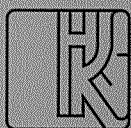
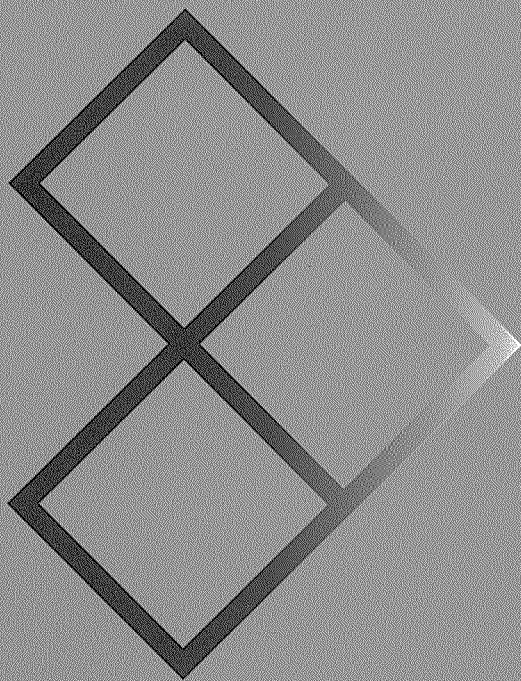


# STUDIES IN CHINESE LINGUISTICS



LINGUISTIC SOCIETY OF HONG KONG

# **Studies in Chinese Linguistics**

edited by

GU Yang

**Linguistic Society of Hong Kong**

**1998**

First published 1998 by  
The Linguistic Society of Hong Kong  
G.P.O.Box 9772, Hong Kong

ISBN 962-7578-03-7

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Printed in Hong Kong by Wah Cheong Printing Press Lit.

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## Acknowledgments

The publication of this volume is partially funded by the Freemason's Fund for East Asian Studies. The Organization's generous support is gratefully acknowledged.

The editor would also like to acknowledge the support of the reviewers who gave criticisms and valuable comments to the draft version of the articles published in this volume.

The editor wishes to express special thanks to HUANG Pai Yuan and WONG Nai Fai for their help at various points when the book manuscript was being prepared. Without their help, this book would still be at its primitive stage.

Finally, the editor is grateful to all the contributors and the audiences at the two linguistics events who have made the articles in this volume their present form.

## Preface

As a continued effort to the Linguistic Society of Hong Kong book series of grammatical studies in the Chinese languages in Hong Kong, this collection of articles attempts to report a number of new findings by local Chinese linguists. The nine articles were selected from two sources, a research Workshop of Chinese Syntax and Semantics in 1994 and the Annual Research Forum of 1994, organized by the Linguistic Society of Hong Kong. The majority of the authors have been teaching and conducting research in Hong Kong. A few of them were based on Hong Kong when their research published in this volume was being conducted. The articles concentrate on studies of Mandarin Chinese, a focus which has gained increasing attention in the region in recent years.

The topics of these articles range over various aspects of Mandarin Chinese. Some authors address issues in Chinese linguistics from a comparative perspective, such as Gladys TANG and GU Yang's article on the properties of reflexive pronouns in English and Chinese, and YANG Xiaolu's article on English subjects and the Mandarin null arguments. Others address issues in syntax and morphology. HE Yuanjian discusses the Chinese A-not-A and A-not-AB interrogative sentences. In view of their interaction with the aspectual system of the language the author suggests treating these interrogative forms as stemming from the lexicon. SHI Dingxu, WANG Lidi, and GU Yang, attempt to provide explanations to Chinese verb formation and compound formation in the absence of overt morphological marking in the language. Issues relating to the interface between the lexicon and morphosyntax are addressed in the articles by these authors. Semantic issues are also a concern. JIANG Yan's article offers new perspectives on interpreting scope differences in Chinese, and Tom LAI and HUANG Changning's article discusses a new approach to computing Chinese sentences by making reference to semantic information. Jenny WANG's article focuses on the phonological aspect of Mandarin Chinese by examining five Beijing high vowels and provides derivational mechanisms for these vowels. The area of second language learning is represented by the two articles on comparative studies mentioned earlier. YANG Xiaolu's article investigates the acquisition of subjects in English by speakers of Chinese, a language which often allows omitted subjects. Gladys TANG and GU Yang's article concerns the effects of binding differences on Chinese learners of English.

It is hoped that the content of this volume can add to the existing richness of Chinese linguistics and Chinese language study. It is also hoped that the publication of the volume will continue to facilitate scholarly exchanges between local and overseas researchers, as has been intended in the Society's endeavor to publish this research series.

*GU Yang*

# A-NOT-A QUESTIONS REVISITED\*

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The widely-accepted analysis of Huang (1988) for “A-not-A” questions in Mandarin Chinese fails to explain how the aspectual system interacts with “A-not-A” forms. A new analysis is proposed to resolve this problem, with a focus on “A-not-AB” and “A-not” questions. The analysis treats the sequence “A-not” rather than “A-not-A” as a constituent at both syntactic and lexical level. It further treats “not” as a question particle in this sequence. As a result, previously unexplained interactions between aspect markers and “A-not-A” forms are now accounted for.

## 1. INTRODUCTION

“A-not-AB” questions refer to sentences such as in:

- (1) ni    chi-bu-chi   fan?  
you   eat-not-eat meal/rice  
‘Will you eat?’
- (2) ni    xi-bu-xi-huan    ta?  
you   like-not-like-enjoy him  
‘Do you like him?’

(1) represents a syntactic “A-not-AB” construction and (2) a lexical one. The key to differentiating one from the other is the “B” part of the symbolic configuration.

In syntactic A-not-AB constructions, “A” is a head-of-phrase category,<sup>1</sup> and “B” material immediately following “A”. Sometimes, “B” is a constituent, such as the NP “fan” (rice/meal) in “chi-bu-chi fan” (eat-not-eat rice/meal); sometimes “B” is not a constituent, such as “Meiguo lai” (America come) in “cong-bu-cong Meiguo lai” (from-not-from America come) where “A” is the preposition “cong” (from). Note that we identify a syntactic “A-not-AB” construction in this way because it is consistent with the way in which we may identify other A-not-A questions. For example, in “AB-not-AB” questions like “cong Meiguo lai bu cong Meiguo lai” (from America come not from America come), where “A” is the preposition “cong” (from) and “B” the material that immediately follows “A”, i.e. “Meiguo lai” (America come).

In lexical "A-not-AB" constructions, however, "B" is part of a word, such as "huan" (enjoy = morpheme) in "xi-bu-xi-huan" (like-not-like-enjoy). Here, "AB" (rather than "A" alone) represents a head-of-phrase category of which "A" and "B" are a part.<sup>2</sup>

### 1.1. *Previous Analyses*

The traditional analysis treats both syntactic and lexical "A-not-AB" questions as being derived from conjoined predicate structures to which coordination deletion applies (Ding et al 1961; Chao 1968; Wang 1965, 1967, 1988; Tang 1984a-b; Fan 1982; Lu 1985; Lin 1985; Zhu 1981, 1985, 1991). So, (1) and (2) are said to have been derived from the processes illustrated in (3) and (4) respectively:

- (3) ni [chi fan][bu chi fan] => ni [chi Ø][bu chi fan]  
 you [eat meal][not eat meal]
- (4) ni [xihuan ta][bu xihuan ta] => ni [xi-Ø<sub>1</sub> Ø<sub>2</sub>][bu xihuan ta]  
 you [like-enjoy him][not like-enjoy him]

Huang (1988) argues against the traditional analysis by pointing out that it will not work in either syntactic or lexical "A-not-AB" questions. Consider:

- (5) ta cong-bu-cong Meiguo lai?  
 he from not from America come  
 'Is he from America?'

Were (5) derived from coordination deletion, the deletion process could be illustrated in:

- (6) ta [cong Meiguo lai][bu cong Meiguo lai] =>  
 ta [cong<sub>1</sub> Ø<sub>1</sub> Ø<sub>2</sub>][bu cong Meiguo lai]

As we see, the deletion site "Ø<sub>1</sub>" results in preposition stranding, which is as is well known not permitted in Chinese. The conclusion is, therefore, (5), a syntactic "A-not-AB" construction, is not derived from coordination deletion.

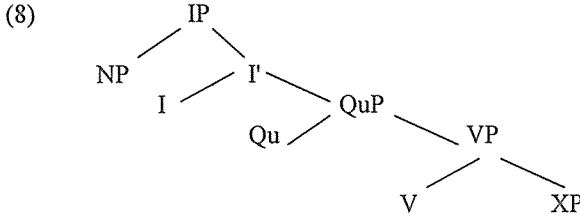
Deletion analysis does not work for lexical "A-not-AB" constructions either. Resume the example (2) and consider the deletion process in question in (4). The deletion site "Ø<sub>1</sub>" in (4) is at word level and hence impossible because deletion in syntax, i.e. that which

creates the deletion site " $\emptyset_2$ ", does not extend to morphology, otherwise it violates the Lexical Integrity rule, as Huang (1988) pointed out.

Huang therefore concludes that "A-not-AB" constructions as a whole are not derived from coordination deletion but from a different process as illustrated in:

- (7)  $[[A] B] \Rightarrow [[A-A] B]$  (A-Reduplication)  
 $\Rightarrow [[A\text{-not-}A] B]$  (Neg-insertion)

According to Huang (1988), A-reduplication and Neg-insertion in (7) are driven by phonological rules which are "triggered off" by the functional category Qu that is contained in an "A-not-AB" question. The symbol Qu stands for *Question* and embodies the interrogative function of a question sentence. To illustrate, we follow Huang (1988) and assume the deep structure of an "A-not-AB" question in (8), in which V represents the head-of-phrase category "A" or "AB".<sup>3</sup>



(8) will be a syntactic "A-not-AB" construction when the verb represents "A" and the complement to the verb is "B". Resuming the example (1), we have the analysis in (9) (with the irrelevant details omitted):

- (9)  $[_{IP} \text{ ni } [_{QuP} [_{Qu} [_{VP} \text{ chi fan } ]]] \Rightarrow [_{IP} \text{ ni } [_{QuP} [_{Qu} [_{VP} \text{ chi-bu-chi fan } ]]]]$   
 $\downarrow \quad \uparrow$

" $\downarrow \quad \uparrow$ " indicates the "Qu-triggered" execution of the derivational processes in (7).

(8) will be a lexical "A-not-AB" construction when the verb represents "AB", in which both "A" and "B" are part of the verb. Resuming the example (2), we have the analysis in (10) (with the irrelevant details omitted):

- (10)  $[_{IP} \text{ ni } [_{QuP} [Qu] [_{VP} \text{ xi-huan ta } ]]] \Rightarrow$   
 $\downarrow \quad \quad \uparrow$   
 $[_{IP} \text{ ni } [_{QuP} [Qu] [_{VP} [[\text{xi-bu-xi}] \text{ huan}] \text{ ta } ]]]$

The strengths of Huang's (1988) analysis are: (a) it has established that "A-not-AB" questions are not derived from conjoined predicates, (b) these questions contain an functional category Qu, and (c) it has offered a uniformed treatment for both syntactic and lexical "A-not-AB" constructions.

### 1.2. *Interaction of Aspect with A-not-A Forms*

However, Huang's analysis cannot explain one major fact in "A-not-A" questions, i.e. the interaction of such forms with aspectual markers. Consider:

- (11) a. ta [lai mei lai] Meiguo  
           he come not come America  
       b. ta [lai mei-you lai] Meiguo  
           he come not-asp come America  
       c. ta [lai-le mei lai] Meiguo  
           he come-asp not come America  
       d. ta [lai-le mei-you lai] Meiguo  
           he come-asp not-asp come America  
       - a, b, c & d: 'Has he arrived in America?'
- (12) a. ta [lai mei lai-guo] Meiguo  
           he come not come-asp America  
       b. ta [lai mei-you lai-guo] Meiguo  
           he come not-asp come-asp America  
       c. ta [lai-guo mei lai-guo] Meiguo  
           he come-asp not come-asp America  
       d. ta [lai-guo mei-you lai-guo] Meiguo  
           he come-asp not-asp come-asp America  
       - a, b, c & d: 'Has he been to America?'

- (13) a. ta [lai-guo-le mei lai-guo] Meiguo  
           he come-asp-asp not come-asp America  
       b. ta [lai-guo-le mei-you lai-guo] Meiguo  
           he come-asp-asp not-asp come-asp America  
       - a & b: 'Has he ever been to America?'

The derivations laid out by Huang as in (7) will fail to produce some of the "A-not-A" forms in (11)-(13). Taking the "A-not-A" form in (13a) for example, derivations according to Huang are as follows:

- (14) lai-guo-le  
       V-asp1-asp2  
       ↓  
       ▼ **Reduplication**  
       lai-guo-le lai-guo-le  
       V-asp1-asp2 V-asp1-asp2  
       ↓  
       ▼ **Neg-insertion**  
       \* lai-guo-le mei lai-guo-le  
       V-asp1-asp2 Not V-asp1-asp2

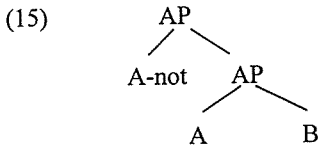
However, as we see, the final result of (14) is ungrammatical, strongly suggesting that the analysis is faulty. As we have seen in (13a), the correct form is "lai-guo-le mei lai-guo" (come-asp1-asp2 not come-asp1), the aspect marker "le" (asp2 here) does not co-occur with the second verb. Thus, it appears that Huang's (1988) analysis is not adequate enough to account for such interactions between aspect markers and "A-not-A" forms, and a new analysis is called for.

## 2. A NEW ANALYSIS

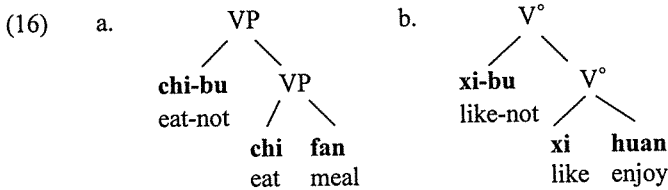
The new analysis preserves the uniformed treatment of syntactic and lexical "A-not-AB" constructions by Huang (1988), but will not adopt his technology of derivation. Crucially, we no longer treat "A-not-A" forms as a single sequence. Instead, it is split into "A-not" and "A". In "A-not", "not", i.e. Neg, functions as a question particle and is suffixed to "A" to form an interrogative morphology, just as aspect markers are suffixed to verbs to form aspectual morphology in Chinese. This treatment is not without foundation. Firstly, Neg in

"A-not-A" questions plays no role of negation. Secondly, the interrogative function of modern Chinese negating items has been a historical heritage, which I shall come to explain later in section 4.0.

Under our new analysis, "A-not-AB" constructions, either syntactic or lexical, have the base-generated structure in:



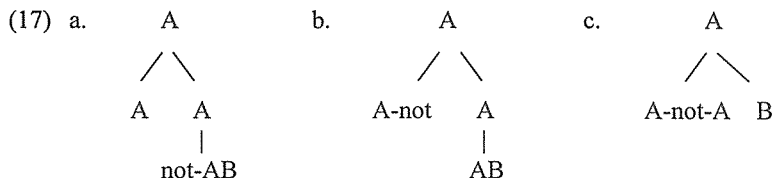
To illustrate, (16a) is syntactic "A-not-AB", and (16b) a lexical one:



A lexical structure like (16b) can be either *strongly lexical*, i.e. it represents a word, or *weakly lexical*, i.e. it represents a syntactic construct with morphological representation. Here, I tend to treat it as the latter, because: a) as Zhu (1991) points out, the influence of a syntactic "A-not-AB" construction on morphology is a fairly recent event of the Chinese language; and b) "being a lexical item" does not reduce to being "listed" in Lexicon (Di Sciullo & Williams 1987). As a syntactic construct, a (weakly) lexical structure like (16b) will be a subtree in a phrasal structure, with its root node labeled with an  $X^0$  category, hence differing from phrasal structures or trees which have a root node  $X^n$ ,  $n > 0$  (Sadler & Arnold 1993). Evidence for the constituent structure in (15) may be based on a number of facts.

## 2.1. Constituency

There are three possible constituent structures for an "A-not-AB" construction:



For lexical constructions, we may have such pause patterns as follows, where the vertical line " | " indicates a pause.

(18)	A:	B:	C:
a.	xi-bu   xi-huan like-not   like-enjoy	*xi   bu-xi-huan	*xi-bu-xi   huan
b.	shui-bu   shui-jiao sleep-not   sleep-sleep	*shui   bu-shui-jiao	*shui-bu-shui   jiao
c.	gao-bu   gao-xing happy-not   happy-joy	*gao   bu-gao-xing	*gao-bu-gao   xing
d.	wei-bu   wei-da great-not   great	*wei   bu-wei-da	*wei-bu-wei   da

Native speakers find the A column acceptable, but not the B or C columns. This suggests that the structure in (15) may correctly represent the lexical "A-not-AB" construction.

For syntactical "A-not-AB" constructions, consider the coordination deletion patterns in (19)-(26):

- (19) a. ni mai bu mai bao, mai bu mai shu?  
you buy not buy newspaper, buy not buy book  
b. ni mai bu mai bao, Ø mai shu?  
you buy not buy newspaper, buy book  
- a & b: 'Will you buy newspapers and books?'  
c. \* ni mai bu mai bao, Ø shu?  
you buy not buy newspaper, book
- (20) a. ni renshi bu renshi ta, renshi bu renshi wo?  
you know not know him, know not know me

- b. ni renshi bu renshi ta, Ø renshi wo?  
 you know not know him, know me  
 - a & b: 'Do you know him and me?'
- c. \* ni renshi bu renshi ta, Ø wo?  
 you know not know him, me
- (21) a. ni qing bu qing ta chi fan, qing bu qing ta he  
 you invitenot invite him eat meal, invitenot invitehim have  
 cha?  
 tea
- b. ni qing bu qing ta chi fan, Ø qing ta he cha?  
 you invite not invite him eat meal, invite him have tea  
 - a & b: 'Will you invite him for a meal and for tea?'
- c. \* ni qing bu qing ta chi fan, Ø ta he cha?  
 you invite not invite him eat meal, him have tea
- (22) a. ni song bu song shu gei ta, song bu song bao  
 you send not send book to him, send not send newspaper  
 gei ta?  
 to him
- b. ni song bu song shu gei ta, Ø song bao gei ta?  
 you send not send book to him, send newspaper to him  
 - a & b: 'Do you send newspapers and books to him?'
- c. \* ni song bu song shu gei ta, Ø bao gei ta?  
 you send not send book to him, newspaper to him
- (23) a. ni xiu bu xiu hua zai zhentou-shang,  
 you embroider not e. flower at pillow-on,  
 xiu bu xiu niao zai zhentou-shang?  
 e. not e. bird at pillow-on
- b. ni xiu bu xiu hua zai zhentou-shang, Ø xiu  
 you embroider not e. flower at pillow-on, e.  
 niao zai zhentou-shang?  
 bird at pillow-on  
 - a & b: 'Do you embroider flowers and birds on the pillow?'
- c. \* ni xiu bu xiu hua zai zhentou-shang, Ø niao  
 you embroider not e. flower at pillow-on, bird  
 zai zhentou-shang?  
 at pillow-on

- (24) a. ni qian bu qian ta qian, qian bu qian ta qing?  
 you owe not owe him money, owe not owe him favours  
 b. ni qian bu qian ta qian, Ø qian ta qing?  
 you owe not owe him money, owe him favours  
 - a & b: 'Do you owe him any money and favours?'  
 c. \* ni qian bu qian ta qian, Ø ta qing?  
 you owe not owe him money, him favours  
 (25) a. ni pao bu pao-de kuai, pao bu pao-de wen?  
 you run not run-particle fast, run not run-particle steady  
 b. ni pao bu pao-de kuai, Ø pao-de wen?  
 you run not run-particle fast, run-particle steady  
 - a & b: 'Can you run fast and steady?'  
 c. \* ni pao bu pao-de kuai, Ø wen?  
 you run not run-particle fast, steady

Clearly, (19)-(25) show that the sequence "A-not", but not "A-not-A" deletes, indicating that "A-not" is a constituent immediately dominated by the conjunct, a VP in this case (cf. the Immediate Dominance Condition Tsai 1969). Further, the fact that the sequence "A-not-A" does not delete suggests that it is unlikely a constituent. Given these facts, we may conclude that the structure in (15) also correctly represents a syntactic "A-not-AB" construction.

## 2.2. *A-not Questions*

Being a constituent, the "A-not" sequence can therefore occur on its own as a question. This is exactly the case throughout the history of the Chinese language. According to Mei (1978), Yi (1989), Liu (1994) and Sun (1994), "A-not" questions occurred as early as in Archaic Chinese when "A-not-A" questions did not even exist, as the following examples show:

- (26) a. 既已告矣,未知中否?《庄子·天地》  
 ji yi gao yi, wei zhi zhong-fou (Zhuangzi.Tiandi)  
 as already tell ptl., not know OK-not  
 'I have informed him, but do not know if it is OK.'  
 b. 問諸道略,不知信否?《左傳·定公四年》  
 wen zhu daolue, but zhi xin-fou (Zuo.Ding.4)  
 ask him-at strategy, not know believe-not  
 'Ask him about strategies. I do not know if you believe them or not.'

- c. 宦三年矣,未知母之存否?《左傳·宣公二年》  
 huan san nian yi, bu zhi mu zhi cun-fou  
 be-official three year ptl., not know mother Foc exist-not  
 (Zuo.Xuan.2)  
 ‘I’ve been in office for 3 years now. I don’t know if my mother is still alive.’
- d. 我不識能至否?《孟子·公孫丑下》  
 wo bu shi neng zhi-fou (Mengzi.Gongsunchou.Xia)  
 I not know able reach-not  
 ‘I do not know if he could reach the court.’

In (26a-d), a verb and the negating item “fou” (not) form a A-not sequence functioning as a question.<sup>4</sup>

“Fou” continued to occur in “A-not” questions after the Archaic period, as in (27), as other forms of Neg emerged, as in (28)-(31):

- (27) a. 秦王以十五城請易寡人璧,可予否?《史記·廉頗藺相如列傳》  
 Qin-wang yi shiwu cheng yi gua-ren bi, ke  
 Qin-King use 15 city exchange my jade, may  
 yu-fou (Shiji)  
 give-not  
 ‘The Emperor of Qin has promised me fifteen cities for my jade. Shall I give it to him?’
- b. 廉頗老矣,尚能飯否?《史記·廉頗藺相如列傳》  
 Lianbo lao yi, shang neng fan-fou (Shiji)  
 Lianbo old ptl., still can eat-not  
 ‘Sir Lianbo is very old. Can he still eat well?’
- c. 視吾舌尚在否?《史記·張儀列傳》  
 shi wu she shang zai-fou (Shiji)  
 see my tongue still be-at-not  
 ‘See if my tongue is still there?’
- (28) 人主唯天下安社稷固不耳?《漢書·賈誼傳》  
 ren-zhu wei [tian-xia an she-ji gu] -bu er (Hanshu)  
 king concern [society stable state secure]-not ptl.  
 ‘Is it the case that the emperor is concerned with the stability and security of his state?’

- (29) 汝意云何，爲欲歸不？（《出曜經》，《大正藏》IV，691b）  
 ru yi yun he, wei yu gui-bu (Dazhengzang.4)  
 you intend say what, do wish return-not  
 'What do you want to say? Do you wish to return?'
- (30) 師云：“那個人還吃不？”（《祖堂集》2.10）  
 shi yun: na-ge ren hai chi-bu (Zutangji)  
 master say: that person still eat-not  
 'The Master asks, "Will that person still eat?"'
- (31) 今日上不至天，下不至地，可以言未？《三國志·諸葛亮傳》  
 jin-ri shang bu zhi tian, xia bu zhi di, keyi  
 today up not to heaven, down not to earth, may  
 yan-wei (Sanguozhi)  
 speak-not  
 'There is no body around today. Can you talk?'

In the present day Chinese (particularly in northern China), "A-not" questions are still in wide use, such as:

- (32) ta lai bu?  
 he come not  
 'Will he come?'
- (33) ni chi bu?  
 you eat not  
 'Will you eat?'

In (32)-(33), Neg appears to function as a question particle. For one thing, Neg here plays no part of negation, and is in fact in complementary distribution with one that negates, as in shown:

- (34) a. ta bu lai.  
 he not come  
 'He will not come.'
- b. \* ta bu lai bu?  
 he not come not  
 (Does he not come?)

- (35) a.   ni    bu   chi.  
           You not eat  
           ‘You do not eat.’  
       b. \* ni    bu   chi bu?  
           you not eat not  
           (Do you not eat?)

Secondly, Neg in "A-not" questions is an independent item in the sense that it is not derived from "A-not-A" constructions as some authors believe (e.g. Zhu 1985, 1991). To illustrate, if we take the view that "A-not" questions are derived from "A-not-A" ones, then the analysis in (36) ought to be correct:

- (36)   ni    [lai]    [bu lai]   =>   ni    [lai]    [bu Ø]  
       you [come] [not come]        you [come] [not Ø]

But such an analysis fails to work in a number of cases. Consider:

- (37)   ni    pao-de    kuai bu?  
       you run-particle fast not  
       ‘Can you run fast?’  
       (38)   ni    shang   xuexiao qu    bu?  
           you ascend school go not  
           ‘Will you go to school?’  
       (39)   zhe   ping   jiu   ba   Zhangsan   zui-de        dao bu?  
           this   bottlewine BA   Zhangsan   drunk-particle fall not  
           ‘Can this bottle of wine make Zhangsan drunk?’  
       (40)   ni    mai-de   qi bu?  
           you buy-afford not  
           ‘Can you afford it?’

