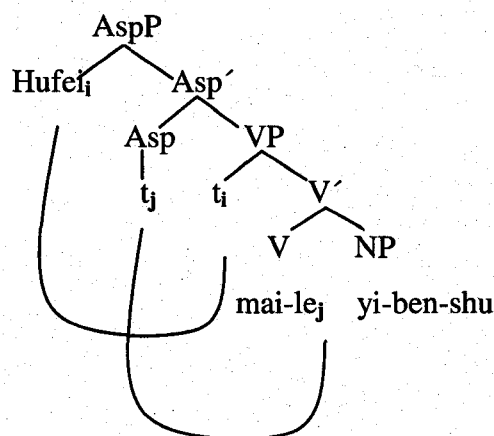
Ni shi (T4)-**shi** (T0) kan

You try-try see

'You try and see.'

As shown in the above examples, all the aspectual markers and the reduplication of verb are toneless, except the durative marker *zai*.⁸⁴ Interestingly, *zai* also occurs in different syntactic positions from the other aspectual markers. That is, *zai* appears preverbally, while its counterpart *-zhe* appears postverbally.⁸⁵ Syntactically, Aspect has been argued to head an independent projection, namely, AspP (Cheng 1991). The structure of an AspP taken from Cheng (1991) is shown below:

- (102) Hufei mai-le yi-ben-shu
 Hufei buy-ASP one-CL-book
 ‘Hufei bought a book.’



(Cheng 1991: 12)

The structure in (102) is different from languages such as English in the following respects. First, there is no INFL node. Cheng attributes it to the fact that Chinese does not have inflection. Second, the subject is base-generated in the SPEC of VP, and raised to the SPEC of AspP. Finally, Cheng argues that the aspectual marker *-le* lowers to the verb at S-structure. With regard to the aspectual marker *zai*, Cheng suggests that it does not lower. Only affixes

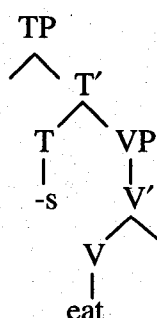
⁸⁴ Li and Thompson (1981) refer to toneless aspectual markers, *-le*, *-zhe*, *-guo* as suffixes, and the tone-bear aspectual marker *zai* as a word.

⁸⁵ Both *zai* and *-zhe* signal the ongoing nature of the event. They can be used interchangeably for activity verbs such as *eat*, *run*, *hit*, etc. In some cases, one is preferable than another. For instance, *-zhe* is used for verbs of posture as shown in the following:

- i. Ta zai yizi-shang zuo-zhe
 He at chair-on sit-DUR
 ‘He’s sitting on the chair.’

would lower. However, if affixation is the reason for lowering, one cannot explain the Aspect category in (101) where reduplication of verb is not a suffix, but appears in the same position as a suffix (i.e. the postverbal position). Moreover, as discussed in the previous chapter, certain lowering movement operations cannot be done at the level of syntax. For instance, in English, tense morphology appears on the main verb despite the fact that the main verb does not move to T(ense) in the syntactic derivation (Embick and Noyer 2001). This is an example of mismatch between morphology and syntax.

(103) He eat-s an apple.



In (103), the verb 'eat' does not move to T in syntax derivation. A morphological operation of *lowering* must be performed in order to get the surface order of 'He eat-s an apple'. It has been shown throughout the chapter that morphological movement operations such as *lowering* that cannot be explained by syntactic principles should in fact take place at the syntax-phonology interface. At the interface, morphological movements can be performed based on phonological principles. In other words, lowering is a prosodically-conditioned movement triggered by the prosodic properties of the relevant elements, such as aspectual markers.

Similar to the Modifier phrase structure, the AspP is head-initial and headed by an aspectual marker. The head directionality of the AspP is consistent with other phrase categories in Chinese. I would like to suggest that when an aspectual marker is toneless, it must undergo a prosodically-conditioned movement to the position where their prosodic properties can be accommodated. Accordingly, a toneless aspectual marker is prohibited

from a domain-initial position.⁸⁶ The tone-bearing aspectual marker *zai*, in contrast, remains in their underlying position because its prosodic properties meet the requirement of being the domain-initial position. Under this approach, the puzzle that only aspectual markers such as *le* (toneless), but not *zai* (tone-bearing) is lowered can be easily solved.

4.2 Sentence final particles

I have shown in Chapter 2 that Chinese has a rich system of sentence final particles. All of these markers are toneless and unstressed. They are repeated as follows:

(104) a. *le*: ‘currently relevant state’

ta	chu-qu	mai	tongxi	le
he	exit-go	buy	thing	SFP

‘He has gone shopping.’

b. *ne*: ‘response to expectation’

ta	hen	kaixin	ne
he	very	happy	SFP

‘He is very happy.’

c. *ba*: ‘solicit agreement’

women	zou	ba
we	go	SFP

‘Let’s go!’

d. *ou*: ‘friendly warning’

xiaoxin	ou
careful	SFP

‘Be careful, OK?’

⁸⁶ Regardless the domain is a foot, a prosodic word or a prosodic phrase.

e. a/ya: 'reduce forcefulness'

shei a/ya?

who SFP

'Who is it?'

f. ma: 'question'

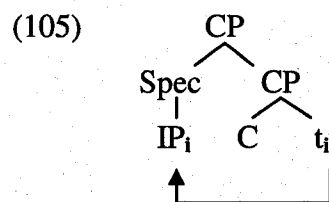
ni hao ma?

you good SFP

'How are you?'