Supposing the analysis in (36) is correct, then it should work for (37)-(40). Then we would be able to re-construct (37)-(40) before deletion:

- (37)' \* ni [pao-de kuai] [bu pao-de kuai]  
       (38)' ?? ni [shang xuexiao qu] [bu shang xuexiao qu]  
       (39)' \* zhe ping jiu [ba Zhangsan zui-de dao] [bu ba Zhangsan zui-de dao]  
       (40)' \* ni [mai-de qi] [bu mai-de qi]

These are simply ungrammatical, suggesting that we cannot derive sentences like (37)-(40) under the analysis in (36).

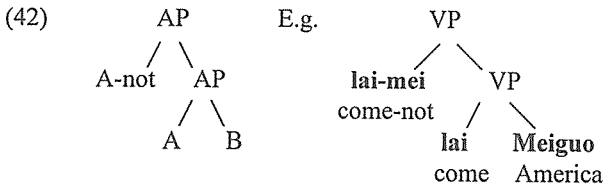
Instead, if we treat Neg in “A-not” questions as a question particle, namely, to adopt the structure (15), “A-not” questions can be analysed simply as in (41):

(41) Subject [A-Not]

### 3. ASPECT MARKING IN A-NOT-A FORMS

We now turn to (11)-(13), containing “A-not-A” forms of complex aspectual markings. Our new analysis offers a principled account for them.

Under the structure (15), syntactic “A-not-AB” constructions are represented as such in:



All lexical items, i.e. “A-not”, “A” and “B”, are base-generated from the Lexicon.

This means, firstly, items that carry aspectual markers comply with the morphological schema in:

(43)                      [ X X-asp<sub>1</sub>...asp<sub>n</sub> ]

So, the verb “lai” (*to come*), which is used in the sentences in (11)-(13), has the following entries in Lexicon:

- (44) a.    lai-0            0 = default aspect  
       b.    lai-le        perfective  
       c.    lai-guo      indefinite past  
       d.    lai-guo-le   perfective + indefinite past

Secondly, as negating items in Chinese also carry aspectual markers, we have:

- (45) a. bu-0 default aspect  
 b. mei-0 perfective aspect <sup>5</sup>  
 c. mei-you perfective aspect

Thirdly, the entries in (44) and those in (45) would combine to form "A-not" forms:

- (46) a. lai-bu (to come-not)  
 b. lai-mei (to come-not, perfective)  
 c. lai-mei-you (to come-not, perfective)  
 d. lai-le-mei (to come-not, perfective)  
 e. lai-le-mei-you (to come-not, perfective)  
 f. lai-guo-mei (to come-not, indefinite past)  
 g. lai-guo-mei-you (to come-not, indefinite past)  
 h. lai-guo-le-mei (to come-not, perfective + indefinite past)  
 i. lai-guo-le-mei-you (to come-not, perfective + indefinite past)

Finally, the "A-not-A" forms in (11)-(13) are derived from selectively drawing entries from (44), (45) and (46), reproduced in (47)-(48) and (49):

- (47) a. [[lai-mei] lai] (11a)  
 b. [[lai-mei-you] lai] (11b)  
 c. [[lai-le-mei] lai] (11c)  
 d. [[lai-le-mei-you] lai] (11d)  
 (48) a. [[lai-mei] lai-guo] (12a)  
 b. [[lai-mei-you] lai-guo] (12b)  
 c. [[lai-guo-mei] lai-guo] (12c)  
 d. [[lai-guo-mei-you] lai-guo] (12d)  
 (49) a. [[lai-guo-le-mei] lai-guo] (13a)  
 b. [[lai-guo-le-mei-you] lai-guo] (13b)

#### 4. NEG MOVEMENT

Lastly, our analysis will not be complete without mentioning the likely LF movement of Neg that functions as a question particle in "A-not" and "A-not-AB" questions. As is well-known (Tang 1984a-b), a root "A-not" or "A-not-AB" question may optionally take the question particle *Ne*:

- (50)        ta lai-bu (ne)?  
               he come-not Qu  
               'Will he come?'
- (51)        ta lai-bu    lai       Meiguo (ne)?  
               he come-not-come   America Qu  
               'Will he come to America?'

But an embedded "A-not" or "A-not-AB" question cannot take *Ne*:

- (52)        wo   bu   zhidao [ta   lai-bu (\*ne)]  
               I    not   know   he   come-not Qu  
               'I do not know whether he will come.'
- (53)        wo   bu   zhidao [ta   lai-bu    lai       Meiguo (\*ne)]  
               I    not   know   he   come-not   come   America Qu  
               'I do not know whether he will come to America.'

Why? An answer is provided if we take the view that there is an LF movement of Neg in "A-not" and "A-not-AB" questions, and that such movement is to check off the +Qu feature in C°

As stated before, Huang (1988) argues that "A-not-A" questions contain a functional category Qu, which projects into a QuP (see (8)). He also argues that "A-not-AB" questions are essentially wh-type questions. Later, Aoun & Li (1993) claim that in Spec of QuP is base-generated an empty Qu-operator, which will move to Spec of CP. Assuming the Qu-operator is of +wh in nature, its movement to Spec of CP is, as I take it, to fulfil the scopal requirement akin to that in all wh-questions.

What is left relevant here is the functional category Qu itself. In Chomsky (1993/95), feature(s) held by a functional category must be discharged before a derivation converges. Adopting this view, the +Qu feature in Qu° needs to be checked off. Further, we assume here that C° in "A-not" and "A-not-AB" questions is also of +Qu, additionally to +wh. The +Qu there also needs to be checked off.

Since checking is either by merge or movement, let us assume that in "A-not" and "A-not-AB" questions in which *Ne* is present, *Ne* is base-generated in  $Qu^\circ$  and hence checks off the +Qu feature there first. Then, it moves to  $C^\circ$  and checks off the +Qu there (word order irrelevant):

$$(54) \quad [CP \dots Ne_i \dots [IP \dots [QuP \dots t_i \dots [VP \text{ A-Neg } \dots]]]]$$

When *Ne* is absent, the Neg in "A-not" and "A-not-AB" questions will take its place.<sup>6</sup> Here, the Neg functioning as a question particle is base-generated in VP and moves to  $C^\circ$  via  $Qu^\circ$ , checking off the +Qu feature in both places:

$$(55) \quad [CP \dots Neg_i \dots [IP \dots [QuP \dots t_i \dots [VP \text{ A- } t_i \dots]]]]$$

The *Ne* movement in (54) is overt, but the Neg movement in (55) covert.

Assuming the analyses in (54) and (55) for root questions, the question we now have to answer is why only (55), but not (54), is available to embedded questions.

The answer lies in the very fact that embedded CPs, but not root CPs, are *lexically* selected by matrix verbs, a fact noted by many (e.g. Chomsky 1981, Rizzi 1995). By virtue of this lexical selection, an embedded  $C^\circ$  is what may be called *lexically related* (cf. Chomsky 1993/95). Here, I assume that by way of Economy (e.g. a covert movement is less costly than an overt one), a functional category  $F^\circ$ , if lexically related, may be checked in LF. Thus, returning to (54), it is ruled by Economy for embedded questions.

Such manifestation of Economy is also true of other languages. In French, for instance, the paradigm in (56) is observed:

- (56) a. *qui<sub>i</sub> est-ce que Jean a vu t<sub>i</sub> ?*  
 b. *Paul demande [qui<sub>i</sub> (\*est-ce que) Jean a vu t<sub>i</sub> ]*

The paradigm is identical in nature to that between (50) and (52) or (51) and (53) in Chinese, bearing in mind that according to Huang (1988) "A-not" questions like (50)&(52) and "A-not-AB" questions like (51)&(53) are wh-type questions.

Putting wh-movement aside, we wish to ask why the presence of the French question particle *est-ce-que* is permitted in root questions, but not in embedded ones, in the same way we asked earlier why the presence of the Chinese question particle *Ne* is permitted in root questions, but not in embedded ones.

The same answer we gave to Chinese extends to French, in principle. In French, like in all languages as Aoun & Li (1993) argue, questions contain a QuP. In the root question (56a), *est-ce-que* is presumably base-generated in Qu° and moves to C°, again for the purpose of checking off the +Qu feature in both of these functional categories:

$$(57) \quad [CP \dots \text{est-ce que}_i \dots [IP \dots [QuP \dots t_i \dots [VP \dots ]]]$$

$\uparrow$  \_\_\_\_\_ |

For the embedded question (56b) where the C° is lexically related to the matrix verb, the checking can be done in LF, for Economy. Thus, a null question particle is at work in place of *est-ce-que* (in the spirit of Aoun & Li 1993; see note 6):

$$(58) \quad [CP \dots \text{Qu}_i \dots [IP \dots [QuP \dots t_i \dots [VP \dots ]]]$$

$\uparrow$  \_\_\_\_\_ |

The fact that both Chinese and French have the same type of paradigm regarding the distribution of question particles, and that they can be both explained under the same principle of Economy, further strengthens our current analysis.

## 5. CONCLUSION

I have in this paper proposed a new analysis for "A-not-A" questions in Mandarin Chinese, with a focus on "A-not" and "Anot-AB" questions. Compared with Huang's (1988) analysis, the current proposal has the following advantages: (a) it differentiates syntactic "A-not-AB" constructions from their lexical counterparts; (b) it no longer treats "A-not-A" as a single sequence, but splitting it into "A-not" and "A"; (c) Neg in the "A-not" sequence is treated as a question particle; and (d) this Neg will move in LF if there is no other question particle present. It is shown that our new analysis is able to account for "A-not-A" forms that contain complex aspectual markings, which Huang's analysis fails to explain.

## NOTES

\* Earlier versions of this paper were presented at 1995 LSHK Annual Research Forum and at NACCL7 (1996). I thank the audience for their comments, and in particular an anonymous reviewer for his comments. Needless to say, I am solely responsible for whatever mistakes remaining.

<sup>1</sup> More examples are:

- (i) ta gao-bugao ? (Adj-Neg)  
he tall not tall  
'Is he tall?'
- (ii) ta chang-bu chang lai ? (Adv-Neg)  
he often not often come  
'Does he often come?'
- (iii) ta neng-bu neng lai ? (Mod-Neg)  
he can not can come  
'Can he come?'
- (iv) ta shi-bú shi jintian lai ? (Foc-Neg)  
he be not be today come  
'Is he coming today?'
- (v) ta cong-bu cong Meiguo lai? (P-Neg)  
he from not from America come  
'Does he come from America?'
- (vi) ta you-mei mei lai ? (Aux-Neg)  
he asp not asp come  
'Has he come?'

<sup>2</sup> More examples of words that may form a lexical "A-not-AB" construction are as follows:

- |      |                              |                                |                        |
|------|------------------------------|--------------------------------|------------------------|
| (i)  | shuijiao (sleep)             | xuexi (study)                  | youyong (swim)         |
|      | renshu (concede)             | xizao (take a bath)            | zaoyao (spread rumour) |
|      | chaojia (quarrel)            | yonggong (work hard)           | yuzhong (weight-lift)  |
|      | lifa (have a hair cut)       | kaoshi (take an exam)          |                        |
|      | dazhang (fight a battle/war) | chikui (be taken advantage of) |                        |
| (ii) | xiugai (revise)              | zhiding (draw up)              | xuyao (need)           |
|      | zhidao (know)                | yunxu (permit)                 | xiwang (hope)          |
|      | zunbei (prepare)             | renshi (know)                  | keyi (may)             |
|      | qipian (cheat)               | taolun (discuss)               | biye (graduate)        |
|      | facai (prosper)              | guntan (fuck-off)              | taitou (take the lead) |
|      | zhuyi (pay attention to)     | guanxin (care about)           | gaoxing (glad)         |
|      | xinfu (happy)                | meili (pretty)                 | xiaosa (handsome)      |
|      | fengliu (admirable)          | pilao (tired)                  | guangrong (glorious)   |
|      | weida (great)                | relie (warm)                   | zhengque (correct)     |

Those in (i) can also form a lexical "AB-not-A" construction, such as shuijiao-bu-shui (sleep-not-sleep), but those in (ii) cannot, such as \*"xiugai-bu-xiu" (revise-not-revise).

<sup>3</sup> Subject NP may not be minimally required to be VP-internal (Hornstein 1994).

<sup>4</sup> "Fou" is the equivalent to the modern form "bu" (Wang Li 1958; Chao 1968; Chou 1972).

<sup>5</sup> "Mei", according to W. Wang (1965, 1967, 1988), carries the fused aspect marker "you" (*perfective aspect*) and can therefore be considered an allomorph of "mei-you".

<sup>6</sup> In wh-questions where *Ne* is absent, a null question particle is at work (Aoun & Li 1993).

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# THE COMPLEX NATURE OF V-C CONSTRUCTIONS\*

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## 1. INTRODUCTION

A verbal morpheme in Chinese can sometimes be combined with another morpheme to form a unit that functions like a single verb. In many cases, the two morphemes in the combination are related to each other in ways that are syntactically and semantically definable but they have no independent relationship with other elements in the sentence. The combination as a whole enters syntactic relations with the rest of the sentence (Zhou 1994, Chen 1994). If a combination in this category consists of a verbal morpheme and a nominal one, the nominal morpheme may have different relationship with the verbal morpheme and the combination can be characterised as a S(ubject)-V compound like the one in (1), an A(dverbial)-V compound like the one in (2) or a V-O(bject) compound like the one in (3).

- (1)      Laotaitai   shifen      xin-teng   sunzi.  
         old lady   very      heart-ache grandson  
         ‘The old lady loves her grandson very much.’
- (2)      Shushiwan   ren      qianwang   lu-ji      Zhougong.  
         thousands   people   go      road-mourn   Zhougong  
         ‘Thousands of people went to the roadside to pay their last respect to Zhougong.’
- (3)      Women   yinggai   guan-xin   qunzhong   jiku.  
         we      should   relate-heart   mass      suffering  
         ‘We should pay attention to people sufferings.’

A combination in this category may also consist of two verbal morphemes, which may be adjectival or stative in nature. The relationship between the two could be characterised as that of adverbial and verb, as in the case of (4) where the adjectival morpheme *qing* ‘plain’ modifies the verbal morpheme *chang* ‘sing’ or as in the case of (5) where the verbal morpheme *quan* ‘draw circles’ indicates the manner of the action *yue* ‘read’. The relationship between the two verbal morphemes may also be considered that of conjunction, as in the case of (6) where two synonymous verbal morphemes are conjoined or as in the case of (7) where

two antonymous morphemes are conjoined.

- (4) Laotou qing-chang-le yi duan Jiu Gu  
 old-man plain-sing-Asp. one Cl. Save-Orphan  
 'The old man sang a song from (the opera) Saving the Orphan without  
 he orchestra.'
- (5) Zhuxi yijing quan-yue-le wenjian.  
 chairman already circle-read-Asp. document  
 'The chairman has read the document by drawing circles on it.'
- (6) Yihui jijiang xiu-gai xianfa.  
 parliament soon mend-modify constitution  
 'The Parliament will amend the constitution very soon.'
- (7) Zhengfu keyi mai-mai junhuo.  
 government can buy-sell arms  
 'The government can buy and sell arms.'

When two verbal morphemes are combined to form a unit, it is also possible for them to maintain separate and independent relationship with other elements in the sentence, like the complex verbs in sentences (8) through (10), which are commonly known as *dongbu jiegou* 'verb-complementary constructions',<sup>1</sup> or V-C constructions for short. The V in such a combination can be any verb, i.e., an intransitive, transitive or ditransitive verb, and the C is usually a stative verb, a preposition or a so-called *quxiang dongci* 'directional verb' like *qu* 'go'.

In the V-C construction *chi-ni* 'eat-bored' of (8), the V *chi* 'eat' is related to both the subject and the object of the sentence but the C *ni* 'bored' is only related to the subject, so that the sentence has the interpretation that the person ate fish and meat and as a result became bored. The V *na* 'hold' of *na-zou* 'take-gone' in (9) is related to both the subject and object while the C *zou* 'gone' is related to the object only. Sentence (9) thus means Xiao Xu took the books and the books were gone. In the *le-huai* 'happy-extreme' of (10), the V *le* 'happy' is related to the subject and object in a very unusual way while the C *huai* 'extreme' is in a predication relation with the VP. The sentence thus has the reading that the news of success made everyone happy and the happiness had reached an extreme degree.

- (8) Ta chi-ni-le            dayu        darou.  
 he eat-bored-Asp.    big-fish    big-meat  
 'He has eaten so much rich fish and meat, and got tired of it.'
- (9) Xiao Xu    na-zou-le            liang    ben    shu.  
 Xiao Xu    hold-gone-Asp.    two    Cl.    book  
 'Xiao Xu took away two books.'
- (10) Chenggong    de        xiaoxi        le-huai-le            dajia.  
 success        DE        news        happy-extreme-Asp.    everyone  
 'The news of success made everyone happy to an extreme extent.'

Many V-C constructions are ambiguous with more than one reading, depending on how each morpheme in the V-C is related to other elements in the sentence. The complicated nature of V-C constructions has attracted much research interest (see BLILTI 1992). Two major lines of analysis on V-C constructions have emerged in the process. In one analysis, V-Cs are treated as phrases (e.g., J. Li and Liu 1957, cf. Ernst 1993) and in the other, they are considered compound verbs (e.g., Y. Li 1990, 1995). It will be argued in this paper that V-Cs are neither phrases nor compounds in the usual sense of the two terms. They should be treated as a separate category, namely, syntactically derived verbs (e.g., Zou 1995).

## 2. LEXICAL ITEMS, PHRASES AND SOMETHING IN BETWEEN

In contemporary linguistic studies, the concept of words or lexical items seems to be well-established, i.e., words are the smallest free linguistic unit with independent syntactic functions (e.g., Fromkin and Rodman 1993, Chomsky 1965, Quirk et al. 1985). A phrase is a unit larger than a word not only because it may consist of two or more words but also because it is the unit that has direct syntactic functions in a clause (e.g., Chomsky 1957, Li and Thompson 1981, Zhang 1994). An important difference between a word and a phrase is that no syntactic process can affect any element inside a word, hence the rule known as the lexical integrity hypothesis (e.g., Chomsky 1970, Huang 1991), but the internal structure of phrases may be altered by syntactic processes since phrases are syntactically derived.

Compounds are usually treated as lexical items because they have the syntactic functions of single words even though they consist of two or more words and the formation

of compounds is not productive in the sense of Quirk et al (1985). The number of compounds in any language is finite at a given time. Compounds belong to the lexicon and enter the syntax as lexical items. Compounds also obey the lexical integrity hypothesis and do not allow any syntactic process to affect the individual elements inside, namely, cannot be expanded in the sense of Chao (1968). The compound *guo-wen* ‘intervene-ask, discuss’ in (11a) therefore cannot have a perfective marker *le* between *guo* ‘interfere’ and *wen* ‘ask’ even though the whole compound can take the perfective aspect, as in (11b).

- (11) a. \* Ta guo-le-wen                    zhe    jian    shi.  
           he intervene-Asp.-ask    this    Cl.    issue  
       b. Ta guo-wen-le                    zhe    jian    shi.  
           he intervene-ask-Asp.    this    Cl.    issue  
           ‘He meddled with this issue.’

Whether a linguistic unit can be expanded has often been used as the criterion to determine whether it is a phrase or a compound (e.g., Chao 1968, Zhang 1994). The *du-shu* ‘read books, study’ in (12a), for example, has a somewhat non-literal interpretation of ‘study’ and is considered a lexical entry in many dictionaries, including the well-known *Xiandai Hanyu Cidian (A Dictionary of Modern Chinese)*. However, it should be considered a phrase because it can be expanded by attaching an aspect marker to *du* ‘read’ and adding a phrase to modify *shu* ‘book’, as in the case of (12b).

- (12) a. Ta zai Meiguo    du-shu.  
           he at U.S.            read-book  
           ‘He studies in the U.S..’  
       b. Ta zai Meiguo    du-le            jinian            shu.  
           he at U.S.            read-Asp. several-year    book  
           ‘He has studied in the U.S. for several years.’

Another often cited criterion for differentiating a word from a phrase is the function of the item in question. *Duo-xin* ‘many-heart, feel suspicious about, doubt’ is very similar to *guan-xin* ‘relate-heart, pay attention to’ in that they both have derived non-literal meanings and semantically they both require an entity to be affected by the action they represent.

However, it has often been argued that *guan-xin* ‘pay attention to’ is a word but *duoxin* ‘doubt, feel suspicious about’ is a phrase (e.g., Zhang 1994), because the entity affected by *guan-xin* can appear as its direct object as in (3) while the entity affected by *duo-xin* ‘doubt’ can only appear in an adjunctive PP but not as a direct object, illustrated by the contrast between (13a) and (13b).

- (13) a. \* Ni      zongshi      duo-xin      wo.  
           you      always      many-heart      me  
       b. Ni      zongshi      dui wo duo-xin.  
           you      always      to me many-heart  
           ‘You never trust me.’

It has been argued that there is a third category in Chinese, namely, syntactically derived complex verbs. A case in hand is the complex verb represented by the *bo-pi* in (14) (from Thompson 1973). The NP *juzi* ‘orange’ in the *ba* construction has the thematic role of patient and is usually considered a direct object (e.g., A. Li 1990, Zou 1995), but the verbal element *bo* ‘to peel’ has already got a patient nominal element *pi* ‘skin’ in the post-verb position. To account for the fact that the NP *juzi* ‘orange’ is actually affected by the action of peeling and has the status of an object, it is often assumed that *bo* ‘to peel’ and *pi* ‘skin’ form a single complex verb that takes *juzi* ‘orange’ as the direct object (Thompson 1973, A. Li 1990, Zou 1995, Shi 1997).

- (14) Ta ba juzi      bo-le      pi.  
       he BA orange peel-Asp. skin  
       ‘He peeled the orange.’

V-O constructions like the *bo-pi* ‘peel’ in (14) are not hard to find in Chinese and most of them are ad hoc creations of everyday life like the *gan-le miantiao* ‘make into noodles’ in (15) (from L. Li 1984). It is very unlikely that these items would ever be included in any dictionary because their ad hoc nature and the easy expandability associated with most of them. The phrase *gan-le miantiao* ‘make into noodles’ in (15a), for example, can be easily expanded to *gan-le kuan miantiao* ‘make into wide noodles’, *gan-le yi-wan miantiao* ‘make into a bowl of noodles’ or *gan-le yi-wan kuan miantiao* ‘make into a bowl of wide noodles’,

and the V-O complex can still take *nakuai mian* ‘that piece of dough’ in a BA construction as its direct object, as shown in (15b).

- (15) a. Wo ba na kuai mian gan-le miantiao.  
 I BA that Cl. dough roll-Asp. noodle  
 ‘I have made noodles out of that piece of dough.’
- b. Wo ba na kuai mian gan-le yi wan kuan  
 I BA that Cl. dough roll-Asp. one Cl. wide  
 miantiao.  
 noodle  
 ‘I have made a bowl of wide noodles out of that piece of dough.’

Verbs that can occur in V-O complexes like *bo-pi* ‘to peel’ and *gan-miantiao* ‘to make noodle’ are usually not ditransitive in nature but are ordinary transitive verbs which take one patient NP only. The formation of these V-O complexes is a very productive process in that native speakers can create the complexes freely all the time. The only major requirement is that the NP in the postverbal position and the NP in the *ba* phrase should have a very close relationship which can be semantically defined (Thompson 1973, Zou 1995). It is reasonable to assume that there is a syntactic process in Chinese that combines a transitive verb and an NP to form a new verb which subcategorises for another NP as its patient. This will explain why V-O complexes like *bo-pi* ‘to peel’ and *gan-miantiao* ‘take into noodles’ seem to have the internal structure of a phrase but function like a word or a compound.

### 3. V-C CONSTRUCTIONS AND PHRASES

It has a long history in the study of Chinese grammar to treat V-C complexes as phrases (e.g., J. Li 1924). A similar analysis is to treat the C in V-C complexes, namely, the complementary, as a post-verbal modifier of the verb with the same status as a pre-verbal modifier (e.g., Lü and Zhu 1952, Lü 1953, Ernst 1993). Since the pre-verbal modifier of a verb is usually considered an adverbial and is part of a VP (e.g., A. Li 1990, Li and Thompson 1981), it follows that in this line of analysis the complementary and the verb form a phrase but not a compound or a word.

As a matter of fact, it has been implicitly assumed in many analyses that V-C complexes have the status of phrases. It is very common in the literature of traditional grammar to treat *buyu* 'complementary' as a member of the sentence on a par with subject, predicate, object, attributive and adverbial (e.g., Ding et al. 1961, J. Zhang 1994). In other words, complementary is related to the verb, namely, the predicate in their terms, in the same way as subject, object and adverbial do. Given the fact that object and verb form a phrase, as do adverbial and verb, it follows that C and V form a phrase as well.

Another often cited argument for treating V-C complexes, at least some of them, as phrases is that both the V and C in many cases are words instead of bound morphemes that cannot stand alone (e.g., Lü and Zhu 1952, Zhang 1994). The *jieshi-qingchu* 'explain-clear' in (16) (from Zhang 1994) is such an example. The reasoning is that since both *jieshi* 'explain' and *qingchu* 'clear' are commonly accepted compound words, *jieshi-qingchu* 'explain-clear' must be a phrase. This is assumed to be in contrast with cases like *guan-che* 'pierce-through, to carry out', which is said to be a commonly accepted word because it consists of two bound morphemes.

- (16) Women yijing ba wenti jieshi-qingchu-le.  
 we already BA issue explain-clear-Asp.  
 'We have explained the issue and it has become clear.'

There are some problems with the argument that a linguistic unit is a phrase if its components all have the status of words or free morphemes. One problem is that the distinction between bound and free morphemes in Chinese is not always as clear as it looks; and it is therefore not reliable to use this distinction as the criterion to determine the status of morphemes or combination of morphemes. Many words in Classic Chinese have lost their status as free morphemes in modern Chinese because they can no longer stand alone as independent lexical items and can only appear in fixed expressions. The nominal *zhuang* 'law suit paper' is such an example. It is a bound morpheme in the sense that it is never used alone as a noun except in the fixed V-O expression *gao-zhuang* 'to file a law suit' or A-N constructions like *e-zhuang* 'vicious law suit'. *Gao-zhuang* 'to file a law suit' is considered a fixed expression because *gao* is the only verb that can be used in this case. If another verb such as *di* 'send in' is used, *zhuang* 'law suit paper' can no longer be used as the object. The phrase must be *di zhuang-zi* 'to send in the law suit papers'.

The problem in this case is that *gao-zhang* 'file a law suit' seems to have all the characteristics of a VP but not those of a compound. The combination cannot take as its direct object the entity affected by the action of filing a law suit. An aspect marker can be attached to the verb *gao* 'to file (a complaint)', as in (17a), and noun phrases and other elements can appear between *gao* and *zhuang*, as in (17b). It is therefore reasonable to treat *gao-zhuang* 'file a law suit' as a phrase even though *zhuang* 'law suit paper' may not have the status of a word.

- (17) a.   Ta zai wo zher   gao-le    zhuang.  
           he at I   here   file-Asp. suit  
           'He has filed a complaint to me.'
- b.   Ta gao-le    ni    yi    zhuang.  
           he file-Asp. you   one   suit  
           'He has filed a law suit against you.'

On the other hand, phrase is not the only category that has words, namely, free morphemes, as its components. A compound could have two words as its components as well. The compound verb *miao-hua* 'draw' in (17) is a typical case. Both *miao* 'draw, copy' and *hua* 'draw' can be used as independent verbs but *miaohua* 'draw' itself cannot be expanded. No aspect marker can appear between *miao* and *hua* nor can any modifier be inserted between them when *miaohua* maintains the interpretation of 'draw'.

- (18)   miao-hua zui   xin    zui    mei       de    tuhua  
       draw-draw most   new    most   beautiful   DE   picture  
       'to draw the newest and nicest picture'

Syntactically derived complex verbs like the *bo-pi* 'to peel' in (14) and *gan-miantiao* 'to make noodles' in (15) represent another case where two words are combined to form a new word instead of a phrase. The fact that a V-C complex may consist of two words therefore does not necessarily lead to the conclusion that the V-C complex must be a phrase.

For the analysis that treats the complementary as a modifier of the verb, the problem comes from a different source. It is a common practice to classify V-C constructions roughly into three types according the function of the complementary (e.g., Ma 1992, Zhang 1994,

Wang 1995), namely, resultative constructions like *shui-hua* 'sleep-blurred' in (19), directional complementary constructions like the *na-chu-lai* 'take-out-come' in (20) and degree complementary constructions like the *hen-tou* 'hate to an extreme degree' in (21).

- (19) Xiao guniangmen shui-hua-le yan.  
 little girls sleep-blurred-Asp. eye  
 'The little girls slept and as a result their eyes became blurred.'
- (20) Laoban na-chu-lai yi pan chao suancai.  
 owner take-out-come one Cl. stir-fry pickle  
 'The owner (of the restaurant) took out a plate of stir-fried pickles.'
- (21) Pan Laoda fan-tou-le Luo Erniang.  
 Pan Laoda dislike-extreme-Asp. Luo Erniang  
 'Pan Laoda dislikes Luo Erniang to an extreme degree.'

In the resultative constructions and directional constructions, the complementary always enters a syntactic relationship with certain argument or arguments in the sentence while the verb also enters another syntactic relationship with certain arguments. There may or may not be an overlap between the two sets of arguments (Lü 1986). In sentence (19), for example, the entities that slept are the girls while the entities that became blurred are their eyes. In sentence (20), the person who took the plate is represented by the subject while the entity that came out is represented by the object of the V-C. The V and C in these two cases hold separate relationship with different arguments and the V and C have no direct semantic relationship with each other in spite of the fact that the two C form one unit syntactically.

It can be seen clearly from the contrast between (22a) and (22b) that the C in a resultative V-C does not modify the verb but holds a separate relation with an argument. The adjective *cuo* 'wrong' in (22a) modifies the verb *guai* 'accuse' as an adverbial. The sentence thus has the interpretation that Lao Li accused his daughter for some wrong reason and the sentence entails that Lao Li may have one daughter only. The adjective *cuo* 'wrong' in (22b) is in a predication relation with the object *nüer* 'daughter'. The sentence means that the daughter being accused by Lao Li is the wrong one and it entails that Lao Li has two or more daughters.

- (22) a. Lao Li cuo            guai-le            nǚer.  
           Lao Li wrongly    accuse-Asp.    daughter  
           ‘Lao Li wrongly accused his daughter.’
- b. Lao Li guai-cuo-le            nǚer.  
           Lao Li accuse-wrong-Asp.    daughter  
           ‘Lao Li accused the wrong daughter.’

In the so-called degree V-C constructions, the C does not hold independent syntactic relationship with any argument but is related to the verb. It is mainly based on this relationship that people have been arguing that the complementary modifies the verb in these cases (J. Li and Liu 1957, cf. Lü 1986, Ernst 1993). The most frequently cited evidence is sentence pairs like (23a) and (23b). It has been claimed that the interpretation of (23a) and (23b) is so closely related that they should be considered identical. Since the phrase *man dianr* ‘slow (down) a little’ is an adverbial modifying the verb *zou* ‘walk’ in (23a), it is argued that the same phrase in (23b) should be treated as a modifier of the verb as well.

- (23) a. Nin    man    dianr            zou.  
           you    slow    a little        walk  
           ‘Please walk slowly.’
- b. Nin    zou-man-dianr.  
           you    walk-slow-a-little  
           ‘Please slow down in walking.’

There are several problems with this line of reasoning. An obvious one is that very few adjective phrases can occur in both a pre-verbal position and a post-verbal position. Those that can occur in either a pre-verbal adverbial position or a postverbal complementary position are usually comparative in nature; but not all the comparative complementary phrases can also occur in a preverbal position (Ma 1992). For example, in order to function as the complementary, the adjective phrase with the meaning low’ must be *man yidianr* ‘slow a little’ as in (23b) or *man-le* ‘too slow’ as in (23c). If the adjective phrase is simply a *man* ‘slow’ that carries no comparative force, it can only function as an adverbial but not as a complementary, as shown by the contrast between (24a) and (24b). On the other hand, the phrase *man-le* ‘too slow’ can only occur in a postverbal complementary position but not in

the preverbal adverbial position. Sentence (25) is therefore not acceptable.

- (23) c.      Nin      zou-man-le.  
                  you      walk-slow-too  
                  ‘You walked in such a way that was too slow.’
- (24) a.      Nin      man      zou.  
                  you      walk      slow  
                  ‘You walk slowly.’
- b. \*      Nin      zou-man.  
                                  you      walk-slow
- (25) \*      Nin      man-le      zou.  
                                  you      slow-too      walk

Another problem for this line of analysis is that the relationship between the complementary and the verb in a degree V-C construction is not the same as that between an adverbial and a verb. In most degree V-C constructions, the complementary is a degree adjective like the *tou* ‘extreme, overwhelming’ in (26a). The V in this type of V-C constructions is usually a stative verb or a verb of emotion which describes the physical or mental status of the subject while the C is an adjective which indicates the extent the status has reached. In the case of (26), the verb *hen* ‘hate’ depicts the psychological status of *Xiaofeng* while the complementary *tou* ‘extreme’ signifies how strong his hatred towards *Zhengqi* has become.

- (26)      Xiaofeng    hen-tou-le                      Zhengqi.  
                  Xiaofeng    hate-extreme-Asp.      Zhengqi.  
                  ‘Xiaofeng hated Zhengqi to an extreme degree.’

Degree adjectives like *tou* ‘extreme’ cannot occur in a preverbal position to modify the verb so that sentences like (27) are not acceptable. When they occur in the postverbal complementary position, degree adjectives are describing a status. There is no obvious reason to treat the complementary adjectives as modifiers (Ma 1992).

- (27) \* Xiaofeng tou            hen-le        Zhengqi.  
          Xiaofeng extreme    hate-Asp. Zhengqi

Certain adjective phrase with some comparative force can function as the adverbial of the verb as well as the complementary of the verb, but the adjective phrase does not have the same relationship with the verb in the two cases and the difference in relationship often leads to difference in interpretations. Take the adjective phrase *wan dianr* 'a little late' as an example. When it precedes the verb *shui* 'go to bed, sleep' in (28a), it has the function of temporal adverbial and (28a) has the interpretation that the listener should go to bed late. When it occurs in the postverbal complementary position, however, *wan dianr* 'a little late' indicates the status of *shui* 'go to bed, sleep' and sentence (28b) has two interpretations. One is that the event of the speaker going to bed should happen late and the other is that the speaker status of being sleeping should continue to a late time. In other words, when *shui* is interpreted as 'sleep', it cannot be modified by the adverbial *wan dianr* 'a little late'. It is therefore doubtful that *shui* 'sleep' can be modified by *wan dianr* 'a little late' from a postverbal position.

- (28) a.    Ni        jintian wan     dianr   shui.  
          you    today late     a little sleep  
          'You should go to bed a little late today.'
- b.    Ni        jintian shui    wan     dianr.  
          you    today sleep late    a little  
           i. 'The time you go to bed today should be late.'  
           ii. 'You should stay in bed until late today.'

A similar phenomenon can be observed from the interaction between adjective phrases indicating a period of time and verbs representing continuous action or movement, such as the adjective phrase *jiu yidianr* 'a little long(er)' and the verb *zhan* 'stand' in (29). *Jiu yidianr* 'a little long(er)' can function as the complementary of *zhan* 'stand' but not as the pre-verbal adverbial of *zhan* 'stand', as shown by the contrast between (29a) and (29b). Since the syntactic function of an adverbial is to modify the verb, it stands to reason to assume that a verb representing continuous action cannot be modified by an adjective indicating a period of time. The complementary in (29b) is therefore not likely to be a

modifier of the verb *zhan* 'stand'.

- (29) a.      Wo    hui    zhan    jiu    yidianr.  
               I      will   stand   long   a little  
               'I will stand a little longer.'
- b. \*    Wo    hui    jiu    yidian zhan.  
               I      will   long   a little stand

If the argument is correct that the complementary in degree V-C complexes like those in (26), (28b) and (29a) is not a modifier of the verb, the relationship between the verb and these complementaries must be characterised in a different way. All of these complementaries describe the condition of an action or the extent of a status. It is reasonable to assume that the degree complementary is in a predication relation with the verb or, to be precise, with the verb phrase, on a par with the relationship between the resultative or directional complementary and certain arguments (cf. Ma 1992, Williams 1980).

Under this assumption, it becomes easier to describe the subtle but genuine difference between the two sentences in (23). Sentence (23a) means the speaker is asking the listener to walk in a slow manner while (23b) means the speaker wants the listener walk to be slower. The difference in interpretation is compatible with native speakers' intuition that (23a) will be uttered when the walking has not taken place while (23b) is used after the walking has already started (e.g., J. Li and Liu 1957). The former is likely to be uttered when a host is seeing his guest off while the latter is likely to be used when someone is complaining mildly to his partner of walking.

- (23) a.      Nin    man    dianr    zou.  
               you    slow   a little walk  
               'Please walk slowly.'
- b.      Nin    zou-man-dianr.  
               you    walk-slow-a-little  
               'Please slow down in walking.'

Given the argument that the complementary in V-C constructions is not a modifier of the verb and the fact that C is not a complement of V, V and C are not likely to form a phrase

in the sense of modern syntax (e.g., Chomsky 1981, 1993, 1995). On the other hand, the V-C complex does have the main characteristics of a verb. Many V-C constructions can take an NP as its argument which represents an entity affected by the action embodied in the V-C complex. Such an NP can appear in a position after the V-C as in (30a) or in a *BA* phrase before the V-C as in (30b). Sometimes the NP can also occur as the subject of a corresponding passive sentence such as (30c). This NP can be considered the direct object of the V-C (C. Li and Thompson 1981).

- (30) a. Kuangfeng chui-zou-le wode toujin.  
 strong-wind blow-gone-Asp. my scarf  
 'The strong wind blew away my scarf.'
- b. Kuangfeng ba wode toujin chui-zou-le.  
 strong-wind BA my scarf blow-gone-Asp.  
 'The strong wind blew away my scarf.'
- c. Wode toujin bei kuangfeng chui-zou-le.  
 my scarf BEI strong-wind blow-gone-Asp.  
 'My scarf was blown away by the strong wind.'

The combination V-C cannot be expanded in the sense of Chao (1968). For example, the C in any V-C construction cannot be modified by an adverbial even though the whole V-C can. The contrast between (31) and (32) illustrates this phenomenon.

- (31) Ni you kan-hua-le yan.  
 you again look-blurred-Asp. eye  
 'You saw it wrong again (lit. You looked and your eyesight got blurred again).'
- (32) \* Ni kan-you-hua-le yan.  
 you look-again-blurred-Asp. Eye

A V-C combination can be marked for aspect, but the aspect marker cannot occur between V and C. It must occur right after C, as illustrated by the contrast between (33) and (34).

- (33) a. Hongshui yan-mo-le women jia.  
 flood swamp-submerged-Asp. our home  
 'The flood submerged our home.'
- b. Dongli zuan-chu-guo yitiao she.  
 hole-inside crawl-out-Asp. one Cl. snake  
 'A snake once came out of the hole.'
- (34) a. \* Hongshui yan-le-mo women jia.  
 flood swamp-Asp.-submerged our home
- b. \* Dongli zuan-guo-chu yitiao she.  
 hole-inside crawl-Asp.-out one Cl. snake

The most natural explanation for the fact that a V-C can take a direct object but cannot be expanded would be that the V-C has the status of a verb. There remains one issue, though. Certain V-C complexes, mainly resultative and directional constructions, can have a potential form in which a potential morpheme *de* or its negative counterpart *bu* is inserted between V and C as in the case of (35a) and (35b). There has been argument that the potential morpheme modifies the C on a par with the adverb/modal *de* or *deyi* 'can, able to' appearing in front of a verb (see X. Li 1985). If this line of analysis is correct, the insertion of potential *de* between V and C should be considered an instance of expansion and V-C would have the status of a phrase.

- (35) a. Wo gan-de-wan zhexie huo.  
 I do-DE-finished these work  
 'I can finish these tasks.'
- b. Ta ting-bu-jin wode quangao.  
 she listen-not-in my persuasion  
 'She does not take my advice.'

The problem for this analysis is that the potential morpheme *de* occurring between V and C behaves differently from the preverbal *de*. The preverbal *de* modifies the whole V-C construction and therefore has the V in its scope. The *de* between V and C, on the other hand, only has C in its scope (Liu 1980). The preverbal *de* can be negated by *bu* but the *de* between V and C can only be replaced by *bu*. The sequence V-*de*-C is a tightly cemented unit that

does not allow any other element to occur between V and *de* or between *de* and C. The relationship between the preverbal *de* and the verb is not so tight that many adverbials can occur between the two (Liu 1980). It is therefore very unlikely that the potential *de* has the same status as the preverbal *de*. Its actual status will be discussed in the next section.

#### 4. V-C CONSTRUCTIONS AND COMPOUNDS

It has now become a widely accepted view that V-C complexes have the status of verbs but there is no consensus on the exact nature of this type of verbs. A popular analysis is to treat V-C as compounds (e.g., Chang 1989, Y. Li 1990, 1993, 1995, Gu 1992, Gao 1997). In terms of modern syntax, compounds are entries of the lexicon, which are acquired by native speakers as chunks and enter syntax as indivisible items (e.g., Chomsky 1981, 1993, 1995, Bresnan 1982).

The best known analysis along this line is that of Y. Li (1990, 1995). His basic assumption is that the combination V-C, at least the resultative V-C, enters syntax directly from the lexicon. His main concern is the multiple reading nature of many V-C constructions and his solution is in essence to treat it as a case of lexical ambiguity. He assumes that both V and C retain their  $\theta$ -grid in the V-C and the two  $\theta$ -grids are combined via the process of  $\theta$ -role identification (Higginbotham 1985) according to the  $\theta$ -role hierarchy (Grimshaw 1990). The identified  $\theta$ -grid will be that of the V-C although the V-C will have the basic features of the V via feature percolation under Y. Li's assumption that V is the head of the compound.

Since both V and C may have more than one  $\theta$ -role to assign, the  $\theta$ -grid of the V-C may mathematically have two or more possible configurations but only some of them are legitimate. In order to provide an explanation for the distribution of legitimate configurations, Y. Li assumes that the  $\theta$ -grid of both V and C is structured according to the prominence hierarchy

agent > goal > theme ...

in the sense that the  $\theta$ -role assigned to the external argument should be higher than the one assigned to the internal argument, and that the  $\theta$ -role hierarchy of both V and C must be preserved in the  $\theta$ -grid of V-C. For example, when V has one  $\theta$ -role and C also has one, the two  $\theta$ -roles may be combined via identification to create a V-C with one  $\theta$ -role to assign,

namely, an intransitive verb like the *zou-lei* ‘walk-tired’ in (36). The  $\theta$ -role from V and that from C may also be kept separately to create a V-C with two  $\theta$ -roles to assign, namely, a transitive verb like the *shui-hua* ‘sleep-blurred’ in (19), where the  $\theta$ -role from V is assigned to the external argument and the  $\theta$ -role from C is assigned to the internal argument. What is not possible is the configuration in which the  $\theta$ -role from V is assigned to the internal argument and the one from C to the external argument.

- (36)     Xiangzi     zou-lei-le.  
              Xiangzi     walk-tired-Asp.  
              ‘Xiangzi walked and became tired.’
- (19)     Xiao     guniangmen     shui-hua-le                     yan.  
              little   girls                     sleep-blurred-Asp.     eye  
              ‘The little girls slept and as a result their eyes became blurred.’

When V and C have more  $\theta$ -roles than the V-C can assign, some of the  $\theta$ -roles are supposedly combined via identification. In sentence (37) (from Y. Li 1990), for example, the V *qi* ‘ride’ has two  $\theta$ -roles, agent and patient, and the C *lei* ‘tired’ has one. Since the V-C only has one external argument and one internal argument, the  $\theta$ -role from C must be combined with one role from V. Hence the two possible readings for (9).

- (37)     Baoyu     qi-lei-le                     neipi     ma.  
              Baoyu     ride-tired-Asp.     that Cl.     horse  
              ‘Baoyu rode that horse and (as a result it/Baoyu got) tired.’

There are two other mathematically possible configurations for the three  $\theta$ -roles of V and C in (37), in which the agent role of V is assigned to the internal argument of the V-C and the role from C is combined with either the agent role or the patient role of the V. Since the  $\theta$ -role hierarchy of the V is reversed in these two configurations, they are ruled out under Y. Li’s assumption that the  $\theta$ -role hierarchy of both V and C must be preserved.

This analysis provides a simple account for the properties of many resultative V-C constructions and presents a possible explanation for the absence of certain interpretation of V-C constructions; but its simplicity also leads to certain problems. An obvious one is that

the mathematical calculation of  $\theta$ -roles from V and C does not always produce the correct  $\theta$ -grid for V-C. The V in (38) (from Y. Li 1990), for example, has two  $\theta$ -roles but only the agent role is assigned to the external argument of the V-C while the patient role is not discharged. Y. Li's solution is to assign the  $\theta$ -role to a third NP. He assumes that in verb reduplication structures like one in (38), the first verb, namely, the *da* in *da Jiaoda* 'beat Jiaoda' is a copy of the main verb, i.e., the V in the V-C construction. The reduplicated verb is assumed to be a case assigner, i.e., a dummy verb which assigns case but no  $\theta$ -role. Under this assumption the NP that receives case from the reduplicated verb must get its  $\theta$ -role from another source, namely, from the main verb which is assumed to be the V of the V-C.

- (38) Puren      da      Jiaoda da-diu-le      yizhi      xie.  
 servant    beat    Jiaoda beat-lost-Asp. one Cl.    shoe  
 'The servant beat Jiaoda (and as a result the servant) lost a shoe.'

This assumption seems to provide a reasonable solution to the problem of the extra  $\theta$ -role from the V in sentences like (38), but many problems emerge when a wide range of phenomena are brought into consideration. Verb reduplication is not limited to verbs that have an extra  $\theta$ -role to assign. The V *chi* 'eat' in (39), for example, has its two  $\theta$ -roles assigned to the external and internal arguments of the V-C and the reduplicated verb still takes an NP as its object. If the reduplicated verb were only a case assigner, the NP *cai* 'dishes' would have no  $\theta$ -role and the sentence would be ruled out under the common assumptions of the  $\theta$ -theory (e.g., Chomsky 1981). The prediction is obviously not borne out.

- (39) Baoyu chi cai      chi-ni-le      jiali      de.  
 Baoyu eat dishes eat-tired-Asp. home DE  
 'Baoyu eats dishes from home and gets tired of them.'

On the other hand, it seems unnecessary for a V to discharge the extra  $\theta$ -role when it has one. Sentence (40) is similar to (38) except for the reduplicated verb and (40) is acceptable to native speakers even though the patient role of the V *da* 'beat' remains undischarged.

- (40) Puren      canjia      oudou da-diu-le      yizhi      xie.  
 servant      join      fight beat-lost-Asp. one Cl.      shoe  
 'The servant got into a fight and (as a result the servant) lost a shoe.'

A related issue is that in cases like (41), the extra  $\theta$ -role cannot appear in a verb reduplication structure. The V *gei* 'give' of the resultative V-C in (41) is ditransitive in nature and the goal role from *gei* 'give' is not discharged to the two arguments of the V-C. However, the undischarged  $\theta$ -role cannot be discharged to the NP in a verb reduplication structure, since (41) is at best very marginal. The acceptable verb reduplication form should be (41'), which presents another problem for Y. Li's assumption about verb reduplication. The two  $\theta$ -roles from the V *gei* 'give' in (41') are assigned to the two NPs *Daiyu* and *qian* 'money', presumably via the dummy copy of *gei* 'give', but the  $\theta$ -role from the C *duo* 'too much' is either not assigned or assigned to *qian* 'money', which has another role from the V via the dummy copy *gei* 'give'. Either way (41') would be wrongly ruled out.

- (41) ?/\* Baoyu gei      Daiyu gei-duo-le      qian.  
 Baoyu give      Daiyu give-more-Asp.      money  
 (41') Baoyu gei      Daiyu qian      gei-duo-le.  
 Baoyu give      Daiyu money      give-more-Asp.  
 'Baoyu gave too much money to Daiyu.'

Sentence (42) is another acceptable example of verb reduplication construction but it does not fit Y. Li's analysis either. The  $\theta$ -role of goal from the V *gei* 'give' is not discharged but the sentence is perfect. Apparently, the NP in a verb reduplication construction does not depend on the V in a V-C for  $\theta$ -role and whether all  $\theta$ -roles from V or C in a given V-C are discharged has no direct impact on the acceptability of such a sentence. It is therefore doubtful that the V or C in a V-C has more  $\theta$ -roles than those already assigned to the arguments of the V-C. The exact nature of verb reduplication structure will be discussed in a separate paper. Suffice it to say here that the reduplicated verb phrase is most likely to an adverbial and the NP inside gets its case and  $\theta$ -role from the reduplicated verb directly.

- (42) Baoyu mai dongxi gei-duo-le qian.  
 Baoyu buy thing give-more-Asp. money  
 'Baoyu gave too much money when he was buying things.'

Another problem for Y. Li's lexical ambiguity analysis is that in many so-called causative V-C constructions like the one in (43) (from Y. Li 1995), the  $\theta$ -grid of V is not preserved. The agent role of the V *chang* 'sing' is apparently assigned to the internal argument of V-C while its patient role is assigned to the external argument. In Y. Li's (1990) terms, the  $\theta$ -grid of V *chang* 'sing' is in an inverse order in (43) and the sentence should be ruled ungrammatical.

- (43) Zheshou ger chang-fan-le Youyou le.  
 this Cl. song sing-bored-Asp. Youyou LE  
 'Youyou sang this song and as a result became bored.'

In order to account for these apparent counterexamples, Y. Li (1995) proposes that in addition to the thematic hierarchy, there exists a causative hierarchy in the order of

causer > affectee

and argues that the causative hierarchy can 'override' the thematic hierarchy. He assumes that the c(ausative)-roles can be randomly assigned to argument positions of resultative V-Cs, as long as the argument receiving the causer role is the one that receives a  $\theta$ -role from V but not from C while the argument receiving the affectee role is the one that receives a  $\theta$ -role from C. In sentence (43), the c-role of causer is assigned to the external argument *zheshou ger* 'this song' of the V-C while the affectee role is assigned to the internal argument. The thematic hierarchy of *chang* 'sing' is overridden by the causative hierarchy so that the sentence is acceptable.

An apparent problem for the causal event analysis is that in many causative V-C resultative constructions like the one in (44) (from Y. Li 1995), the V is intransitive in nature and its only  $\theta$ -role is assigned to the internal argument of the V-C. Y. Li's (1995) condition on c-role assignment is thus not met in these cases. His solution is to argue that the V in these cases may also have the function of a causative verb, as shown in the V-O compound in (45) (from Y. Li 1995). A causative verb has two  $\theta$ -roles and the  $\theta$ -role assignment pattern

of (44) could thus be considered the same as that of (43).

- (44) Taotao de gushi xiao-si wo le.  
 Taotao story laugh-dead me LE  
 'Taotao's story made me laugh to death.'
- (45) Taotao de gushi zui xiao-ren.  
 Taotao's story most laugh-people  
 'Taotao's story makes people laugh the most (=the funniest).'