(Li & Thompson 1981:238-313)

As discussed in Chapter 2, sentence-final particles have been analyzed as head-final complementizers, occupying the C position (Tang 1989). However, the head finality of CP is not compatible with other phrase categories in Chinese and it has faced challenges in the literature. In contrast, Sybesma (1999) argues that SFPs are head-initial complementizers, selecting an IP complement to its right. This argument is based on Kayne's (1994) head-initial universal according to which the head finality in the surface word order is derived by moving the complement of the head to the Spec position, repeated below:



(Sybesma 1999: 281)

Sybesma's head-initial CP is in line with other head-initial phrase categories in Chinese. However, as discussed earlier, one problem with Sybesma's analysis is that not all sentence final particles are wh-words as shown in (104). Only question particles like *ne* and *ma*, are likely to be involved with wh-movement. In view of the prosodic status of sentence-final particles, namely, being toneless and unstressed, I would like to suggest that lowering of the complementizer at the syntax-phonology, similar to the type of lowering discussed in the

previous section, might be an alternative solution. I will leave this possibility for future research.

5. Conclusion

In this chapter, I proposed a prosodic account, arguing that lowering of *de* is motivated by its prosodic properties. Being a toneless clitic, *de* cannot stand alone as an independent prosodic constituent. Rather, it needs to attach to an accented element. I showed that there are in fact two types of clitics in Chinese, one being toneless and another being tone-bearing. The distinction between these two types of clitics lies on the observation in which foot is absent in toneless clitics, but not tone-bearing clitics. It is this absence which forces lowering of *de* out of the left edge of the first PWd of the ModP. The generalization based on the behavior of these two types of clitics was accounted for by Optimality Theory. Finally, I showed that other functional categories in Chinese such as aspectual markers and sentence-final particles exhibit a similar prosodic pattern as toneless and tone-bearing clitics. For instance, the tone-bearing aspectual marker *zai* appears preverbally while the toneless aspectual marker such as *le* appears postverbally. In other words, the placement of functional words is determined by their prosodic properties.

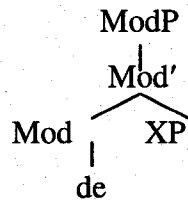
Chapter 6 Conclusion

1. Summary

The main goal of this dissertation is to investigate head directionality of Chinese relative clauses. This investigation is motivated by the basic observation that, apart from relative clauses, Chinese is a head-initial language. I proposed a theory from a syntax-phonology interface perspective, arguing that relative clauses are in fact head-initial in line with other phrase categories in Chinese.

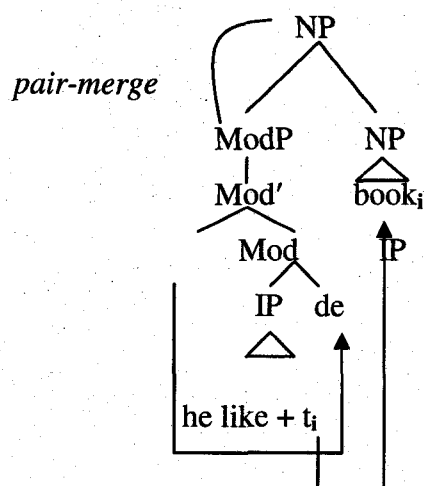
I argued that relative clauses in Chinese receive a head-initial modifier phrase analysis, following Rubin (in prep.):

- (1) The structure of the modifier phrase



The modifier phrase is headed by *de*, which selects an XP, such as IP, NP or AP, as its complement. This hypothesis not only provides a unified analysis of *de*, but also defines the functional properties of *de*. In other words, *de* is the head of the modifier phrase, triggering modifying relations. To derive the surface word order, I proposed a derivation involving two movement operations for argument relativization. First, the head noun is raised from inside the relative clause. Second, *de* is lowered to attach to the relevant phrase category at the syntax-phonology interface. An example of deriving a relative clause is illustrated below:

- (2) ta xihuan de shu
 he like DE book
 'the book that he likes'



The first step involves raising the head noun from the IP (i.e. reconstruction effects), and merging the ModP into the dominant NP. The second step of derivation requires lowering of *de* to attach to the IP as shown above. The main argument of lowering *de* is built upon the evidence that *de* behaves like a clitic. I showed that there are in fact two types of clitics in Chinese, one being toneless and another being tone-bearing. A toneless clitic lacking tone and stress needs to be lowered to attach to the host (i.e. in the enclitic position). In contrast, a tone-bearing clitic does not require lowering. Therefore, it always appears in the proclitic position. The distinction between these two types of clitics is triggered by the absence of a foot in the toneless clitics. It is this absence which forces lowering of *de*. The generalization based on the behavior of these two types of clitics is accounted for in Optimality Theory. Finally, I showed that the position of other functional categories such as aspectual markers and sentence-final particles in Chinese is influenced by their prosodic status.

2. Conclusion

This dissertation contributes to the longstanding debate about the head directionality of phrase categories, with special reference to relative clauses. On the one hand, the conclusion that Chinese relative clauses are head-initial provides positive evidence to the view that phrase categories in Chinese are consistently head-initial. On the other hand, it also lends support to the Head-Direction Parameter according to which all phrase categories in one language are either head-initial or head-final. This study also sheds light on the prosodic properties of *de* and other functional categories such as aspectual markers and sentence-final

particles in Chinese. The findings that there are two types of clitics in Chinese account for the following observation—a tone-bearing clitic always appears in the proclitic position while a toneless clitics must occupy the enclitic position. These findings bring important implications to other functional categories which also share similar prosodic properties, such as aspectual markers and sentence-final particles. That is, the prosodic properties of these elements may determine their positions in a sentence.

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