The problem will not go away so easily, though. The intransitive V in many causative V-Cs never has a causative usage. The V-C *le-huai* 'happy-extreme' in (10), for example, is causative but the V *le* 'happy' itself does not have any causative property of its own. The unacceptable status of (46) bears evidence to that fact. Other resultative V-Cs in this category include the *gan-si* 'dry-dead' in (47) and V-Cs like *re-yun* 'hot-collapsed', *dong-shang* 'cold-injured', *ke-huai* 'thirsty-bad' and *teng-feng* 'painful-mad'. When these V-Cs are used causatively, they represent a sequence of events, namely, something caused the event represented by V to happen first and then the event represented by C to take place as a result.

- (10) Chenggong de xiaoxi le-huai-le dajia.  
 success DE news happy-extreme-Asp. everyone  
 'The news of success made everyone happy to an extreme extent.'
- (46) \* Chenggong de xiaoxi le-ren.  
 success DE news happy-people
- (47) Chang qi wuyu gan-si-le suoyou de zhuangjia.  
 long term no-rain dry-dead-Asp. all DE crop  
 'The big drought made all crops dry and as a result the crops died.'

The exact nature and derivation of causativity will not be discussed in this paper. See Gu (1992) for a possible account. Suffice it to say that causativity is most likely to be associated with certain causative verbs, with or without phonetic content, instead of all V-Cs. The main concern here is to present as many cases as possible where the thematic hierarchy of either V or C is not preserved but the resultative V-C construction is nonetheless acceptable. The V-C *xia-baohe* 'fall-saturated' in (48), for example, takes one argument only

and the argument apparently receives the  $\theta$ -role from the C *baohe* ‘saturated’ in Y. Li’s (1990, 1995) terms. Since the  $\theta$ -role from the verb *xia* ‘fall’, no matter what it is, remains idle, the sentence is wrongly predicted to be ungrammatical by Y. Li’s analysis. The same can be said about the V-C *qi-bai* ‘infuriate-white’ in (49), which would be wrongly ruled out because the  $\theta$ -role from the V *qi* ‘infuriate’ is not assigned to any argument and it is not possible to create an NP position to take the  $\theta$ -role.

- (48) Di yijing xia-baohe-le, yu buzai shen-jin-qu.  
 field already fall-saturated-Asp. rain no longer permeate-in-go  
 ‘The field has taken so much rainfall that it was saturated the rain did not permeate into the field any more.’
- (49) Tade lian dou qi-bai-le.  
 his face even infuriate-white-Asp.  
 ‘His face became white as the result of outrage.’

The resultative V-C *chang-hong* ‘sing-popular’ in (50) (from Wang 1997) represents another case. The sentence has the interpretation that a song became popular throughout the Northeast as the result of someone singing it. Under this interpretation, the patient role from the V *chang* ‘sing’ is assigned to the external argument of V-C and the  $\theta$ -role from the C *hong* ‘popular’ is also assigned to the external argument. The internal argument of the V-C is a locative phrase which does not receive  $\theta$ -role from either V or C, at least not in the sense of Y. Li (1990). The same can be said about the  $\theta$ -role assignment pattern in (51). The V in (51) has one  $\theta$ -role to assign as does the C. Both  $\theta$ -roles are assigned to the external argument of V-C and the internal argument is an NP indicating a location. The internal argument apparently does not receive its  $\theta$ -role from either the V or the C.

- (50) Yi shou ge chang-hong-le Dongbei.  
 one Cl. song sing-popular-Asp. Northeast  
 ‘A song became popular in the Northeast.’
- (51) Wenhua Shan zheng zou-qiao shichang.  
 T-shirt currently walk-popular market  
 ‘T-shirts are selling very well in the market.’

The resultative V-C in (52) poses yet another problematic case. The  $\theta$ -role from the V *ji* 'jam, push into' is assigned to the internal argument of the resultative V-C instead of the external argument while the  $\theta$ -role from the C *man* 'full' is assigned to the external argument instead of the internal argument. The sentence thus has the interpretation that the passengers pushed into all the available space of the train compartment and the compartment became full. Since sentence (52) does not have a causative reading but the  $\theta$ -role assignment in (52) is in a reversed order, the sentence will be wrongly ruled out within Y. Li's framework. Similarly, the  $\theta$ -role from the V in (53) is assigned to the internal argument of the V-C while the  $\theta$ -role from C is assigned to the external argument, but (53) is nonetheless perfect.

- (52) Toudengche                      ye      ji-man-le      chengke.  
       first-class-compartment also   jam-full-Asp. passenger  
       'The first class compartment was also jammed with passengers.'
- (53) Xiuli   de      lianpang   rujin   pa-man-le      zhouwen.  
       pretty DE      face      now   crawl-full-Asp.   wrinkle  
       'Wrinkles have crawled all over the pretty face.'

## 5. V-C AS A SYNTACTICALLY DERIVED VERB

Apparently, there are more problems in the analysis of resultative V-Cs than the lexical ambiguity analysis can handle, and it seems reasonable to take a different approach when the multiple reading nature of all V-C constructions is being examined. There is a long tradition in linguistic analysis to make a distinction between word formation that creates lexical items and syntactic processes that produce phrases. An often utilised criterion is the productivity of the process involved (e.g., Bloomfield 1933, Quirk et al. 1985). The formation of compounds in English, for example, is usually considered a non-syntactic process because it lacks productivity in the sense that many possible compounds are not in actual use. Items like *lemonstone* and *bushhopper* remain potential English words only even though similar items like *limestone* and *grasshopper* are real English words (Quirk et al. 1985).

It is generally agreed that the formation of V-C complexes in Chinese is very productive (e.g., C. Li and Thompson 1981, Y. Li 1990, 1995, Gu 1992, Zou 1995).

Although there are certain categorical restrictions on the choice of C, namely, C is usually a stative verb, a preposition, a directional verb or a member of a small group of transitive verbs, there seems to be no constraint on the categorical status of V. There seems to be no known accidental gap in the formation of V-C constructions, either. As long as the categorical requirement on C is satisfied, a V-C is well formed and, as long as the two predication in a V-C are both semantically well formed, the V-C will be acceptable.

Sometimes the relationship between the two predication in a V-C is not so obvious in isolation and the V-C might be frowned upon, but the problem will disappear when an appropriate context is established. The resultative V-C *yanjiu-lao* 'research-old', for example, is considered hard to accept by many native speakers because they see no clear logic connection between doing research and becoming old. In the context of sentence (54) (from Lü 1986), however, it poses no problem at all since the two events represented by the two predication are closely related in that context and a resultative reading is easy to obtain.

- (54) Ni     jinhou     bie zai     yanjiu     huojianle.     Ren     ye  
 you     now-after     not again     research     rocket Part.     person also  
 yanjiu-lao- le,     jia     ye     yanjiu-qiong-le,  
 research-old-Asp. family also     research-poor-Asp.  
 shenti ye     yanjiu-kua-le,     haishi yanjiu-bu-chu-lai.  
 health also     research-collapsed-Asp.     still     research-not-go-come  
 'You should not do research on rockets any more! You became old as a result  
 of doing research; your family became poor as a result and your health  
 collapsed as a result. The results (rockets) are still not out yet.'

Obviously, the formation of V-Cs has the earmark of a syntactic process but V-Cs themselves have the characteristics of verbs instead of verb phrases. It seems that the formation of V-C does not fit either of the two processes envisioned by Quirk et al. (1985). A reasonable solution to this apparent problem is to explore a third possibility, namely, a syntactic process that produces words instead of phrases. Hale and Keyser (1991, 1993) have proposed to derive verbs like *shelve* via the so-called l-syntactic processes. They also speculate that the analysis can be expanded to cover the derivation of so-called light verb constructions like Basque *lo egin* 'sleep-do, to sleep' and *barre egin* 'laugh-do, to laugh' (Hale and Keyser 1991). To further their analysis of light verb constructions, it can be

assumed that the l-syntactic processes responsible for English verbs like *shelve* have their s-syntax counterparts in Chinese that are responsible for the derivation of complex verbs like the *bo-pi* 'take-off-skin, to peel' in (14) and the V-Cs discussed in this paper.

Syntactically derived verbs do not belong to the lexicon in the sense of Chomsky (1981, 1995), i.e., they are not stored in the memory as single units nor do they enter syntax as lexical items, even though they have all the functions of verbs. In other words, the components of these verbs enter the syntax as lexical items but they become part of a verb in the derivation or computation process and partially lose their independent status. The technical details of the derivation or computation will not be discussed here. See Thompson (1973) and Zou (1995) for possible solutions within different theoretic frameworks.

The analysis that treats V-Cs as syntactically derived verbs provides a plausible account for the fact that the V and C in a V-C construction have separate relationship with possibly different elements in the sentence. For example, if it can be assumed that V and C head separate phrases at certain stages of the derivation, it would be possible to assume that they retain the original relationship with elements in their phrases, presumably via traces they have left in their original positions, after V and C have merged to form a single verb element (Zou 1995).

This line of analysis has the advantage that it renders it unnecessary to choose a head from the two components of a V-C. Under the assumption that V-Cs are compounds that come directly from the lexicon, it becomes obligatory to assign the status of head to the same element to guarantee that all V-Cs will have the same status and behave the same. Y. Li (1990, 1995) thus assumes that V is always the head of a V-C so that all V-Cs have the status of a verb. Within the framework of X-bar theory which Y. Li adopts, however, the status of C becomes a problem. C is apparently not a complement of the V, nor is it a modifier of the V. Under the assumption that V is the only head, C cannot be conjoined to the V either. C cannot be an affix if the V-C is assumed to be a compound. There seems to be no other possible status left for C within the X-bar theory. The problem disappears under Zou's (1995) assumption that V and C head separate maximal projections and the two heads merge to form the V-C.

The arguments and modifiers of the V-C may come from the two phrases headed by V and C respectively; and some of them may be directly related to the V-C itself. In Chomsky's (1995) terms, these elements may be inserted via GT into the structure at different stages of the computation process. Such an analysis can accommodate more thematic relationships

than the rigid lexical ambiguity analysis does and thus provides a means to establish a possible account for the distribution of arguments in sentences (47) through (54).

Since V and C are assumed to head separate phrases and therefore hold separate predication relationship with different elements, it is possible in this line of analysis to assume that the potential *de* is also the head of a phrase, which is in predication relationship with the phrase headed by C, to account for the relationship between the potential *de* and other elements (e.g., Liu et al 1985, Shi 1995).

Another advantage of the syntactic analysis is that it provides a straightforward account for the properties of V-Cs that have a syntactically derived verb as C. The C of the V-C in sentence (54), for example, is intransitive in nature and can only take one argument as predicate under normal conditions. However, it is related to two arguments in (55), the postverbal NP *qi* 'air' and the NP *luntai* 'tire' in the *ba* phrase. The  $\theta$ -grid of *zu* 'enough' cannot simply be expanded to include two  $\theta$ -roles as in Y. Li (1990), because the two NPs are not related to *zu* 'enough' at the same level. The sentence has the interpretation that after the pumping, the air was enough and as a result the tires became having enough air. In other words, *qi* 'air' is combined with *zu* 'enough' to form a complex verb first and the complex verb *zu qi* 'enough-air' enters a predication relationship with *luntai* 'tire'.

- (55)   Wo    ba    luntai da-zu-le                   qi.  
          I    BA   tire    pump-enough-Asp.   air  
          'I pumped enough air into the tires (lit. I pumped the tired and as a result  
          the air in it was enough.).'

If the V-C *dā-zu* 'pump-enough' is considered a compound coming from the lexicon, the formation of the complex verb will become a problem because it involves part of a compound and should be ruled out on the ground of violating the lexical integrity hypothesis. If, on the other hand, the V-C itself is syntactically derived, the problem will not arise. The technical details of the actual derivation will be discussed in a separate paper.

## 6. CONCLUDING REMARKS

It is argued in this paper that V-Cs are not phrases or compounds in the usual sense of the two terms. They should be treated as verbs that are derived via syntactic processes. It is thus possible to account for many of the unusual properties of V-Cs.

There have been objections against the notion of syntactically derived items that have the status of  $X^0$ . The main argument is that they are not found in languages like English and is therefore not universal, and certain theory frameworks do not allow such processes. The philosophy underlying this paper is that linguistic facts should be the basis of theories and facts should be gathered from all natural languages, not from just a few chosen ones. If a theory has a very narrow data base and cannot handle certain phenomenon, it is the theory that must be modified.

## NOTES

\* The author wants to express his gratitude towards Liejiong Xu, Steve Matthews, Yuanjian He, Yang Gu, Lingling Wang, Jenny Wang and the reviewer of this volume for their comments. All the errors remain the responsibility of the author.

<sup>1</sup> It is a common practice to translate the term *buyu* as 'complement'. In contemporary syntax, however, the complement of a verb usually refers to the object, i.e., the nominal phrase subcategorized by the verb and being affected by it. It is therefore misleading to call one verbal element a complement to the other when the two actually have similar status. The term *buyu* will be translated as complementary in this paper, referring to supplying additional information to the verb, which is the original intention when the term was created. The term *dongbu jieyou* will be translated as verb-complementary construction.

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# MORPHOLOGICAL PROPERTIES OF VERB-COMPLEMENT CONSTRUCTIONS IN CHINESE\*

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This study discusses the morphological properties of verbal compounds in Chinese. Verb-complement constructions (VCCs) in Chinese fall into four distinctive categories: phrasal-syntactic, phrasal-lexical, morpho-syntactic and morpho-lexical. The analysis treats the first two types as phrasal constructions and the latter two as compound formations and I focus on the morphological properties of the compound VCCs. Three constraints on the well-formedness of VCCs are proposed in the study, namely, the No Phrase Constraint, the Locality Constraint and the Anaphoric Island Constraint. It is argued that the VCCs are morphological formations conditioned by these constraints and as such they are distinguishable from phrasal constructions, which are free from the constraints. While both morpho-syntactic and morpho-lexical VCCs are formed through the process of Incorporation; the process for the former takes in syntax and that for the latter in the lexicon.

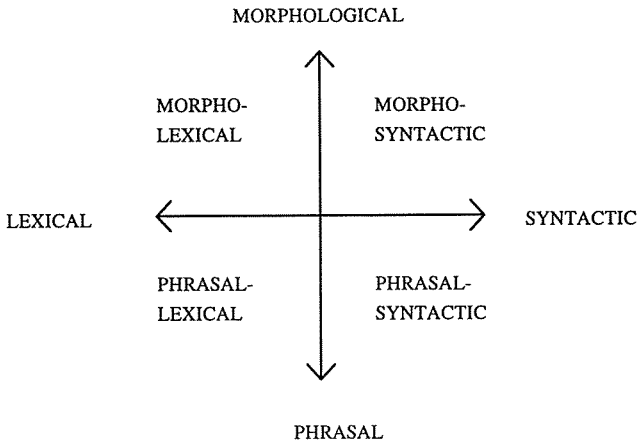
## 1. INTRODUCTION

Ever since Chomsky published *Remarks on Nominalization* (1970), which reveals the differences between gerundive nominals and lexically derived nominals, the existence of morphology as an independent domain in the grammatical system has remained an open question. For those who uphold the Lexicalist Hypothesis (Pesetsky 1979, Williams 1981, Selkirk 1982, Scalise 1984, Di Sciullo and Williams 1987, Anderson 1988 *inter alia*), the structural features of the internal composition of words “cannot be relevant to syntax” (Di Sciullo and Williams 1987). On the other hand, those who strive for a unified approach to grammar (Roeper and Siegel 1978, Lieber 1981, 1992, Sproat 1988, Baker 1988, Paul 1988 *inter alia*) maintain that “all principles of grammar apply both above and below word level” (Lieber 1992:23).

In this study, I present an analysis on verb-complement constructions (VCCs) in Chinese such as *kan-shu* ‘read-book’, *qi-ma* ‘ride-horse’, *diao-yu* ‘hook-fish’, focusing on the morphological properties of such formations. The analysis is

primarily based on a modified version of Dowty's (1979) proposal, which distinguishes two pairs of concepts: syntax/morphology and syntax/lexicon. I have replaced the first pair syntax/morphology with phrasal formation/morphological formation. This is more than a change for terminological convenience, for different mechanisms are involved. The opposition between morphological and phrasal formations is based on a difference in the relationship between the constituents of a construction. In a morphological formation, the non-head constituent is structurally dependent on its head constituent; while in a phrasal construction, the non-head constituent is structurally free. The opposition between lexical and syntactic processes is based on a difference in the level of grammatical organization. Lexical processes are assumed to take place at the pre-syntactic level; while syntactic processes take place in syntax. The two sets of distinctions exist in parallel and cross-cut each other as shown diagrammatically by (1):

(1)



As a result of this interactive process, four different types of VCCs -- morpho-lexical, morpho-syntactic, phrasal-syntactic and phrasal-lexical -- are expected to be found.

In Section 2, I will give a brief survey of different types of VCCs in Chinese. In Section 3, I will argue for the morphological nature of compound VCCs, that is, morpho-lexical and morpho-syntactic VCCs.<sup>1</sup> I will do so by identifying a number of constraints on the structural well-formedness of morphological formations and demonstrate that compound VCCs are conditioned by such constraints while their

phrasal counterparts are free. In Section 4, it is shown that the systematic differences between morpo-lexical and morpo-syntactic VCCs are best explained if we regard morpo-lexical compounds to be formed pre-syntactically and morpo-syntactic compounds to be formed in syntax.<sup>2</sup>

## 2. A TYPOLOGY OF VCCs IN CHINESE

It is generally recognized that lexical processes are typically unproductive and opaque for meaning interpretation, while syntactic processes are productive and compositional in meaning (Chomsky 1970). We find that there are compound VCCs formed at both the lexical (morpo-lexical) and at the syntactic (morpo-syntactic) levels in Chinese as shown by the examples in (2) and (3) respectively:

### (2) MORPHO-LEXICAL VCC

chu-jia	leave--home	'to become a Buddhist monk'
tao-nan	escape-calamity	'to seek refuge in flight'
deng-lu	step-(onto)-land	'to land from sea'
chu-hai	leave-(on)-sea	'to set off on voyage'
kai-dao	cut-(with)-knife	'to have an operation'
tiao-san	jump-(with)-parachute	'to parachute'
kai-xin	open-heart	'to have fun'

### (3) MORPHO-SYNTACTIC VCC

chu-cao	cut-weeds	'to do weeding'
qi-ma	ride-horse	'to go riding'
chi-fan	eat-meal	'to have meals'
chou-yan	inhale-smoke	'to smoke'
zhong-shu	plant-tree	'to plant trees'
da-shui	fetch-water	'to fetch water'
kai-hua	open-flower	'to bloom into flower'
kan-shu	read-book	'to do reading'

The different properties of morpho-lexical and morpho-syntactic VCCs are quite obvious in terms of syntactic productivity and semantic compositionality. First, the morpho-syntactic VCCs in (3) above represent a productive process in the sense that each of these compounds can be further restricted by additional lexical modifiers on the non-head. In other words, morpho-syntactic VCCs are easily expandable. For example, the compound *kan-shu* ‘read-book’ is productive in that we can say *kan-xian-shu* ‘read-pleasure-book’, *kan-gu-shu* ‘read-classic-book’ or *kan-xiao-ren-shu* ‘read-picture-book’; likewise, we can expand *kai-hua* ‘open-flower’ and say *kai-hong-hua* ‘open-red-flower’, *kai-xian-hua* ‘open-new-flower’ *kai-xing-hua* ‘open-apricot-flower’. In contrast, the morpho-lexical VCCs in (2) cannot be expanded in this way. We do not find such forms as *\*tao-zai-nan* ‘escape from calamity’, *\*chu-da-hai* ‘set out for the sea’ or *\*kai-ren-xin* ‘open a man’s heart’ from *tao-nan*, *chu-hai* or *kai-xin* respectively, even though the expanded forms are semantically well-formed. Such restrictions cannot be explained away on prosodic ground either, for, then, we have to ask the question why they should affect only formations such as those in (2) and not those in (3). I believe that the unproductiveness of the VCCs in (2) is due to structural constraints and can be explained if we accept the view that they are formed in the lexicon, which is an inaccessible domain by any syntactic processes. I will take up this point in Section 4 again. Secondly, the compositional nature of the meaning of the morpho-syntactic VCCs in (3) is shown by the fact that their meanings are derivable from the meanings of their constituents. The meanings of *chu-cao* ‘hoe weed’, *qi-ma* ‘ride horse’, *chi-fan* ‘eat meal’, etc. can be directly read off from their constituent parts. But with morpho-lexical compounds such as *chu-jia* ‘become a Buddhist monk’, *tao-nan* ‘seek refuge in flight’, *deng-lu* ‘land’, etc., their meanings cannot be obtained in the same fashion. In each case, extension or specialization of meaning is present. The semantic opacity of the morpho-lexical VCCs again points to their lexical nature.

Parallel to the morpho-syntactic VCCs shown in (3), there exists an exact counterpart construction for each of them at the phrasal level. For example:

(4) PHRASAL-SYNTACTIC VCC

chu yi-pian cao	cut one-CL weeds	‘weed one patch of land’
qi liang-pi ma	ride two-CL horse	‘ride two horses’
chi san-wan fan	eat three-CL rice	‘eat three bowls of rice’

chou si-gen yan	inhale four-CL smoke	'smoke four cigarettes'
zhong wu-ke shu	plant five-CL tree	'plant five trees'
da liu-tong shui	fetch six-CL water	'fetch six buckets of water'
kai qi-duo hua	bloom seven-CL flower	'seven flowers are blooming'
kan ba-ben shu	read eight-CL book	'read eight books'

There are a number of structural differences between morpho-syntactic and phrasal-syntactic VCCs. These differences will be systematically investigated in the next section. For now it is sufficient to note that the essential difference between these two types of VCCs is that they manifest a different kind of relationship between the (verbal) head and the (nominal) non-head constituents. In a morpho-syntactic VCC, the non-head is structurally dependent on the head, but the non-head is structurally independent from its head in a phrasal-syntactic VCC.<sup>3</sup>

If syntactic productivity and semantic compositionality are characteristics of syntactic processes, then we find that not all phrasal constructions are syntactic formations. This leads us to define the expression in (5) as phrasal-lexical constructions.

(5) PHRASAL-LEXICAL VCC

peng yi-bizi hui	bump one-nose dust	'to be let down'
chuan yi-tiao kuzi	wear one-CL trousers	'to be allied with s.b.'
zuo yi-tiao ban-deng	sit-on one-CL bench	'to side with s.b.'
tong yi-ge mafengwo	hit one-CL bee-hive	'to get into trouble'
che mou-ren de hou-tui	grab s.b. DE hind-leg	'to be a burden to s.b.'
jiou mou-ren de bianzi	pull s.b. DE pig-tail	'to find fault with s.b.'
zou mou-ren de hou-men	pass s.b. DE back-door	'to use s.b.'s relations'
bao mou-ren de cu-tui	hold onto s.b. DE big-leg	'to get powerful support'

These constructions are phrasal in the sense that the non-head constituent is structurally independent from the head, but they are also lexical in the sense that they are structurally unproductive and semantically opaque. To demonstrate this, let us examine the properties of structural unproductiveness and opacity of meaning more closely with the expression *peng yi bizi hui*. The expression literally means to 'bump one's nose into dust' but its intended meaning is 'to be disappointed' or 'to be turned

down'. The expression would not work, if we replace *hui* 'dust' with its nearest synonyms such as *mei-hui* 'coal-dust' or *tu* 'earth' as in *\*peng yi bizi mei-hui* 'to bump one's nose into coal-dust' or *\*peng yibizi tu* 'to bump one's nose into earth'. Such expressions would only be acceptable when they are interpreted literally, in which case the object NPs are used referentially. But that is beyond the reach of the lexicalized phrases such as *peng yibizi hui*, for they are never intended to be interpreted literally in their actual use! The same is true with the expression *bao mou-ren de cu tui*, literally meaning 'hold onto someone's big leg', is only to be understood as referring to 'get someone's powerful backing'. The expression *\*bao mou-ren de han tu*, has exactly the same literal meaning as the lexicalized idiom (the word *han* 'strong' is a close synonym to *cu* 'big' in this case), but it cannot be accepted as an alternative idiomatic expression.

### 3. MORPHOLOGICAL PROPERTIES OF COMPOUND VCCs

In this section, I intend to investigate the morphological nature of compound VCCs (including both morpho-lexical and morpho-syntactic ones) such as *kan-shu* 'read-book', *qi-ma* 'ride-horse', *diao-yu* 'hook-fish' as opposed to phrasal constructions *kan yi-ben shu* 'read a book', *qi yi-pi ma* 'ride a horse', *diao yi-tiao yu* 'hook a fish'. We have claimed that the difference between morphological VCCs and phrasal VCCs is that the non-head constituent is structurally dependent on the head in morphological VCCs. In what follows, it will be shown that this structural dependency is manifested by three separate conditions on the well-formedness of morphological structures: No Phrase Constraint, Locality Constraint and Anaphoric Island Constraint and that compound VCCs are conditioned by all three constraints.

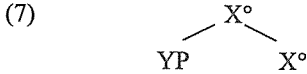
#### 3.1. No Phrase Constraint

The No Phrase Constraint on the well-formedness of morphological formations prevents phrasal constituents from entering into any morphological formation. A definition of the No Phrase Constraint is given by Scalise (1984):

## (6) NO PHRASE CONSTRAINT (Scalise 1984:155)

A word formation rule can take as its base only major lexical categories (N, A, V) but not phrases (NP, AP, VP).<sup>4</sup>

The constraint is represented by the tree diagram in (7):



In (7), the phrasal constituent YP is governed by an X<sup>°</sup> head, violating the No Phrase Constraint, and the formation is ungrammatical. The patterns emerging from the adjective-noun constructions (ANCs) in Chinese can be used as a good example to demonstrate the effect of the No Phrase Constraint. In Chinese, there are two different types of adjectival modifiers: lexical modifier and phrasal modifier.<sup>5</sup> The examples in (8) represent nominal expressions with adjective modifiers, whose head is X<sup>°</sup> and those in (9) are nominal expressions with phrasal modifiers, whose head is X':

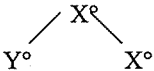
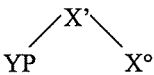
## (8) LEXICAL MODIFIER

<b>gao-shan</b>	'high-mountain'
<b>zang-yifu</b>	'dirty-clothes'
<b>xian-gongfu</b>	'spare-time'
<b>qiao-shou</b>	'adroit'
<b>re-kangtou</b>	'warm home'

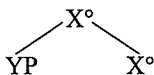
## (9) PHRASAL MODIFIER

<b>tebie-gao-de shan</b>	'exceptionally high mountains'
<b>feichang-zang-de yifu</b>	'pretty dirty clothes'
<b>hen-qiao-de shou</b>	'very deft hands'
<b>tai-shen-de shu</b>	'too difficult book'
<b>tei-re-de fangjian</b>	'too hot a room'

The underlying structure for those constructions in (8) and (9) are illustrated by the tree-diagrams in (10) and (11), respectively:

- (10) 
- (11) 

The adjective modifiers in (8) are zero-level constituents, that is  $Y^\circ$  in (10) and the A-N constructions in (8) are morphological formations; the adjective modifiers in (9) are phrasal constituents, that is, YP in (11) and the formations in (9) are also phrasal expressions. Notice that there are certain restrictions on the modification and expansion of the adjectival constituents under the  $X^\circ$  head. It is not possible to add adverbial modifiers such as *tebie* 'exceptionally', *feichang* 'unusually' or *hen* 'very' to the modifying adjectives in (8): *\*tebie gao shan* 'exceptionally high mountains', *\*feichang zang yifu* 'pretty dirty clothes' or *\*hen qiao shou* 'very deft hands', whereas the phrasal adjectives marked with the particle *de* are free to take adverbial modifiers as shown in (9). The structural constraint that forbids the further expansion of the adjective under an  $X^\circ$  head is captured by the tree diagram in (12):

- (12) \* 

We see from (12) that the ungrammatical structure violates the No Phrase Constraint, for the added adverbial phrasal is adjoined to YP, which is under an  $X^\circ$  node.

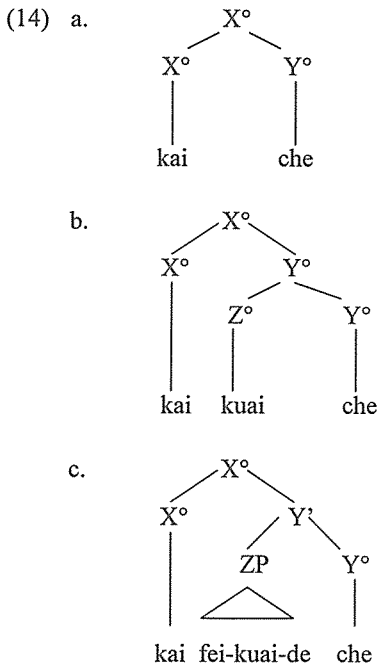
Let us turn to compound VCCs in Chinese and see if the No Phrase Constraint has any effect on the structural well-formedness of this type of compounds. Indeed, we find that the No Phrase Constraint provides a straightforward explanation for why the items in the rightmost column of (13) can not be accepted as word-like morphological formations.

(13) MORPHOLOGICAL CONSTRUCTIONS

kai-che	→	kai-kuai-che	→	*	kai-fei-kuai-che
drive-car		drive-fast-car			drive-very-fast-car
kan-shu	→	kan-xian-shu	→	*	kan-gang-chu-shu
read-book		read-pleasure-book			read-just-published-book

qi-ma	→	qi-zhuang-ma	→ *	qi-biao-fei-ti-zhuang-ma
ride-horse		ride-stout- horse		ride-very-strong-strong-horse
diao-yu	→	diao-da-yu	→ *	diao-hen-da-yu
hook-fish		hook-big-fish		hook-very-big-fish

Recall that our No Phrase Constraint dictates that “a word formation rule can take as its base only major lexical categories but not phrases.” The tree diagrams in (14) show the underlining structures for the base and the expanded forms in (13):

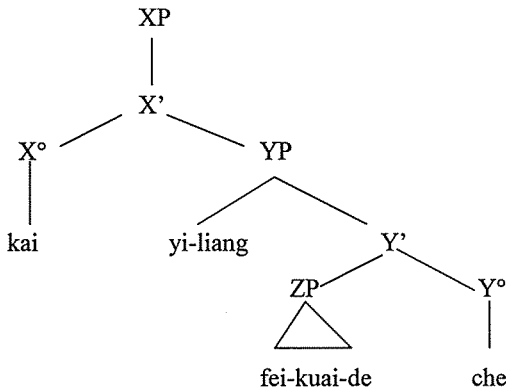


The structure in (14c) is violates the No Phrase Constraint. It is, therefore, ruled out as an acceptable morphological formation. In a phrasal construction, however, which is not conditioned by the No Phrase Constraint, the non-head constituent of a VCC is free to expand as testified by the examples in (15) and the representation of the underlying structure in (16):

## (15) PHRASAL CONSTRUCTION

kai	yi-liang	fei-kuai-de	che
drive	one-CL	very-fast	DE car
kan	yi-ben	gang-chu-de	shu
read	one-CL	just-published	DE book
qi	yi-pi	biao-fei-ti-zhuang-de	ma
ride	one-CL	very-strong	DE horse
diao	yi-tiao	hen-da-de	yu
hook	one-CL	very-big	DE fish

## (16)



The above discussion demonstrates that the No Phrase Constraint, which is a distinctive feature of morphological formations is effective on compound VCCs as well as on other types of compound constructions in Chinese, but phrasal constructions are free from the No Phrase Constraint.

3.2. *Locality Constraint*

Our next criterion for identifying morphological formations is the Locality Constraint, which can be derived from the permissible patterns of interaction of the phrasal and morphological modifiers.<sup>6</sup> As we have noted earlier, there are two different types of adjectival modifiers in Chinese: phrasal and morphological. Those in (17) and (18) are nominal expressions containing morphological modifiers.

- (17) a.    xiao     ying-han                zidian  
              small   English-Chinese    dictionary  
        b.    xin   hua-qiao                cun  
              new overseas-Chinese    village
- (18) a.    ying-han                xiao    zidian  
              English-Chinese    small   dictionary  
        b.    huaqiao                xin    cun  
              overseas-Chinese    new   village

In the two examples in (17), the noun *zidian* ‘dictionary’ and *cun* ‘village’ are each modified by two adjectival modifiers: *xiao* ‘small’ and *ying-han* ‘Chinese-English’ for *zidian* ‘dictionary’ and *xin* ‘new’ and *huaqiao* ‘Chinese-expatriate’ for *cun* ‘village’. In (18a, b) the two nouns are modified by the same adjectival modifiers and the only difference is that the sequential order of the adjectival constituents have be reversed. We see that this reversal has produced no effect on the well-formedness of the constructions in question. If we represent the adjectival modifiers in (17) and (18) with small letters **a** and **b** respectively, we can establish the following formula:

- (19)    **ab**  $\longleftrightarrow$  **ba**

Next, we observe that possessives, demonstratives, numeral-classifiers and other types of phrasal modifiers can also be ordered freely, when they occur in sequence. For example:

- (20) a.    Wo-de yi-ben    zidian  
              I DE one-CL dictionary  
        b.    xin-jian-de                na-ge    cun  
              newly-constructed DE that-CL village
- (21) a.    yi-ben    wo-de    zidian  
              one-CL I DE    dictionary  
        b.    na-ge    xing-jian-de                cun  
              that-CL newly-constructed DE    village

If we represent the phrasal modifiers in (20) and (21) with capital letters A and B, respectively, the following is obtained:

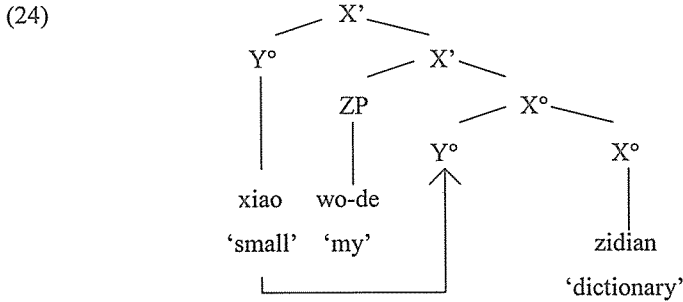
$$(22) \quad AB \longleftrightarrow BA$$

When the above two types of modifiers represented by small letters a and b and capital letters A and B are combined, their ordering is not entirely free. Using the examples in (17a and 19a) above, the following pattern emerges:

- (23) a.    wo-de    xiao    ying-han       zidian    (Aab)  
               yiben    xiao    ying-han       zidian    (Bab)  
               wo-de    ying-han    xiao       zidian    (Aba)  
               yiben    ying-han    xiao       zidian    (Bba)  
               wo-de    yiben    xiao    ying-han    zidian    (ABab)  
               yiben    wo-de    xiao    ying-han    zidian    (BAab)  
               wo-de    yiben    ying-han    xiao    zidian    (ABba)  
               yiben    wo-de    ying-han    xiao    zidian    (BAba)
- b. \* xiao    wo-de          zidian    \* (aA)  
       \* xiao    yiben          zidian    \* (aB)  
       \* ying-han    wo-de          zidian    \* (bA)  
       \* ying-han    yiben          zidian    \* (bB)  
       \* xiao    ying-han    wo-de    yiben    zidian    \* (abAB)  
       \* xiao    ying-han    yiben    wo-de    zidian    \* (abBA)  
       \* ying-han    xiao    wo-de    yiben    zidian    \* (baAB)  
       \* ying-han    xiao    yiben    wo-de    zidian    \* (baBA)

There are other permissible and impermissible combinations such as *Aba*, *BAb*, *\*AaBb*, *\*AabB* or *\*aABb*, which I have not included in the above list. But from what we have, a clear pattern has emerged, which shows that all phrasal ( $X'$ ) modifiers, i.e., those represented by the capital letters must precede all morphological ( $X^0$ ) modifiers, i.e., those represented by small letters, no matter what their internal sequences are. In the ill-formed *\*xiao wo-de zidian* 'small-my-dictionary', the non-head *xiao* 'small' is now separated by the phrasal modifier *wo-de* 'my' from its head *zidian* 'dictionary'.

The underlying structure for the ill-formed construction with a ‘run-away’ non-head constituent can be represented by the tree diagram in (24):



From these examples, we can derive the following Locality Constraint on the well-formedness of morphological constructions:

(25) THE LOCALITY CONSTRAINT ON MORPHOLOGICAL STRUCTURES:

Morphological formations are barriers for movement. The non-head constituent of a morphological formation must be lexically governed by its head.

Let us turn to VCCs and see if the Locality Constraint is a valid structural condition on compound VCCs. It is quite obvious in the case of morpho-lexical VCCs that the non-head constituent may not be raised to a pre-verbal position. In the examples in (26) and (27) *chu-hai* ‘go-to-sea’ and *xia-di* ‘till-land’ are such VCCs. The nominal constituents in these compounds *hai* ‘sea’ and *di* ‘land’ can not be forwarded as shown by (26b) and (27b):

- (26) a. Yu-chuan chu-hai le.  
           fishing-boat go-to-sea ASP  
           ‘The fishing-boats have gone to sea.’  
       b \* Yu-chuan hai chu le.  
           fishing-boat sea go-to ASP

- (27) a. Nong-min xia-di le.  
 farmer till-land ASP  
 'The farmers have gone to work in the fields'
- b. \* Nong-min ba di xia le.  
 farmer BA land till ASP

The ill-formedness of (26b) and (27b) can not be attributed to syntactic constraints, for the constructions with pre-verbal object NPs are quite common in Chinese. The examples in (28) and (29) bear witness to this claim:

- (28) a. Wo xie xin le.  
 I write letter ASP  
 'I have written a letter'
- b. Wo xin xie le.  
 I letter write ASP
- (29) a. Ta chi yao le.  
 he eat medicine ASP  
 'He has taken the medicine.'
- b. Ta ba yao chi le.  
 he BA medicine eat ASP

The object NP *xin* 'letter' in (28b) and *yao* 'medicine' in (29b) occur in the pre-verbal position in their respective sentences. They are considered to be base-generated at the post-verbal positions as shown in (28a, 29a) (see Huang 1982). On the other hand, the Locality Constraint on morphological structures as stated in (25) provides a natural explanation on why the sentences in (26b) and (27b) are ungrammatical. The movement of the nominal constituents in these cases violates the Locality Constraint.

Furthermore, we would expect the Locality Constraint to be effective not only on morpho-lexical VCCs, but also on morpho-syntactic VCCs; yet the examples in (28) and (29) seem to argue against such a claim. Upon closer inspection, however, the structural difference between the VP structures of (28a) and (29a) and (28b) and (29b) is revealed. The pre-verbal object NPs in (28b) and (29b) are typically understood as specific and definite, even though they appear in their bear forms; on the other hand, the post-verbal nominal constituents in (28a) and (29a) are non-

specific and non-referential.<sup>7</sup> The internal structure of the VPs in (28b) and (29b) is  $[_{VP}[_{V'}V \text{ NP}]]$  and that of (28a) and (29a) is  $[_{VP}[_{V'}[_{vV} N]]]$ . That is to say the object-verb constructions in (28b) and (29b) are phrasal and the VCCs in (28a) and (29a) are morphological. If this structural distinction is real, then we can no longer perceive the post-verbal nominal constituents in (28a) and (29a) to be identical with the pre-verbal object NPs in (28b) and (29b). Our claim that all morphological constructions are conditioned by the Locality Constraint is, therefore, justified.

### 2.3. *Anaphoric Island Constraint*

An interesting observation first brought out by Postal (1969) is the so-called Anaphoric Island effect exhibited by the following pairs of sentences in (30) and (31):

- (30) a. Drivers of trucks<sub>i</sub> fill them<sub>i</sub> up with diesel.  
       b. \* Truck<sub>i</sub> drivers fill them<sub>i</sub> up with diesel.
- (31) a. Hunters of aardvark<sub>i</sub> rarely find them<sub>i</sub> on the veld.  
       b. \* Aardvark<sub>i</sub> hunters rarely find them<sub>i</sub> on the veld.

The contrasts in these minimal pairs of sentences show that while it is possible to have co-reference between words in a phrase, it is not possible to do the same when the antecedent is contained within another word. Words are anaphoric island in the sense that they form inaccessible domains for anaphoric processes of various kinds. Thus, we state the anaphoric Island Constraint as in (32):

- (32) ANAPHORIC ISLAND CONSTRAINT:  
       Morphological formations are barriers for anaphoric co-reference.

We will verify the effectiveness of the Anaphoric Island on morphological constructions in Chinese and, in particular, their effectiveness on compound VCCs, but first let us examine some nominal compounds which exhibit this effect.

- (33) a.  $Ta_i$  de **che-paizi** bei jingcha zhai le,  
 he DE car-license-plate PASS police take-away ASP  
 $e_i$  bu- neng shang- lu le.  
 not can drive-on- road ASP  
 'His car-license-plate has been taken away by the police; he cannot drive on the road'
- b.  $Ta$  **chezi** de **paizi** bei jingcha zhai le,  
 his car DE license-plate PASS police take-away ASP  
 $e_j$  bu- neng shang-lu le.  
 not can drive-on-road ASP  
 'The license-plate of his car has been taken away by the police; the car cannot be driven on the road.'
- c. \*  $Ta_i$  de **chej-paizi** bei jingcha zhai le,  
 he DE car-license-plate PASS police take-away ASP  
 $e_j$  bu- neng shang-lu le.  
 not can drive-on- road ASP  
 'His car-license-plate has been taken away by the police; the car cannot be driven on the road.'
- (34) a. **Men-dengj** huai le,  $e_j$  kai bu kai le.  
 door-light break ASP open not open ASP.  
 'The door-light is broken; the light cannot be turned on.'
- b. **Menj-shang** de **deng** huai le,  $e_j$  kai bu kai le.  
 door-top DE light break ASP open not open ASP  
 'The light on the door is broken, the door cannot be opened.'
- c. \* **Menj-deng** huai le,  $e_j$  kai bu kai le.  
 door-light break ASP. open not open ASP.  
 'The door-light is broken; the door cannot be used.'

The empty subject  $e$  of the second clause in (33a) and (33b), can be either co-indexed with the possessive pronoun *ta* 'he', as shown in (33a), or with *chezi* 'car', as shown in (33b). However, it can not be co-indexed with *che* 'car' in *che-pai-zi* 'car-license-plate' as shown in (33c). The same is true of the examples in (34), where the empty subject  $e$  can be either co-indexed with the head noun *deng* 'light' as in (34a) or with the phrasal modifier *men* 'door' in (34b), but it cannot be co-indexed with *men* 'door'

in (34c), which is only part of a morphological unit. These examples show that when a constituent is a part of a morphological construction, of which it is not the head (as *che* ‘car’ in *che-pai-zi* ‘car-license-plate’ and *men* ‘door’ in *men-deng* ‘door-light’), it is subject to the Anaphoric Island Constraint stated in (32). Consequently, it cannot be identified as the antecedent for anaphoric relations. When the same constituent is part of a phrasal construction (as *chezi* ‘car’ in *chezi de pai-zi* ‘license-plate of the car’ and *men* ‘door’ in *men shang de deng* ‘light above the door’), it can be freely used as antecedent for anaphoric co-indexation.

We would expect compound VCCs to exhibit the same anaphoric island effect, if they are genuine morphological formations. Indeed, the examples in (35) and (36) provide support for this argument.

- (35) a. Ta sheng-le yi-ge wa-wa<sub>j</sub> e<sub>j</sub> bai-bai-pang-pang-de.  
 she produce-ASP one-CL baby healthy  
 ‘She has given birth to a baby<sub>j</sub>, who<sub>j</sub> is very healthy.’
- b. Ta<sub>j</sub> sheng-le wa-wa e<sub>j</sub> bai-bai-pang-pang-de.  
 she produce-ASP baby healthy  
 ‘She is very healthy after giving birth to a baby.’
- c. \* Ta sheng-le wa-wa<sub>j</sub> e<sub>j</sub> bai-bai-pang-pang-de.  
 she produce-ASP baby healthy  
 ‘She has given birth to a baby<sub>j</sub>, who<sub>j</sub> is very healthy.’
- (36) a. Wangwu qu-le yi-ge laopo<sub>j</sub> e<sub>j</sub> zhengtian  
 Wangwu marry-ASP one-CL wife all-day  
 lehehe-de.  
 happy.  
 ‘Wangwu married a wife<sub>j</sub>, who<sub>j</sub> is happy all the time.’
- b. Wangwu<sub>i</sub> qu-le laopo e<sub>i</sub> zhengtian lehehe-de.  
 Wangwu marry-ASP wife all-day happy.  
 ‘Wangwu got married and he is happy all the time.’
- c. \* Wangwu qu-le laopo<sub>j</sub> e<sub>j</sub> zhengtian lehehe de.  
 Wangwu marry-ASP wife all-day happy.  
 ‘Wangwu<sub>j</sub> married a wife, who<sub>j</sub> is happy all the time.’

In (35) and (36), we take the subject of the second clause to be *e*. When the main clause has a genuine syntactic object NP, *e* is co-indexed with the object ( $j \dots j \dots$ ) as shown by (35a) and (36a).<sup>8</sup> But when the post-verbal constituent is part of the morphological formation with the head verb, *e* can only be co-indexed with the subject of the main clause ( $i \dots i \dots$ ) as shown by (35b) and (36b) and co-indexation between the post-verbal nominal and *e* is blocked ( $*j \dots j \dots$ ) as shown by (35c) and (36c). The examples in (37) and (38) exhibit similar patterns for co-indexation, except that it takes place between two co-ordinated clauses.

- (37) a. Ta<sub>i</sub> zai meiguo nian-guo yi-suo da-xue<sub>j</sub>, e<sub>i</sub> ganjue  
 he in America study-ASP one-CL university feel  
 e<sub>j</sub> hen bu-yiban  
 very extraordinary  
 'He studied at an American university, and felt it was extraordinary.'
- b. Ta<sub>i/j</sub> zai meiguo nian-guo da-xue, e<sub>i</sub> ganjue e<sub>j</sub>  
 he in America study-ASP university feel  
 hen bu-yiban  
 very extraordinary  
 'He studied in university in America, and felt himself to be extraordinary.'
- c. \* Ta<sub>i</sub> zai meiguo nian-guo da-xue<sub>j</sub>, e<sub>i</sub> ganjue e<sub>j</sub>  
 he in America study-ASP university feel  
 hen bu-yiban  
 very extraordinary  
 'He studied in university in America, and felt it was extraordinary.'
- (38) a. Ta<sub>i</sub> chuan-le yi-jian mingpai<sub>j</sub>, e<sub>i/j</sub> kanshangqu hen  
 he wear-ASP one-CL chic look very  
 shengqi.  
 smart  
 'He was wearing a piece of chic clothes and he/it looked very smart.'

- b. Ta<sub>i</sub> chuan-le mingpai, e<sub>i</sub> kanshangqu hen shengqi.  
 he wear-ASP chic look very smart  
 'He was wearing chic and (he) looked very smart.'
- c \* Ta chuan-le mingpai<sub>j</sub> e<sub>j</sub> kanshangqu hen shufu.  
 he wear-ASP chic looks very smart  
 'He was wearing chic and (it) looked very smart.'

Notice that there are two empty categories:  $e_i$  and  $e_j$  in the second clause in (37). The first empty subject  $e_i$  is always co-indexed with the subject of the first clause forming [  $i \dots i \dots$  ] and the second empty subject  $e_j$  may either be co-indexed with the subject of the first clause forming [  $j \dots j \dots$  ] as shown in (37b) or it may be coindexed with the object of the first clause, as long as the latter is an NP at the phrasal level as in the case of (37a). If the object is an  $X^0$  constituent and is part of a compound VCC with the preceding verb, the empty category  $e_j$  cannot be co-indexed with it. In (38) the empty subject  $e$  in the second clause can always be co-indexed with the subject of the preceding clause. It may also be co-indexed with the object if the latter is a full NP. However, if the verb and object is a compound VCC, the empty  $e$  in the second clause may no longer be co-indexed with the object as shown by the ill-formed (38c).

#### 4. MORPHO-LEXICAL VS. MORPHO-SYNTACTIC VCCs

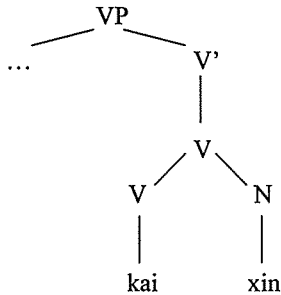
We have made a distinction between morpho-lexical and morpho-syntactic VCCs in our earlier discussion. The opposition between lexical and syntactic processes is based on the Lexicalist Hypothesis, which was first postulated by Chomsky (1970). According to the Lexicalist Hypothesis, words are to be treated as minimal, indivisible entities from the point of view of syntax. Thus, Chomsky (1970) states that: "syntactic rules cannot make reference to any aspect of the internal structure of a word." Lapointe (1978) provides a revised version of the Lexicalist Hypothesis, which came to be known as the Lexical Integrity Hypothesis (LIH):

## (39) THE LEXICAL INTEGRITY HYPOTHESIS (Lapointe 1978:8)

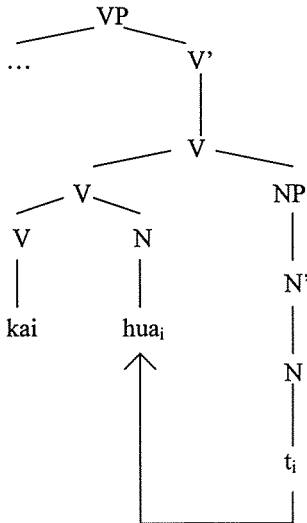
No syntactic rules can refer to elements of morphological  
(i.e., lexical) structure.

We have observed that morpho-lexical VCCs such as *kai-xin* 'open-heart (i.e., be happy)' can not be expanded into such forms as *\*kai-ren-xin* 'open-man-heart', but morpho-syntactic VCCs such as *kai-hua* 'open-flower (i.e., bloom)' can be freely expanded into such forms as *kai-hong-hua* 'open-red-flower' and *kai-xing-hua* 'open-apricot-flower'. The explanation for this difference in terms of productivity lies in the fact that morpho-lexical VCCs are formed in the lexicon and while morpho-syntactic VCCs are derived in syntax by the process of Noun Incorporation (NI).<sup>9</sup> The tree diagrams in (40) and (41) represent the underlying syntactic structures of *kai-xin* 'open-heart' and *kai-hua* 'open flower', respectively:

(40)



(41)



However, there is one condition for Noun Incorporation (NI) to take place in cases like (41), that is, the post-verbal constituent must be an  $X^0$  element. It will not undergo NI, if it is phrasal  $X'$  element. This is in line with the No Phrase Constraint on morphological formations discussed earlier and it precludes the possibility of such constructions as *kai-hen-hong-hua* ‘open-very-red-flower’, containing phrasal elements from entering into morphological formation.

In the case of morpho-syntactic VCCs, compounding does not take place until after it enters syntax and that if the post-verbal nominal is a full NP, instead of being incorporated into the head verb, it becomes a syntactic object and will have to raise in order to be assigned the Accusative Case.<sup>10</sup> The contrast between the incorporated object and syntactic object is shown respectively by the a-numbered examples in (42)-(45) and the b-numbered examples in (42)-(45):

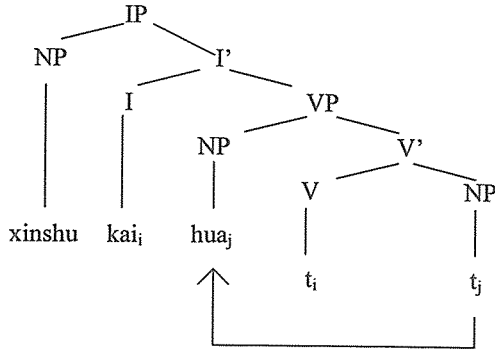
- (42) a. Xing-shu      kai-hua      le.  
 apricot-tree   open-flower   ASP  
 ‘The apricot tree is in blossom.’
- b. Xing-shu      kai-le      xuduo   hua.  
 apricot-tree   open-ASP   lots-of   flower  
 ‘The apricot tree is blooming with lots of flowers’
- c. Xing-shu   hua      kai-le      xuduo.  
 apricot-tree   flowersn   open-ASP   lots-of.  
 ‘The apricot tree flowers are blooming in great quantity’
- (43) a. Zhei   haizi   zhang-ge      le.  
 this   child   grow-height   ASP  
 ‘The child has grown in height.’
- b. Zhei   haizi   zhang-le      laogao   de   ge.  
 this   child   grow-ASP   a lot   DE   height  
 ‘The child has grown a lot in height.’
- c. Zhei   haizi   ge      zhang-le      laogao.  
 this   child   height   grow-ASP   a lot  
 ‘The child’s height has grown a lot.’

- (44) a. Diban da-la le.  
 floor do-wax ASP  
 'The floor has been waxed.'
- b. Diban da-le san-ceng la.  
 floor do-ASP three-layer wax  
 'The floor has been coated with one layer of wax.'
- c. Diban la da-le san-ceng.  
 floor wax do-ASP three-layer  
 'The floor wax has applied three times.'
- (45) a. Da hua mao xia-zair le.  
 big flower cat breed ASP  
 'The big black-and-white cat bred a litter of kittens.'
- b. Da hua mao xia-le yi-wo zair.  
 big flower cat breed-ASP one-litter kitten  
 'The big black-and-white cat has bred a litter of kittens.'
- c. Da hua mao zair xia-le yi-wo.  
 big flower cat kitten breed-ASP on-litter  
 'The big black-and-white cat has bred a litter of kittens.'

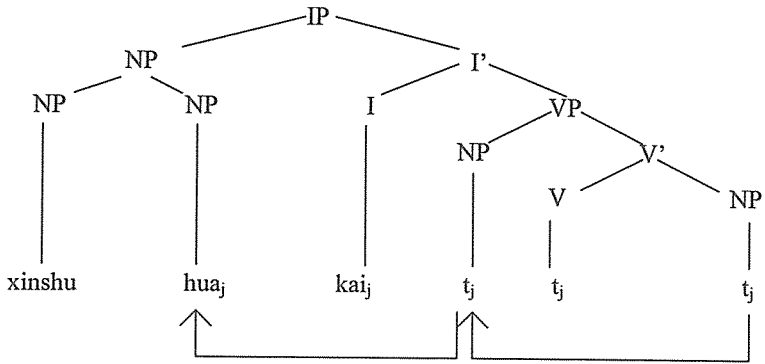
Alternatively, the post-verbal object NP may be assigned Nominative Case in the subject position through object-to-subject movement as the c-numbered examples in (42)-(45) indicate. The former subject, either an Agent or a Locative may optionally appear in these sentences in the form of a demoted adjunct to the subject position (either as a secondary subject or as a modifier to the subject through reanalysis by the use of DE: *xingshu de hua* 'apricot tree's flower'. In the latter case a genitive oblique case is assigned to *xingshu* 'apricot tree'). Finally, notice the post-verbal constituents in these sentences. They are modifiers to the object NP before raising. The operation of object-to-subject raising has left these modifiers stranded.

The syntactic derivations for (42b) and (42c), after object-to-subject raising, are shown by the tree-diagrams in (46) and (47):

(46)



(47)



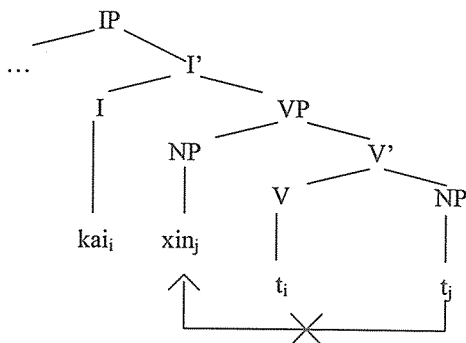
In the case of morpho-lexical compounds, the fact that compounding takes place in the lexicon and that the nominal constituent in such a compound cannot be projected onto syntax as a syntactic object explains the ill-formedness in constructions like the b-numbered sentences in (48)-(51). In contrast, the structure of the a-numbered sentences in (48)-(51) with a compound VCC under the  $V^{\circ}$  node is well-formed:

- (48) a. Zhei-hui, haizimen kai xin le .  
 this-CL children open heart ASP  
 ‘This time, the kits had a lot of fun. ‘
- b. \* Zhei-hui, haizimen kai-le hen-duo xin.  
 this- CL children open-ASP lots-of heart
- c. \* Zhei-hui, haizimen xin kai-le hen-duo.  
 this- CL children heart open-ASP lots-of

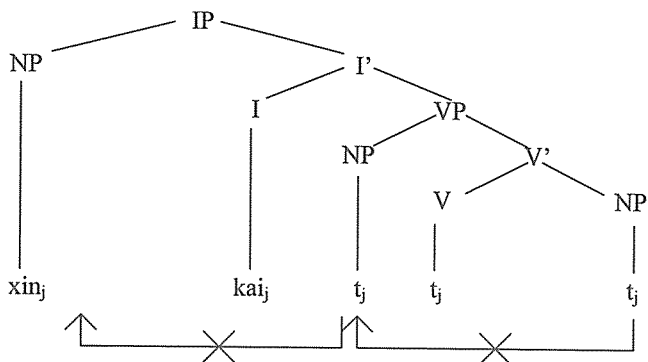
- (49) a. Lao-Zhang wan-ming le.  
 Lao-Zhang play-life ASP  
 'Lao-Zhang was doing it at all cost.'
- b. \* Lao-Zhang wan-le yi-tiao ming.  
 Lao-Zhang play-ASP one-CL life
- c. \* Lao-Zhang ming wan-le yi-tiao.  
 Lao-Zhang life play-ASP one-CL
- (50) a. Pusa xian-sheng le.  
 Buddha show-holy-spirit ASP  
 'There was an apparition of the Buddha.'
- b. \* Pusa xian-le yi-ge sheng.  
 Buddha show-ASP one-CL holy-spirit
- c. \* Pusa sheng xian-le yi-ge.  
 Buddha hoy-spirit show-ASP one-CL
- (51) a. Xiao-Li sai-le yihui che.  
 Xiao-Li race-ASP once car  
 'Xiao-Li went for a car race.'
- b. \* Xiao-Li sai-le yi-liang che.  
 Xiao-Li race-ASP one-CL car
- c. \* Xiao-Li che sai-le yi-liang.  
 Xiao-Li car race-ASP one-CL

Furthermore, since the nominal constituent in a morpho-lexical compound cannot be projected onto syntax as an independent NP, it follows that it is impossible for the nominal constituent to undergo raising to the subject position as being verified by the ill-formed c-numbered sentences in (48)-(51). The surface derivation of the canonical structure of such impossible constructions as (48b, c) are shown by the tree diagrams in (52) and (53):

(52) \*



(53) \*



The movement of the post-verbal nominal in both (52) and (53) are instances of moving an  $X^0$  constituent to an XP position that is outside the governing domain of the head verb, and, thus, the movement violates the Locality Constraint stated in (26).

## NOTES

\* This study is part of my M.Phil. thesis. I am particularly grateful to Dr. Gu Yang, who is my supervisor, for the exchange of ideas between us, for her patience and encouragement throughout the project. I must also acknowledge my gratitude to the Lingnan Foundation, which partly supported this study and to the reviewer who provided me with valuable comments on my paper. I am solely responsible for all the errors found in this paper, of course.

\*

<sup>1</sup> I use the term “compound VCC” to cover both morpho-lexical VCCs and morpho-syntactic VCCs as opposed to phrasal-lexical and phrasal-syntactic VCCs. The latter two categories both involve phrasal constructions.

<sup>2</sup> The present study is in line with proposals made in Borer (1988) and Shibatani and Kageyama (1988), which regards morphology as a subsystem of grammar which may be realized at different levels of grammatical organization, say, lexicon or syntax. Such an approach treats morphology as being independent from the lexicon. The former is concerned with the relationship of the constituents of words; the latter represents one level of language organization prior to syntax.

<sup>3</sup> In the present analysis, we make the claim that the post-verbal nominal *shu* 'book' and *yu* 'fish' are part of a morphological formation in *kan-shu* 'read-book' and *diao-yu* 'hook-fish', even when the two constituents are separated by aspect markers and event quantifiers as in:

- (i) Ta kan-le yi-huir shu.  
he read-ASP a while book  
'He did some reading for a while.'
- (ii) Wo diaole ban-tian yu.  
I hook half-a-day fish  
'I went fishing for half a day.'

Partly following Huang's (1991) proposal and at the risk of oversimplifying, I assume that the event quantifiers *yihuir* 'a while' and *bantian* 'half a day' in the above examples are base-generated at the pre-verbal position and that the derived structure is the result of head-to-head movement, which raises the head verb for aspect-marking and which left the post-verb nominal constituent stranded in its position of the base-structure. Crucially, the post-verbal nominal constituents in these VCCs, being dependent on the head verbs are considered to be *clitics* and as such they have both morphological and syntactic properties.

Johnson (1991) offers a detailed description of the mechanisms involved in the stranding of the clitic from its head for verb-particle construction in English, which can throw some light on our question concerning the stranding of the nominal constituent, if we take it to be a clitic. Furthermore, Roeper (1988) claims that a unique post-verbal clitic position is always available. If this claim is universally true, it provides us with further support in viewing the post-verbal nominal constituents as clitics in compound VCC constructions in Chinese.

<sup>4</sup> In the present discussion, a distinction is maintained between lexical and morphological formations. An  $X^0$  element such as (N, A, V) is regarded as a constituent of a morphological formation. Hence, we may rephrase Scalise's definition as: a word formation rule can take as its base only  $X^0$  categories (N, A, V), but not phrases (NP, AP, VP).

<sup>5</sup> Zhu (1980) claims that there are three types of adjectives in Chinese. In addition to the two types under consideration, a third type of adjectives is what he calls "descriptive adjective modifiers, such as: *pang-pang-de xiao nan-hair* 'a scout little boy', *duan-duan-de chenmo* 'a moment of silence', *xiang-pen-pen-de fan* 'enticing food' and *hong-pu-pu-de lian* 'a radiant face', but in so far as we are concerned about the distinction between phrasal and morphological constructions, we can the depictive adjectives fall into the same group with phrasal modifiers.

<sup>6</sup> See Lu (1993) for discussions on the conditions of these two types of modifiers.

<sup>7</sup> See discussion in Section 3.3 on the referential properties of VCCs.

<sup>8</sup> In this case, the co-indexation may also take place between the subject and the empty category *ej*. However, the preferred reading of the sentence seems to take the object as the antecedent for co-indexation when it is referential. Presumably, this is because the object is closer to the empty category and it would pose as a barrier when the subject is co-indexed.

<sup>9</sup> I am here partially sharing Baker's (1988) analysis of NI, which defines the process in terms of syntactic movement operating over lexical categories rather than maximal syntactic projections. He argues that regular NI submits to the same principles that govern other movements in syntax. My analysis, on the other hand, focuses on the morphological properties NI, which are independent from syntax.

<sup>10</sup> Chomsky (1991) proposes that structural Case is assigned not by the verb, but instead by a functional head *AgrO* immediately above V which he identifies with Object.

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# REFLECTIONS ON INCORPORATION, CONFLATION, AND THE RESULTATIVE COMPOUND FORMATION\*

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This paper argues for the existence of a covert causative verb in Mandarin Chinese. Such a causative verb is shown to fall into the universal causativity paradigm in that it calls for relevant verbs to check its causative features. Two types of compound verbs, V-V resultative compounds and *nong*-V compounds are shown to be capable of supporting the causative verb. Issues surrounding the internal aspects of the compounds and their relevance to the covert causative verb, and conditions on verb movement are shown to have a bearing on the make-up of the compounds concerned.

## 1. INTRODUCTION

In this article, we concern ourselves with a construction in Mandarin Chinese (henceforth Chinese) which can be exemplified by sentences like (1). It has been proposed that this construction contains a causative structure (Huang 1991; Li 1990a, 1993; Gu 1992).

- (1)      Lisi ma-ku-le      ta-de meimei.  
         Lisi scold-cry-aspl his      sister  
         'Lisi scolded his sister and she cried.'

In (1), there is no overt causative verb such as *shi* "make", *ling* "cause", etc.; a resultative compound (henceforth V-V resultative compound) *ma-ku* "scold-cry" acts as the predicate to render a causative meaning.

In addition to the causative sentence shown in (1) where a V-V resultative compound is present, there are yet another two constructions in Chinese which contain respectively a single verb and a verb suffixed with a morpheme *-de*, as exemplified in (2) below:<sup>1</sup>

- (2) a.    *nei-ge shiyan      zuo-le ta zhengzheng yi      wanshang.*  
          that-CL experiment do-asp he entire          one night  
          (Lit.) 'The experiment took him an entire night to complete.'
- b.    *Wangwu-de hua      xiao-de      Lisi chuan-bu-guo-qi-lai.*  
          Wangwu's words laugh-DE Lisi breathe-not-past-gas-come  
          'Wangwu's words made Lisi laugh to such an extent that he  
          could hardly breath.'

Apparently in none of these cases, i.e., (1) and (2), is there a single, unified lexical causative verb. As glossed, the two verbs in the V-V resultative compound of (1) mean respectively 'scold' and 'cry', and they each can be used as a single verb, the former being transitive, the latter intransitive or unergative. The verb *zuo* in (2a) is transitive meaning 'do', and it is interpreted causatively; the postverbal duration phrase *zhengzheng yi wanshang* 'an entire night' is analysed as denoting a result (Gu 1997), meaning to cause someone to lose some time. *xiao* 'laugh' in (2b) also has a single verb status when used alone as an intransitive or unergative verb. In (2b), it is interpreted causatively with the phrase *Lisi chuan-bu-guo-qi-lai* 'Lisi could hardly breathe' representing a result.

We think that these pieces of evidence can be taken to indicate that there is a covert causative verb in Chinese syntax, which unifies the sentences in (1) and (2). The causative verb exists in the lexicon with all the relevant features and it heads its own projection, VP, in syntax. We consider it viable to treat this covert causative verb along the same line of Baker's (1988) analysis on the causative Affix. Baker argues that the causative affix, CAUS AFF, must be supported by a lexical verb due to the requirement of Stray Affix Filter<sup>2</sup> (Baker 1988). In the case of Chinese causative verb, although there is no overt affix that needs to be hosted, morphological realization of the causative verb is nevertheless obligatory. The need for a matrix verb, therefore, is motivated by the realization or checking of the lexical semantic features, i.e. subcategorization requirement, of the causative verb in question.

In the ensuing sections, we discuss certain syntactic and semantic aspects pertaining to the morphological support of the Chinese covert causative verb.

Given the scope of this paper, of the three types of causative constructions listed in (1) and (2), we shall focus our attention on the one containing V-V resultative compounds. In Section 2 we shall discuss the aspectual properties of the resultative compounds. In Section 3 we identify two types of compounds and discuss their differences in their make-up. Section 4 focuses on the syntax of the causative verb. Section 5 provides some further remarks on the issues concerned. Section 6 concludes the paper.

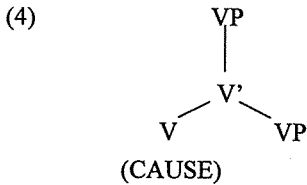
## 2. THE INTERNAL ASPECT OF RESULTATIVE COMPOUNDS

Cross-linguistically, the notion of causativity may be grammaticalized in different ways. It may be lexically encoded to yield explicit lexical causative verbs. It may also be morphologically realized via conflation. In this regard, a number of cases have been made explicit by scholars working on English (Hale and Keyser 1991) and other languages (Zubizarreta 1985 for Romance languages; Baker 1988 for many other languages). In these authors, causativity is represented in syntax as a verb phrase. The causative verb has an entry in the lexicon with its subcategorization and theta marking properties specified. As discussed in Baker (1988) about Chichewa, the causative morpheme is a morphologically defective element, a verbal affix, which must be syntactically supported so as to satisfy morphological subcategorization requirement of the verb at S-structure.<sup>3</sup> The subcategorization frame of the causative morpheme is lexically specified as (3) below.

- (3) CAUSE AFF: V: [ \_\_\_\_\_ YP (result) ]  
external theta-role: Cause

As indicated, the causative morpheme takes the form of an affix. Its verbal stem needs to be supported by an authentic verb, which can be derived from the sentence via verb movement. There is an external argument of Cause and a subcategorized complement YP which represents the result component of the causative predicate. The causative morpheme is base-generated with such

features. After it projects into syntax, the structure of the verb phrase in (4) obtains.



There is evidence that the Chinese data can be captured in the same light. The Chinese cases in (1) and (2) exemplify that causativity may be instantiated by a covert verb which is later supported by a lexical verb.

Let us consider an option under which a covert causative verb is morphologically supported by a verb that reflects the internal aspectual structure of causativity. Causativity is known to involve a complex event structure expressing an aspect of accomplishment composed of a contour of two sub-events, activity and result (for instance, Grimshaw 1990).<sup>4</sup> Li (1993) proposes that the causative aspectual contour be further specified as an A(spect)-head and an A(spect)-complement on the basis of the temporal iconicity condition he formulated. For the purpose of our discussion, we refer to these two components as a causing event, and a resulting event, i.e., [cause+result].<sup>5</sup> This property of causative predicate imposes a restriction on the structure containing a covert causative verb such as (3), i.e., the structure must have available to itself a lexical verb which reflects the aspectual property of the causative verb, i.e., a verb capable of representing causativity.

The Chinese V-V resultative compounds are known to be reflexes of the complex aspectual contour, where the first verb V1 represents the causing event and the second verb V2 stands for the result. The composition of two verbs is a direct consequence of the Chinese lexicon. As discussed in Tai (1984), in Chinese there are no single verbs of accomplishment. This distinguishes it from English, where verbs of accomplishment, such as "break", "melt", etc., occur as a single word, hence Chinese has to resort to compounding of two verbs, one an event causing verb, the other an

achievement verb or a change of state verb, to express the complex aspect of accomplishment.

It must be pointed out that the event structure encoded in the Chinese resultative compound does not guarantee the same kind of causativity. Consider the following examples.<sup>6</sup>

- (5)      Zhangsan cai-si-le      yi-tiao   maomaochong.  
             Zhangsan tread-die-asp   one-CL caterpillar  
             'Zhangsan treaded on a caterpillar and it died.'
- (6)      Lisi zui-dao      le.  
             Lisi intoxicate-fall asp  
             'Lisi was intoxicated and he fell down.'

The crucial distinction between the two sentences in (5) and (6) lies in the identification of a Cause or Causer. In (5), it is obvious that the Causer is *Zhangsan* whose treading on the caterpillar caused its death. In (6), the Causer is understood as some kind of wine or beer or alcohol, but it is not overtly expressed. Consequently, *cai-si* 'tread-die' in (5) gives rise to a transitive sentence, while *zui-dao* 'drunk-fall' in (6) occurs in an intransitive sentence.

A compound like the one in (6) is nevertheless not confined to intransitive use. It can be used as a transitive verb with the Cause overtly expressed, as exemplified in (7):

- (7)      nei   ping   jiu      zui-dao-le      Lisi.  
             that bottle wine   intoxicate-fall-asp   Lisi  
             'That bottle of wine intoxicated Lisi and he fell down.'

This alternating pattern between a causative V-V compound and its intransitive, unaccusative counterpart, is abundant in Chinese:

- (8) a.      Zhangsan ji-ku-le      Lisi.  
             Zhangsan irritate-cry-asp   Lisi  
             'Zhangsan irritated Lisi and Lisi cried.'

- b. Lisi ji-ku le.  
Lisi irritate-cry asp  
'Lisi got irritated and he cried.'
- (9) a. Lisi qi-zou-le Wangwu.  
Lisi enrage-leave-asp Wangwu  
'Lisi enraged Wangwu and Wangwu went away.'
- b. Wangwu qi-zou le.  
Wangwu enrage-leave asp  
'Wangwu was enraged and he went away.'
- (10) a. jia dui da-bai-le yi dui.  
A team beat-lose-asp B team  
'Team A fought against Team B and Team B got defeated.'
- b. yi dui da-bai le.  
B team fight-defeat asp  
'Team B fought (in the game/battle, etc.) and was defeated.'

The range of examples in (8)-(10) clearly indicate that the event structures encoded in these compounds may be mapped onto two syntactic representations, transitive, as in the (a)-numbered sentences, and intransitive/unaccusative, as in the (b)-numbered sentences. If a causative event has a complex aspectual structure which is composed of two sub-events, then semantic decomposition of the compounds does reflect the two aspectual constructs. For instance, in the compounds seen so far, it is apparent that V1 represents a kind of agentive activity or a causing event. The verbs in V1 are in general referred to as activity verbs because they alone do not constitute complex non-activity aspects, such as achievement and accomplishment aspects (Vendler 1967 and Smith 1991, among others). V2, on the other hand, depicts the resultant state of the causing event.<sup>7</sup> So if there is a natural correlation between the two verbs in the V-V compound, and if the aspectual characteristics of the two sub-events of a causative event are correctly captured, the compounds under consideration are indeed causative.

A question arises: How should we explain the observed syntactic alternation along with their semantic motivation? In other words, is causativity still retained when a V-V compound is used intransitively? Levin &

Rappaport's (1995) recent study provides an answer to the question. Their work shows that causativity can be analyzed as a basic semantic notion, which is encoded in causative verbs as well as their corresponding unaccusative variants. In their analysis, two kinds of causation are identified. One is referred to as *external causation* which requires an external Cause argument of the verb. The other is characterized as *internal causation* whose Cause argument is identified with the internal argument of the verb. The verbs are treated accordingly. The ones that require an external Cause argument are basic causative verbs. Those relying on an internal Cause argument are derived unaccusative verbs.<sup>8</sup> The syntactic alternation is a direct result of a lexical process of "decausativization", which derives an unaccusative form out of a basic causative verb. During the process, the external theta-role of the basic causative verb is bound prior to its entry into the verb's argument structure, so it fails to become an argument and therefore is not available in syntax. The verb thus derived has only one internal argument. The internal argument NP moves to surface subject position due to independent principles of grammar, i.e., the Case Filter (Chomsky 1981) as generally assumed in the generative literature.

If Levin & Rappaport's analysis is adopted, the puzzle about the Chinese resultative compounds can be explained straightforwardly. Just as causativity is encoded in both causatives and their unaccusative variants, so can a causative and an unaccusative resultative compound assume the same lexical form, a form which contains a [cause+result] contour. The difference between a transitive causative verb, i.e., a basic causative verb, and an unaccusative causative verb is one of *external causation*, which can be interpreted structurally as a verb phrase whose Specifier position accommodates an external argument and whose head has a CAUSE feature, adopting (3) and (4). In other words, V-V resultative compounds are potential causative verbs in the sense that they are encoded with the meaning of *internal causation*. Hence they are the right candidate for checking the CAUSE feature of the covert causative.

Note that a single verb may express a result as a state, but under such a circumstance, no causation is involved, as evidenced by the contrast in (11)-(13):

- (11)        Zhangsan-de    yanjing    hua    le.  
               Zhangsan's    eye        blur    asp  
               'Zhangsan's eyes are blurred.
- (12)    \*    nei-ben    shu    hua-le    Zhangsan-de    yanjing.  
               that        book blur-asp Zhangsan's    eye  
               (Intended reading) 'The book blurred Zhangsan's eyes'.
- (13)        nei-ben    shu    kan-hua-le    Zhangsan-de    yanjing.  
               that        book    read-blur-asp Zhangsan's    eye  
               'Zhangsan read that book and as a result his eyes got blurred.'

The problem with (12) is due to the absence of a verb which expresses the initial aspect of activity or causation of the complex causative predicate. Since a verb like *hua* "blur" can merely denote result, it is unable to take up the role of causation, and the purported causative relation in (12) fails to establish.

### 3. CONSIDERATIONS ON THE CO-EXISTENCE OF V-V AND NONG-V COMPOUNDS

In this section, we will consider issues concerning the make-up of the V-V resultative compounds and how the covert causative verb is lexically filled. Our initial attempt is to derive the two verbs of a V-V compound from two thematic paraphrasal clauses in syntax. In the generative tradition, causatives have often been treated as being derived from a biclausal underlying structure (for instance, Marantz 1984; Baker 1988; Hendrick 1995 and the references cited there). From a morphological perspective, it also seems reasonable, on the first sight, to favor a syntactic approach to the formation of the compounds. Syntactic derivation in general exhibits productivity and regularity (Spencer 1991, 3.2.2.). These features are observable in the resultative compounds. For instance, the aspectual properties of the compounds are regular, given the discussion of 2. Furthermore, the syntactic alternation between a causative and unaccusative pair as captured in (8)-(10) is regular and predictable.

The meaning of *nong* here is not explicit. The specific activities that caused Lisi's eyes to get blurred and Zhangsan's hands to get hurt are depicted in the verbs in the bracketed subject phrase, i.e., *kan* 'read' in *kan nei-ben shu* and *da* 'hit' in *da nei-ge ren*. (15a) and (15b) are thus indicative of the fact that if verbs denoting activity form a set, *nong* is a cover verb (or a light verb in the sense of Hale and Keyser 1993) of all the verbs in the set. Since the explicit meaning of activity is expressed by the verb contained in the domain of the subject in (15a) and (15b), V1 in the compound no longer needs to specify the activity.<sup>10</sup> The role of *nong* here becomes obvious: it can substitute for various verbs of activity (or verbs capable of denoting a causing event), but not vice versa.<sup>11</sup>

- (16) a. \* *nong nei-ben shu kan-hua-le Lisi-de yanjing.*  
           do that-CL book read-blur-Asp Lisi's eyes  
       b. \* *nong nei-ge ren da-teng-le Zhangsan-de shou.*  
           do that-CL person do-hurt-Asp Zhangsan's hand

A requirement on the subject phrase in (15) is that it must denote an activity or a causing event. In other words, the *nong*-V compound must be predicated of an event, rather than a participant of an event. This is not the case with the agentive use of *nong* which is predicated of a participant of an event. This explains the contrast between (14) and (15).

Assume that in (15) the verbs *kan* 'read' and *hua* 'blur', and *da* 'hit' and *teng* 'hurt', respectively, occur in two structural parts. One of them is in the subject part, which represents the causing event; the other is in a complement part, which stands for the resulting event. Since each of these two parts contains a verb, they might be construed as having a respective clausal structure. Assume further that the subject clause has in itself a logical subject designated as a pronominal denoting someone who performs the actions such as *kan* 'read' in (15a) and *da* 'hit' in (15b), respectively. The complement part might also be construed as having a clausal structure (in the sense of Baker 1988. But see the discussion in section 4.). What connects these two parts is the covert causative predicate, as illustrated in the following structural representation:

In addition to the above-mentioned regular properties of the resultative compounds, we come to the following observation which tempts us to derive the compounds in syntax. For instance, in some resultative compounds, V1 is taken by the word *nong* which literally means 'get' or 'make',<sup>9</sup> as shown in (14).

- (14) a. Zhangsan *nong-huai-le* yi-ba yizi.  
 Zhangsan do-bad-asp one-CL chair  
 'Zhangsan did something to the chair and as a result the chair was broken.'
- b. Lisi *nong-luan-le* ziji-de toufa.  
 Lisi make-tangled-asp self's hair  
 'Lisi tangled his hair.'
- c. Wangwu *hen-kuai-de nong-hao-le* yi-dun fan.  
 Wangwu very quickly do-ready-asp one-CL meal  
 'Wangwu quickly made a meal.'

As indicated in the English gloss, the compounds in (14) are used as agentive predicates and *nong* acts like other V1s seen so far; it attributes to the compound a lexical meaning of "do some thing (to some object) with one's hands or some instrument." *nong* can also be used in a compound in a non-agentive sense. For ease of exposition, we shall take the agentive *nong*-V compound to be ordinary V-V resultative compounds, and refer to the non-agentive ones as *nong*-V compounds. In (15) below, the *nong*-V compound takes as its subject a phrase which denotes an activity construed as a causing event.

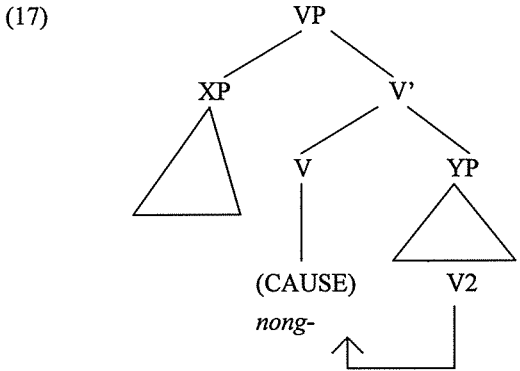
- (15) a. [kan nei-ben shu] *nong-hua-le* Lisi-de yanjing.  
 read that-CL book do-blur-Asp Lisi's eyes  
 'Reading that book caused Lisi's eyes to get blurred.'
- b. [da nei-ge ren] *nong-teng-le* Zhangsan-de shou.  
 hit that-CL person do-hurt-Asp Zhangsan's hand  
 'Hitting that man caused Zhangsan's hand(s) to get hurt.'

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The verb in the subject clause (XP) remains in its base-generated position. The covert causative verb is partly supported by the verb *nong* to take up the first sub-part of the causative predicate, i.e., [cause]. The verb in the complement part (YP) moves to adjoin to the causative head to assume the second sub-part of the causative feature, i.e., [result]. Consequently, the compound such as *nong-hua* 'do-blurred' or *nong-teng* 'do-hurt' is formed.

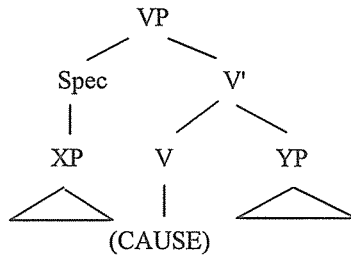
Notice that a structural difference can be observed between the *nong*-V compounds in (15) and the resultative compounds in (18) below.

- (18) a.    *nei-ben shu kan-hua-le Lisi-de yanjing.*  
           that-CL book read-blur-asp Lisi's eyes  
           'Lisi's eyes got blurred as a result of reading that book.'
- b.    *nei-ge ren da-teng-le Zhangsan-de shou.*  
           that-CL person hit-hurt-asp Zhangsan's hand  
           'Zhangsan's hand got hurt as a result of hitting that man.'<sup>12</sup>

Although the sentences in (18) are paraphrastically parallel to (15), the two groups of sentences differ in that the subject in (15), as designated by the XP in (17), contains a verb, whereas the one in (18a&b) has a noun phrase. For the time being, let us consider a possibility V1 and V2 in (18a) and (18b), respectively, are base-generated in two separate clauses, and they are formed into compounds by respective verb movement into the CAUSE verb.

Let us see whether such an assumption can hold. If subject is assumed to be internal to VP (Koopman and Sportiche 1991; Kuroda 1988, and Kitagawa 1986), then the subject XP is base-generated in the Specifier position of the covert causative verb and YP is base-generated in the complement position of the causative verb. To illustrate, the sentences in (15) and (18) may have a parallel structure as represented in (17), and repeated below in (19) with minor modification:

(19)



To derive the V-V compounds, V1 in XP and V2 in YP moves respectively to fill the causative verb slot.

But one naturally wonders: Why would the same underlying structure give rise to two different kinds of compounds, i.e., *nong*-V in (15) and V-V in (18)? As has been mentioned, the role of *nong* is to substitute for an activity verb. A number of questions can then be asked as to (i) why the activity verb needs to be substituted for; (ii) what prevents the verb in the subject XP in (15) from moving out to act directly as V1 of the compound, and (iii) what grammatical function *nong* plays in the compound.

If these questions are on the right track, then there is reason to believe that the activity verbs are substituted for by *nong* due to structural reasons: the movement of verb in the subject phrase is blocked and *nong* is called for to act as V1 in the causative predicate. To the extent that the *nong*-V compounds are always predicated of an event-denoting subject, we can say they are externally causative by virtue of the obligatory presence of a Cause argument. They hence are transitive.

The co-existence of V-V compounds and *nong*-V compounds is thus not a coincidence. The contrast between (15) and (18) should now be interpreted

in terms of aspectual properties of the V-V resultative compounds and the *nong*-V compounds, i.e., they have a different external Cause argument. If these two compounds were both derived from the structure in (19), we would get a biased picture that the use of *nong*-V compound could be dispensed with, because a V-V compound is always available for the structure, or vice versa. In the following section, we will further explore why a movement account to derive V1 in the resultative compounds is not viable.

#### 4. X°-MOVEMENT AND THE ECP

##### 4.1. Condition on X° Chain

Let us consider a situation where verb movement out of XP in (19) is prohibited. Suppose that XP takes the form of a full clause, i.e., a CP. The verb in XP, for instance, *kan* 'read' in (15a), is to move out of the clause to fill in the covert CAUS head position. Abstracting away from the landing site of the moved verb, the movement itself is barred by the condition on chain well-formedness for head movement postulated in Li (1990b). Under Li's analysis, a movement chain must contain elements of the same kind. A lexical head chain, for instance, contains only lexical heads such as Vs, whereas a functional head chain should have only functional heads in it, i.e., C, I, etc. If a verb moves out of a VP into another VP, the resultant chain will contain consistent lexical heads. If a verb moves out of a clause such as a CP into another VP, the embedded verb would move first to I, and then to C, and finally adjoin to the targeted head. Such a movement would constitute a chain containing inconsistent X° elements,

$$(20) \quad [ V, C, I, V ]$$

As indicated in (20), the two lexical V heads would have two intervening functional heads between them, i.e., C, and I, thereby producing an ill-formed chain. The consequence of such an ill-formed sequence of X°s in the chain would inevitably give rise to an ECP violation, as the initial V trace, i.e., the

rightmost V in (20), would not be properly governed by its antecedent, the leftmost V, instead, it would be minimally head-governed by I. This is a clear case of Head Movement Constraint initially formulated in Travis (1984):

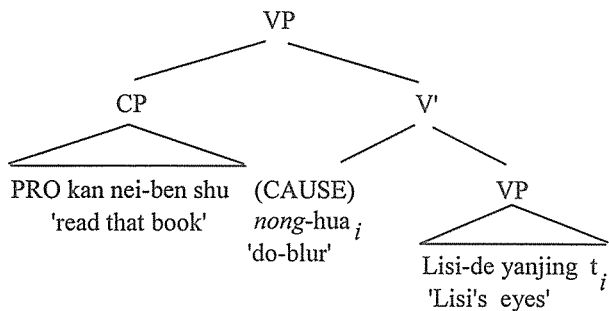
(21) Head Movement Constraint (HMC)

An  $X^0$  may only move into the  $Y^0$  which properly governs it.

HMC was later integrated into the theory of Relativized Minimality (Rizzi 1990), both of which have been subsumed under the Empty Category Principle (ECP) (see the discussion in Chomsky 1991).

To avoid an ECP violation, the verb in XP of (19) has to remain in-situ. Since the covert CAUS verb must be morphologically supported and the sentence is unable to derive a verb from its own structure, the verb *nong* is used to assume the role of supporting the first part of the causative head, which is normally assumed by V1. The verb in the complement YP then moves into the causative head to adjoin to *nong* thereby checking the feature of [result].<sup>13</sup> The surface form of (15a) is thus derived. The structural representation (22) helps to illustrate the point.<sup>14</sup> The same derivation applies to the compound *nong-teng* 'do-hurt' in (15b).

(22)



There is evidence that *nong* must be inserted as a supportive verb in (22), as reflected in the ill-formed sentence in (23) below.

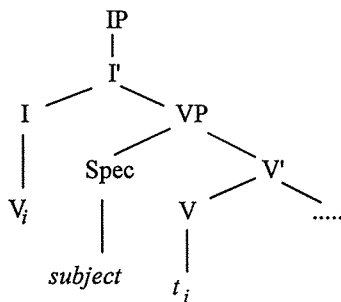
- (23) \* kannei-ben shu hua-le Lisi-de yanjing.  
 read that-CL book blur-asp Lisi's eyes

The sentence is out as expected, because the CAUSE feature of the predicate is not checked off.<sup>15</sup>

#### 4.2. *Condition on Government: Evidence from Incorporation and Conflation*

Notice that in addition to obeying the chain well-formedness condition, to derive the verb *kan* 'read' from (15b), we must ensure that the phrase containing *kan* reside in an ungoverned position by virtue of the ECP. Raising an element out of a subject clause is generally barred due to lack of government relation between the moved element and its landing site, because the subject position is not a governed position. There are two caveats to government in question. Firstly, if we assume the VP-internal Subject Hypothesis (in the sense of Koopman and Sportiche 1991; Kuroda 1988; Kitagawa 1986, among others), the subject phrase is base-generated in the Spec of the VP headed by the covert causative verb, as shown in (24). One possibility which may be invoked to situate the subject phrase in a governed position as a way to respect the ECP is to resort to verb raising to Infl (Chomsky 1986), so that the VP internal subject position can be lexically governed by the raised verb in Infl, again as reflected in (24):

(24)



But this condition cannot be met because in Chinese verbs do not raise overtly to Infl, as can be evidenced by the following fact:

- (25) a.      Zhangsan *hen-kuai-de*    *zuo-wan-le*    *ziji-de* *gongke*.  
                  Zhangsan    very quickly    do-finish-asp    self's    homework  
                  'Zhangsan quickly finished his homework.'
- b.    \*    Zhangsan    *zuo-wan-le*    *hen-kuai-de*    *ziji-de* *gongke*.  
                  Zhangsan    do-finish-asp    very quickly    self's    homework

Raising a verb to Infl has crossed the VP licensed manner adverb *hen-kuai-de* 'very quickly', yielding the wrong word order in (25b). This indicates that in Chinese the subject position cannot be lexically governed by the verb.<sup>16</sup>

The second caveat concerns the government requirement on the trace of the lexical element which undergoes  $X^{\circ}$  movement under discussion. As stated above, traces of  $X^{\circ}$  can never be lexically governed by a governing head at large; they must be governed by their own antecedent; an intervening head will invoke an ECP violation. Furthermore, the  $X^{\circ}$  movement under discussion involves moving a verb into a targeted verb, an operation known in the literature as Incorporation, as extensively discussed in Baker (1988). Baker argues is that in the process of various kinds of incorporation, the verb, noun, or preposition, which moves into a target verb, is an  $X^{\circ}$  element. The target verb must be a governor, but it governs the maximal projection of these  $X^{\circ}$  elements, rather than the zero-level elements themselves. To satisfy the ECP, a trace left by such a zero element must be governed by its own antecedent. This is formulated in Baker as:

- (26)      An  $X^{\circ}$  must govern its trace.

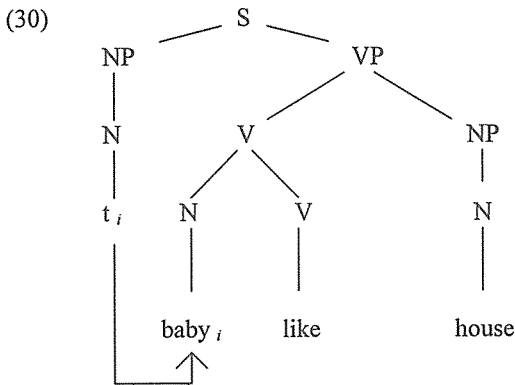
Hence apparently, no  $X^{\circ}$  can move out of an ungoverned maximal projection and an  $X^{\circ}$  trace must be chain-coindexed with its antecedent. This amounts to saying that the head of the chain is the head of the targeted VP. The consequence of such a condition is that no asymmetrical c-commanding relation is allowed between the target VP head and the root  $X^{\circ}$  element.

This is exactly the constraint derived in Baker concerning Incorporation out of the subject position. It has been a long standing observation that object incorporation yields grammatical results whereas subject incorporation does not, and such an asymmetry has often been generalized in terms of a semantic differentiation, namely, theta-roles show different behavior in Incorporation: Theme and Patient incorporate most freely, and Location and Goal less so, whereas Agent fails to incorporate. Baker attributes this semantic differentiation to the general principles of grammar by pointing out that the restriction on Agent in Incorporation follows from the ECP. Agent occurs in subject position and that position is not lexically governed by the verb; Incorporation cannot take place because it will leave an ungoverned trace. To illustrate, consider the following incorporation patterns in (27)-(29) obtained from a number of languages cited in Baker.<sup>17</sup>

- (27) a. *Yao-wir-a a ye-nuhwe -s ne ka-nuhs-a*. (Mohawk)  
 PRE-baby-SUF 3FS/3N-like-asp the PRE-house-SUF  
 'The baby likes the house.'
- b. \* *Ye-wir-nuhwe -s ne ka-nuhs-a*.  
 3FS/3N-baby-like the PRE-house-SUF  
 'Baby-likes the house.'
- Cf. *Yao-wir-a a ye-nuhs-nuhwe -s*.  
 PRE-baby-SUF 3FS/3N-house-like-asp  
 'The baby house-likes.'
- (28) a. *Hliawra-de 0-k'ar-hi yede*. (Southern Tiwa)  
 lady-SUF A:A-eat-FUT that  
 'The lady will eat that.'
- b. \* *0-hliawra-k'ar-hi yede*.  
 A:A-lady-eat-FUT that  
 'The lady will eat that.'  
 (OK as 'She will eat that lady.')
- (29) a. *Fa totouhe tau faiaoga e tau tohi*. (Niuean)  
 HAB-read ERG-PL-teacher ABS-PL-book  
 '(The) teachers often read books.'

- b. \* *Fa totoufaiaoga e tau tohi.*  
 HAB-read-**teacher** ABS-PL-book  
 'The teachers often read books.'

From these pieces of evidence Baker concludes that Incorporation is a syntactic operation which is constrained by the general principles of syntax.<sup>18</sup> Details aside, the starred sentences in (27)-(29) have a derivation which yields a configuration in (30), where the required government relation is not obtained.



The VP contains only the moved noun but not its trace, so the noun "baby" cannot antecedent govern its trace. The effect of (30) provides a unified account for (17), (19) and (24), i.e.,  $X^0$  movement out of subject position is barred.

An additional piece of evidence that  $X^0$  movement out of an ungoverned position is prohibited can be found in Hale & Keyser (1991). Hale & Keyser discussed a range of grammatical properties of lexical items exhibited by a lexical process known as Conflation, as exemplified in (31) and (32) below.

- (31) a. John put his books on the shelf.  
 b. John shelved his books.  
 (32) a. He got a saddle on the horse.  
 b. He saddled the horse.

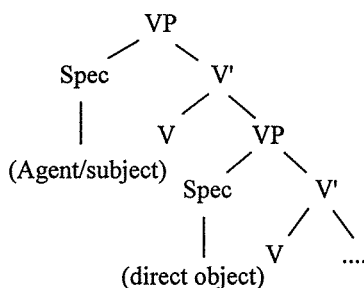
Under their analysis, the underscored nominals in the (a) numbered sentences are conflated into the corresponding verbs in the (b) numbered sentences via  $X^0$  movement. Their findings show that Conflation is in essence a kind of Incorporation in that it is constrained by similar principles of grammar. For instance, most arguments of a verb, such as Theme (as in (32a)), Location (as in (31a)), Source, Instrument, Goal, Experiencer, etc., can in general conflate into a verb. But this pattern is not without restrictions. An Agent argument fails to conflate. The following is a putative example which attempts to conflate the Agent subject "horse" into a verb. The surface subject of the sentence is inserted in order to satisfy the Extended Projection Principle (Chomsky 1982):

- (33) \* It horsed the cowboy. (H&K's (10))  
 'The horse did something to the cowboy.'

This is reminiscent of the fact stated earlier that an Agent argument is outside the governing domain of the verb. In other words, "horse" is external to VP, so it is not properly governed by the target verb it intends to conflate into.

The "VP-shell" structure in (34) (details aside) is adopted in H&K, following Larson (1988, 1990), where the subject position, or the position normally taken by an Agent theta role, is assigned to the Spec of VP:

(34)



When the noun in the subject position is conflated into the higher V position, it leaves a trace which asymmetrically c-commands the verb to which the noun

would adjoin. As has been mentioned, the trace left by  $X^{\circ}$  movement is subject to antecedent government. Since antecedent-government is defined in terms of c-command relations, and the lack of such a relation is obvious in the structure of (34), the trace left by the intended movement will inevitably result in an ECP violation. Such "lowering" is in essence identical to the kind of downward  $X^{\circ}$  movement observed in (30), both violating the ECP.

Given these theoretical grounds, Incorporation and Conflation are barred from the subject position. This restriction has an immediate consequence on the Chinese V-V compound formation: V1 of the compound cannot be derived from a thematic paraphrasal clause in the subject position, whether the subject is VP-internal or in the Spec of IP (as in (30)).

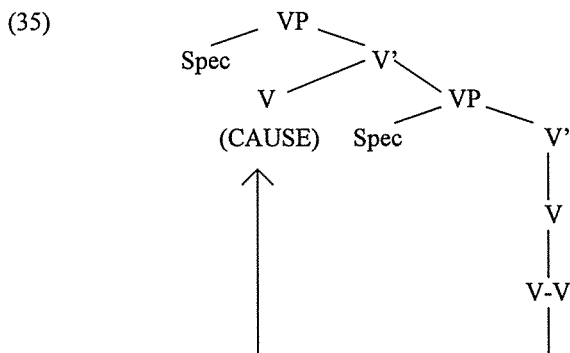
The failure to derive the verb out of a subject XP thus follows from the general principle of the ECP which prohibits raising a verb out of an ungoverned position. Recall the structural representation in (19) which we gave to the sentences in (15) and (18) where the subject XP is analyzed as a CP. It becomes trivial now whether the XP is a CP or an IP or even a VP, because as long as the maximal projection is not under government by the covert causative verb, movement of a verb out of XP is blocked.

## 5. REMARKS ON THE TWO TYPES OF COMPOUNDS

On the basis of the discussion in 4, the possibility for the V-V compounds to be formed in syntax by means of  $X^{\circ}$  movement is eliminated. The distinction between the V-V compounds and the *nong*-V compounds can thus be accounted for systematically. The *nong*-V compounds in (15) are so formed precisely because no verb can be moved out of the XP to check the features in the covert CAUS head. *nong* must be used to fulfill the task. As for the V-V resultative compounds, since V1 can never be syntactically derived from within XP by virtue of the ECP, they can only be lexically formed compounds.

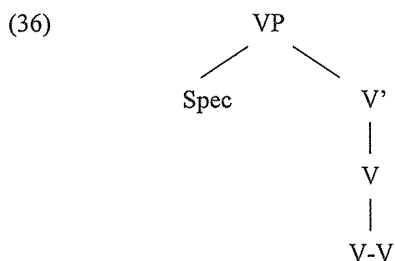
By lexical compounds we mean they are formed prior to syntax, a view in support of Li (1990a) that Chinese V-V resultative compounds are formed presyntactically. One empirical advantage of assuming a lexical origin for the V-V resultative compounds is that it lends support to Levin & Rappaport's

(1995) arguments on "decausativization" as a lexical process (3.2.4.). If unaccusatives are derived from their corresponding causatives via a lexical process, then the original causatives must exist in the lexicon prior to the process came into play. Given that the V-V resultatives are lexically formed compounds, it must be the case that their make-up takes place before the execution of the lexical process of "decausativization". By saying so, we do not excludé the possibility that there are interface levels between the lexicon and syntax, for instance, a level of argument structure, as documented in many researches, may well be a level for morphological make-up of the compounds under discussion. In Section 2, we mentioned that (i) V-V resultative compounds are potential causative verbs as they are encoded with the meaning of internal causation, and (ii) the transitive forms of these compounds are externally causative which are made possible by the covert causative verb. We can now conclude that a V-V resultative compound, under normal circumstances, i.e., without being "decausativized", is selected by the covert CAUSE verb, and eventually moves into CAUSE verb to check the relevant feature there. Adopting the Larsonian VP-Shell (Larson 1988, 1990), we can illustrate the point in (35) (details aside):



The Spec position of the lower VP will be taken by the internal argument of the compound, and the Spec of the higher VP will be taken by the external argument, the Cause(r). Given the structure in (35), it becomes apparent that the effect of "decausativization" as discussed in Levin & Rappaport can be captured straightforwardly in a structural manner. A decausativized V-V

compound projects to a structure which lacks the CAUSE head, hence a single VP:



As there is no external causative feature to be checked off, the V-V does not move.

Now that the two types of compounds, the V-V resultative compounds and the *nong-V* compounds, are not formed at the same level, we should not expect to find strict parallel between them. This prediction is borne out. As illustrated respectively in (37), (38) and (39), (40), a V-V compound does not always have a *nong-V* counterpart, and vice versa.

- (37) a.   zuo   nei-dun fan   nong-zang-le   Lisi-de yifu.  
           make that-CL meal do-dirty-asp Lisi's clothes  
           'Cooking that meal caused Lisi's clothes to get dirty.'
- b. \* nei-dun fan   zuo-zang-le   Lisi-de yifu.  
           that-CL meal do-dirty-asp Lisi's clothes  
           'Lisi cooked that meal and as a result his clothes got dirty.'
- (38) a.   xiu   nei-ba yizi nong-po-le   Lisi-de shou.  
           repair that-CL chair do-break-asp Lisi's hand(s)  
           'Repairing that chair caused Lisi's hand(s) to get cut.'
- b. \* nei-ba yizi   xiu-po-le       Lisi-de shou.  
           that-CL chair repair-break-asp Lisi's hand  
           'Lisi repaired that chair and as a result his hand(s) got cut.'

- (39) a. Zhangsan zhui-lei-le Lisi.  
 Zhangsan chase-tire-asp Lisi  
 'Lisi chased Zhangsan and as a result Lisi got tired.'
- b. \* zhui Zhangsan nong-lei-le Lisi.  
 chase Zhangsan do-tire-asp Lisi  
 'Chasing Zhangsan causes Lisi to get tired.'
- (40) a. nei-ping jiu he-zui-le Zhangsan.  
 that-CL wine drink-drunk-asp Zhangsan  
 'Zhangsan drank that bottle of wine and as a result he got drunk.'
- b. \* he nei-ping jiu nong-zui-le Zhangsan.  
 drink that-bottle wine do-drunk-asp Zhangsan  
 'Drinking that bottle of wine caused Zhangsan to get drunk.'

Strings such as *zuo-zang*, *xiu-po*, etc. are not legitimate compounds in Chinese, whereas the *nong-V* compounds in (39b) and (40b) may only be acceptable when they are used as Agent-Patient predicates, which, nevertheless, are not intended here.

The grammaticality contrast between the compounds in question interestingly brings out the fact that Chinese seems to allow two ways to express causativity. One is to use a lexical resultative compound. The other is to form a causative *nong-V* compound in the syntax. For instance, imagine that the speaker sees two related events, namely, a causing event and a resultant state, and he knows that the logical relation between the two events is a relation of causativity. It is the native speaker's knowledge that in the lexicon of the grammar, there is or there is not a resultative compound to be picked up to express the situation. If there is no such lexical item available in the lexicon, for example, \**zuo-zang* 'do-dirty' as seen in (37), the speaker will form a compound verb which enables him to correctly express the logical relation between the two events. Presumably, this is where the *nong-V* compounds come into play.

On this view, the S-structure formation of the *nong-V* compounds should be viewed as a supplementary means in expressing causativity. The

most obvious support to this claim is that a *nong*-V compound helps link two events where the two verbs contained in each of the event clauses are not lexically compounded. This prediction is already borne out in the ill-formed compounds *\*zuo-zang* 'do-dirty' of (37b) and *\*xiu-po* 'repair-cut' of (38b) which indicate that these forms are lacking in the lexicon.

Notice that the two ways of expressing causativity are not co-existing in the sense that they reflect the multiple representation approach, of which various proposals are found, for instance, in Goodall (1984), Zubizarreta (1982; 1985), Manzini (1983), and Haegeman and Riemsdijk (1986, and the references cited there). One property of the multiple representation structure is that it normally involves verbs and their reanalyzed counterpart (for instance, in Haegeman and Riemsdijk). The Chinese resultative compounds, however, are not a result of verb reanalysis.<sup>19</sup> If the resultative compounds were to involve a process of verb reanalysis, we would expect the following sentences to be well-formed because they are the syntactic correspondence of their resultative compound counterparts. This prediction, as illustrated by the starred sentences of (41), is not borne out.<sup>20</sup>

- (41) a. \* he nei-ping jiu zui-le Zhangsan.  
           drink that-CL wine inebriate-asp Zhangsan  
       Cf. nei-ping jiu he-zui-le Zhangsan.  
           that-CL wine drink-inebriate-asp Zhangsan  
           'Zhangsan drank that bottle of wine and as a result he got drunk.'
- b. \* zhui Zhangsan lei-le Lisi.  
           chase Zhangsan tire-asp Lisi  
       Cf. Zhangsan zhui-lei-le Lisi.  
           Zhangsan chase-tire-asp Lisi  
           'Lisi chased Zhangsan and as a result Lisi got tired.'

One question arises, however, as to why a parallel pattern of a *nong*-V compound and a V-V compound is observed in (15) and (18). For convenience, we repeat them below.

- (42) a. kan nei-ben shu nong-hua-le Lisi-de yanjing.  
 read that-CL book do-blur-asp Lisi's eyes  
 'Reading that book caused Lisi's eyes to get blurred.'
- b. nei-ben shu kan-hua-le Lisi-de yanjing.  
 that-CL book read-blur-asp Lisi's eyes  
 'Lisi's eyes got blurred as a result of reading that book.'
- (43) a. da nei-ge ren nong-teng-le Zhangsan-de shou.  
 hit that-CL person do-hurt-asp Zhangsan's hand  
 'Hitting that man caused Zhangsan's hand(s) to get hurt.'
- b. nei-ge ren da-teng-le Zhangsan-de shou.  
 that-CL person hit-hurt-asp Zhangsan's hand  
 'Zhangsan's hand got hurt as a result of hitting that man.'

We consider that the existence of such a pattern is just accidental, which, to a certain extent, reflects the marginality between the lexical and the syntactic compound formation. In terms of the native speaker's knowledge of the grammar, this may indicate the uncertainty on the side of the speaker in choosing between the two forms (See Comrie & Polinsky 1993). This line of thinking may be speculative at this stage, but as observed in (37)-(40), the apparent lack of parallelism in the V-V compounds and *nong*-V compounds are indicative of the fact that the S-structure *nong*-V compound formation is only a supplementary means.<sup>21</sup>

Note further that the grammatical judgment of (41) hints broadly that the relation between the arguments representing two events in a V-V compound is not a simple alignment of the two event clauses. Instead, they must be linked in the sentence by the head of the covert causative phrase. This explains why *nong*-insertion must take place in a *nong*-V causative structure. If, on the contrary, causativity could be expressed merely by satisfying the alignment of a causing event and a resulting state, we would be left with no explanation as to why (41a&b) are ungrammatical. Under the present analysis, these sentences are ruled out due to the absence of a causative head.

## 6. CONCLUSION

To conclude, there is a covert causative verb in Chinese. This covert verb must be morphologically supported by relevant lexical verbs. Two types of compounds, V-V resultative compounds, and *nong*-V resultative compounds are shown to be capable of supporting the causative verb. The former, being a lexical compound, supports the covert causative via verb movement; the latter, being a syntactic compound, arises as a supplementary means to support the covert causative verb.

## NOTES

\* The research in this paper was partially supported by a grant from the Chinese University of Hong Kong (C001/2010097). I am grateful to Cathy Wong, Leo Wong and Simon Huang for their assistance at various stages in preparing some of the data presented here. I also wish to thank the reviewer whose valuable comments help me to rethink some of the issues and reformulate my arguments. The remaining errors are mine.

<sup>1</sup> A sentence like (2a) is analyzed as a subtype of the causative construction, where the matrix verb is shown to be a covert TAKE verb, which is morphologically realized by an activity verb (GU 1997).

<sup>2</sup> To guarantee the morphological realization of the subcategorization frame of relevant affixes, Baker (1988) put forth the following condition:

(i) Stray Affix Filter

\*X if X is a lexical item whose morphological subcategorization frame is not satisfied at S-structure.

This Filter complies in spirit with Chomsky's proposal (1991, 1993) that S-structure operations are motivated for fulfilling morphological requirements.

<sup>3</sup> It is hypothesized in Lieber (1980) that affixes have the same features and properties as words, except that the former need to be bound. Lieber suggests to associate the bound morphemes with a "morphological subcategorization frame", which specifies the kind of element that the morphemes in question must have a sisterhood relation with in morphological structure.

Baker (1988) proposes applying such an idea to its fullest extent as to allow affixes to have the same properties as free words. In Baker's approach, affixes not only have morphological properties such as category, number, gender, etc., they also have the full range of syntactic properties of free words, including theta role assigning and receiving properties.

<sup>4</sup> Here, as well as in the ensuing discussion, the notion of *aspect* and its various components, including accomplishment, achievement, activity, and state, etc., follow mainly from Vendler (1967), and Smith (1991). For critique, interested readers are referred to Verkuyl (1993).

<sup>5</sup> Li proposes the notions "A-head" and "A-complement" to replace Grimshaw's original notions of "activity" and "result" for the aspectual contour of causativity on the basis of the

following observations. First, an activity requires an Agent subject, but Li cites the sentence "The eerie color frightened Youyou" to show that a Theme subject is also possible. Hence Li argues that "activity" may not be an accurate notion. Second, Li finds that activity verbs like *ku* "cry" and *xiao* "laugh" can occur in V2 of Chinese resultative compounds. Again, Li argues that "result" may not be a correct notion. But as discussed in Gu (1992), verbs like *ku* "cry", *xiao* "laugh", etc., are induced activity verbs, hence, they can still be used to express result.

Despite that some of the V2s have an adjective use, they are referred to as verbs, because adjectives in Mandarin Chinese are defined as *stative verbs* (Li & Thompson 1981).

<sup>6</sup> There are two instances of the perfective aspect marker *le*, a verb-*le*, and a sentence-final *le*. For convenience, we link the former to the verb with a hyphen. By hyphenating the verb-*le* to a V-V compound, we commit ourselves to the view, which is confirmed in our ensuing discussion, that V-V compounds are formed prior to syntax, and the verb-*le* is attached to the compounds just as it attaches to other lexical verbs.

<sup>7</sup> The reviewer points out a case where V2 in a V-V compound does not denote a result. For instance,

- (i)           ta   mai-xiao-le       yi-shuang   xie.  
               He   buy-small-asp   one-CL       shoe  
               (Lit.) 'He bought a pair of shoes which were too small.'

Here, the sentence does not mean that the smallness of the shoes is a result of purchasing. In other words, the purchase of the shoes does not constitute a cause for the shoes to be small. We contend that the V-V compound here is not a resultative compound. V2 here denotes degree or extent (usually not up to one's expectation) in the sense that the object argument in (i) is not an "affected" argument. A clear contrast between a resultative/affected argument and a non-resultative/extent argument can be demonstrated in focus construction:

- (ii) a.       Zhangsan   da-po-le       beizi.  
               Zhangsan   hit-broken-asp   glass  
               'Zhangsan broke a glass.'
- b.       beizi   shi       Zhangsan   da-po       de.  
               glass   FOCUS   Zhangsan   hit-broken   DE  
               'It is Zhangsan that broke the glass.'
- (iii) a.       Zhangsan   mai-xiao-le       yi-shuang   xie.  
               Zhangsan   buy-small-asp   one-CL       shoe  
               'Zhangsan bought a pair of shoes and they were too small.'
- b.       \*       na-shuang   xie       shi       Zhangsan   mai-xiao   de.  
               that-CL   shoe   FOCUS   Zhangsan   buy-small   DE

<sup>8</sup> Linguists in lexical semantics are of the view that the correspondence of causative and unaccusative verbs reflects a derivational relation between the two verb forms. It is generally agreed that the unaccusative form is the basic, while the causative form is derived. But Chierchia (1989) departs from this view by presenting evidence from a variety of languages to show that unaccusatives are in fact derived from their causative counterparts. This position is taken up seriously in Levin & Rappaport. They assert that this is indeed the case. If these authors are on the right track, then the Chinese resultative compounds may serve as an additional support to their theory. As recently discussed in Huang (1995), the historical development of Chinese resultative compounds exhibits a pattern in which the unaccusative use of the causative compounds is a fairly late development due to a process of "decausativization".

<sup>9</sup> Native speakers of Chinese may vary in the use of the word *nong* and the word *gao*, which is literally equivalent to *nong*. Such a difference is in general dialectal, the former being preferred by the Southern speakers, and the latter by the Northern speakers. In our discussion, we choose to use *nong*.

<sup>10</sup> As a matter of individual preference, some speakers may choose to allow V1 to copy the activity verb in the subject phrase, although it would sound redundant to most speakers:

- (i) kan nei-ben shu kan-hua-le Lisi-de yanjing.  
 readthat-CL book read-blur-asp Lisi's eye  
 'Reading that book caused Lisi's eyes to get blurred.'

But by no means can *nong* be contained in the subject phrase to contrast with V1 of the compound:

- (ii) \* nong nei-ben shu kan-hua-le ta-de yanjing.  
 get that-CL book read-blur-asp his eye

We turn to this shortly.

<sup>11</sup> Huang (1995) made a similar observation that when the manner of activity is specified in V1, *nong* cannot be used:

- (i) wo shi da-shang-le ta, bu shi ti-shang-le ta.  
 I indeed hit-hurt-asp him not indeed kick-hurt-asp him  
 'It is that I hurt him by hitting him but not that I hurt him by kicking him.'  
 (ii) \* wo shi nong-shang-le ta, bu shi ti-shang-le ta.  
 I indeed make-hurt-asp him not indeed kick-hurt-asp him

<sup>12</sup> (18b) can have an agentive construal, meaning "That man hit Zhangsan's hand and as a result Zhangsan's hand got hurt." This reading does not concern us here.

<sup>13</sup> Again the chain well-formedness condition will be motivated to safeguard the verb movement out of YP in (19). As argued in Li, a well-formed lexical chain is in general imposed on verb movement. Hence a verb can only move out of a VP. Consequently, YP can only be a VP.

<sup>14</sup> PRO designates the semantic subject of the clause.

<sup>15</sup> The following sentence is given by the reviewer to query the obligatoriness of V1:

- (i) na-chang yu Ø zang-le wo-de yifu.  
 that-CL rain dirty-asp my clothes  
 'The rain made my clothes dirty.'

It is plausible that the missing V1 is due to P(honetic)F(orm) deletion; it is dropped after the causative feature is licensed, as the sentence still has a causative construal and an appropriate V1, e.g. a causative *nong*, can always be supplied:

- (ii) na-chang yu nong-zang-le wo-de yifu.  
 that-CL rain do-dirty-asp my clothes  
 'The rain made my clothes dirty.'

In our view, *nong*, being a "supporting" verb in a V-V compound, is light in semantics and prone to drop.

(ii) also reminds us of the fact that there is no one-to-one correspondence between (15)-(16) and (18). One does not see a (15) type of sentence related to (ii):

- (iii) \* xia na-chang yu nong-zang-le wo-de yifu.  
 fall that-CL rain do-dirty-asp my clothes

This specific case may be related to the fact that the verb *xia* 'fall' in the subject phrase is unaccusative, which falls outside of the range of activity verbs. See also our discussion surrounding (35)-(38).

<sup>16</sup> Other proposals have been made in the literature concerning the government status of the subject position in Chinese, for instance, in Huang (1982) Infl in Chinese is considered to be lexical, and in Aoun & Li (1989) Chinese subjects are not VP-internal. We are not going to details of those proposals here.

<sup>17</sup> The glosses in the following examples for agreement are as follows:

3 (Person), s (Number, singular), F (Gender, feminine), N (Gender, neutral), S (GF subject), A (GF, absolutive). Other glosses include:

ABS (absolutive case), ERG (ergative case), HAB (habitual aspect), etc.

<sup>18</sup> Further evidence supporting Baker's arguments can be derived from Incorporation of unaccusative subjects. Following the Unaccusative Hypothesis of Perlmutter (1978) and Burzio (1986), the unaccusative subjects are the internal arguments of unaccusative verbs and they move to the surface subject position for structural Case. Their maximal projection, i.e., the NP, is theta-coindexed with the target verb and Incorporation of the noun within the NP will not violate the ECP.

<sup>19</sup> At least, it is not the case with modern Chinese, although in classical Chinese, the two verbs used to occur separately in serial verb constructions (Mei 1991), for instance,

(i) Classical Chinese:

da	ru	kou	po
hit	you	mouth	broken

(ii) Modern Chinese:

da-po	ni-de	zui
hit-broken	your	mouth

The classical form no longer exists in modern Chinese; hence there is no motivation for co-analysis of the causatives in question.

<sup>20</sup> Also refer to the discussion surrounding (23) in 4.1.

<sup>21</sup> An additional piece of evidence in support of our speculation is that the causative, non-Agent-Patient *nong*-V compounds are significantly less productive than their V-V counterparts. This, in turn, explains the lack of parallelism between the two.

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# REMARKS ON SCOPE INTERPRETATION IN CHINESE\*

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This paper takes up the issue of proper understanding and proper representation of basic quantified structures in Chinese and puts forth two proposals different from most of the claims in the current literature. The first proposal is that the Entailment Thesis of representation be dropped. The second proposal is that the  $[ [\forall\text{-QNP}] \vee [\exists\text{-QNP}] ]$  structure in Chinese should be consistently judged as ambiguous in scope interpretation.

## 1. INTRODUCTION

In the literature on Chinese quantification, there have been more disputes over the judgments of the data than consensus. It is therefore of primary importance to re-examine the relevant data and to sharpen our intuition if necessary. Reliable judgments are hard to come by in this case, as informants have to be tested on the ambiguity status rather than on the well-formedness of the quantified sentences. Some well-circulated claims on the ambiguity status of Chinese quantified sentences were based on the authors' judgment for just a few sentences. The authors' intuition became the only criterion. Some studies did solicit judgments from native speakers, yet in such an informal way that informants were asked to comment directly on the ambiguity status of given sentences, sometimes with the intended interpretations provided. The findings therefore could not obtain authenticity, since various interfering properties were not adequately controlled. The subjects might not be enough in number to yield convincing results. The format of the questionnaires might be misleading. The informants might be self-selected. And there might be a lack of control stimuli or filler stimuli. Besides, pragmatic factors may also affect data interpretation. In the light of the Theory of Relevance, people would simply choose to understand a sentence in the way optimally relevant to them in the context of utterance. That is, the first interpretation that comes to one's mind would be taken to be the only possible one. Any other possible interpretations would not even be

considered.<sup>1</sup> It would be ideal to have 50 informants out of 100 to interpret a sentence in one way and the rest 50 in the other, thus showing the ambiguity of the sentence. But even if the division of judgments turns out to be one versus ninety-nine, it should not lead to the claim that the sentence is not ambiguous, nor should one claim that one interpretation is the preferred or favored reading. Again, it is just a matter of relevance. At present, convincing psycholinguistic experiments or surveys on Chinese quantification approximating those of Gil (1982) and Kurtzman & MacDonald (1993) are rare with the notable exception of Lee (1986, 1989). However, Lee's experiments did not exert a big enough influence as it deserved. A possible reason is that Lee's task-oriented, game-playing and prize-winning experiments were at best successful with kindergarten children and might have obtained far less homogeneity when tested on adults. Given that the primary target of Lee's experiments was to study children's acquisition of quantified structures, adults' understanding of quantification may be more sophisticated. Therefore, comprehensive studies on the data interpretation of Chinese quantification are still wanting. This accounts for the heterogeneity of data interpretation in the literature, which has been too frequently attributed to regional variation, again without systematic analyses.<sup>2</sup>

In this paper, I will present a different yet more articulate view on Chinese quantified sentences from a logical standpoint. I will endeavor to show that the present literature does not even make the logically valid generalizations over the data judgments obtained through informal tests. I will concentrate on the problem of proper representation of the most basic cases in Chinese quantification and argue that it is high time that students of Chinese linguistics abandoned the Entailment Thesis and gave the relevant structures clear and distinct representations. In this connection, I will also address the issue of proper understanding of the relevant data and try to sharpen the data by revealing the semantic consequences of different ambiguity judgments.<sup>3</sup>

To pave the way for further discussions, I first introduce some relevant concepts in logic.

## 2. SCOPE AND DEPENDENCY

In first-order predicate logic, the *scope* of a quantifier is defined as the shortest propositional function in which it occurs.<sup>4</sup> As quantifiers are usually represented as

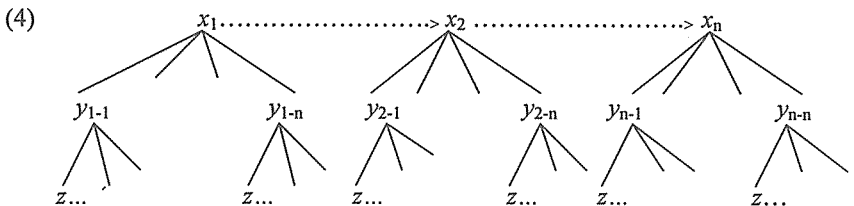
prefix operators, a quantifier therefore has scope over the shortest formula to its right. In the case of a formula being multiply quantified, we have the scope of one quantifier being embedded in the scope of another, the latter appearing to a more left position. Hence the linear order of the quantifiers sharing parts of a formula determines their relative scope. The one appearing to the left has wide scope, and the one appearing to the right has narrow scope. The concept of scope is a valuable one in logic, for it helps us to obtain the correct semantic interpretation of quantified formulae. A quantifier with a narrower scope is to be interpreted within the domain of the quantifier having a wider scope. For example, in (1) the choice of the value for  $y$  is pre-determined by the value of  $x$ . If the domain of  $x$  is  $\{a, b, c\}$ , then the value of  $y$  can only vary according to the value of  $x$ , as shown in (2).

- (1)  $\forall x \exists y \Phi(x, y).$   
 (2)  $x_1=a, y_1=m; x_2=b, y_2=n; x_3=c, y_3=s.$

It is certainly possible for  $y_n$  to be given more than one value relative to  $x_n$ . Therefore, we may have (3) as well.

- (3)  $x_1=a, y_{1-1}=m, y_{1-2}=n, y_{1-3}=s;$   
 $x_2=b, y_{2-1}=p, y_{2-2}=q, y_{2-3}=r; \text{ etc.}$

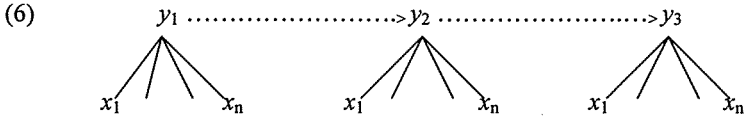
The above process of value assignment for quantified arguments can be graphically illustrated by the following schema:<sup>5</sup>



On the contrary, if the order of the quantifiers in (1) is reversed, as in (5), then the value of  $y$  is not determined by the value of  $x$ .

$$(5) \quad \exists y \forall x \Phi(x,y).$$

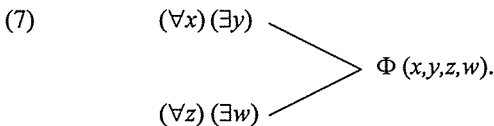
However, in (5) the choice of the value for  $x$  is not determined by  $y$  either. This is due to the nature of the universal quantifier  $\forall$ . The variable bound by  $\forall$  has to range over every entity in its domain regardless of the domain of any of the quantifiers that precede it. We therefore have the following schema for the interpretation of (5).

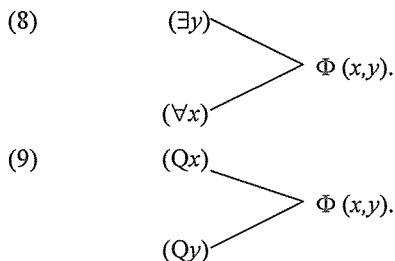


The difference between (4) and (6) is that the value of  $x$  in (6) does not vary with reference to the value of  $y$ . (6) can be considered as a special case of (4). Therefore, (4) *includes* (6) and (6) *entails* (4). We will come back to this point in Section 4.

We can now reach the understanding that in first-order logic, scope plays a role only in the value assignment of the variables bound by an existential quantifier, when it appears in the scope of a universal quantifier. Scope tells us the *dependency* relationship of the interpretation of an existential quantifier on a universal one.<sup>6</sup>

In first-order logic, the interpretation of quantified structures is purely linear, in a left-to-right fashion, as shown in (4). But in second-order logic, it is possible to have existential quantifiers to be interpreted with partial dependency on the preceding universal quantifiers. That is, the  $\exists$  quantifier can choose to depend on some selected  $\forall$  only. Quantifiers interpreted in this way are called *finite partially-ordered quantifiers*. It is crucial for such structures to be represented in a way so that the  $\exists$  quantifier concerned only appears within the scopes of those  $\forall$  quantifiers it depends on. This is what first-order logic is incapable of. We therefore turn to the *branching quantifier* representation, as shown in (7) to (9).





In (7),  $y$  depends on  $x$  but not on  $z$ , whereas  $w$  depends on  $z$  but not on  $x$ . (8) only involves the two standard quantifiers in first-order logic, in which  $y$  is not dependent on  $x$ . Since it is logically equivalent to the non-branching first-order formula (5), branching is trivial in this case. (9) is a more general form than (8), in which all kinds of non-standard quantifiers can appear and it cannot be matched by any first-order formulae, as it contains quantifiers that do not exist in first-order logic.<sup>7</sup>

Quantified structures in natural language differ from those in logic in many ways. One major difference is that the former exhibit ambiguity of scope interpretation in that sometimes, a quantified phrase can either take wide scope or narrow scope regardless of the linear order of the sentence. Therefore, the scope relations cannot be directly read off a sentence and need to be translated into logical forms for proper representation. Quantified structures in natural language have also been found to parallel those in logic in many respects. One similarity is that many types of quantified structures in logic have been found to exist in natural language as well. For example, there are structures in natural language that correspond to linear and branching quantifier formulae in logic, thereby justifying the need to study the properties of the latter in order to achieve proper representation and interpretation of the former.

### 3. THE BASIC QUANTIFIED STRUCTURES IN CHINESE

We take the basic cases of quantification in natural language to be the multiply quantified simplex sentences involving quantified noun phrases (henceforth QNP) in argument positions. In the basic cases, the relevant QNPs correspond to the standard quantifiers in first-order logic, i.e.  $\forall$  and  $\exists$ . A sentence containing just one QNP does not give rise to scope interaction and is therefore not our concern here. In the case of

multiply-quantified sentences, the ideal ones should contain QNPs that correspond to different quantifiers in logic. If the QNPs in a sentence translate into the same type of quantifiers, namely all  $\forall$ s or all  $\exists$ s, then the sentences will hardly be of any interest to linguistic studies for in logic, quantifiers of the same type in the same proposition can commute their domains of scope. Hence the question of relative scope becomes trivial. With these points clarified, we look at the basic cases in Chinese:

- (10) Mei ge ren (dou) mai le yi ben shu  
 every CL man all buy ASP one CL book  
 [ CL = classifier, ASP = aspect marker ]  
 ‘Everyone bought a book.’
- (11) Zuotian, yi ge ren mai le shudianli de  
 yesterday one CL man buy ASP bookshop-in DE  
 mei yi ben shu<sup>8</sup>  
 every one CL book  
 ‘Yesterday, a man bought every book in the bookshop.’

More complex cases abound, but it is from these basic cases that we gather the primary conclusions about Chinese quantification. Admittedly, they have been subject to detailed studies, to such an extent that many people would consider them hardly worthy of any more attention and new-comers to the topic may simply take the existing judgments and treatments as an established evidential.

In theory, each of the basic cases may be ambiguous or it may be not. But an added complexity is that the word *ambiguous* itself has been subject to an ambiguous usage in the literature on Chinese quantification. It is sometimes used to mean ‘ambiguity of understanding’, which we label as *the Understanding Issue*. Some other times, it is used to mean ‘ambiguity of representation’, which can be labelled as *the Representation Issue*. The understanding of the data by native speakers should be objective in nature, but in reality, it can be affected by subjective factors. Semantic representation is purely theory-internal and is therefore mainly subjective. As subjective factors can be involved in both issues, both are subject to logical scrutiny. The Understanding Issue may affect the Representation Issue in an obvious way. Confining our interest to quantified sentences, if a sentence is understood to be

unambiguous, then ambiguous representation is out of the question. If on the other hand, a sentence is ambiguously understood, there is then the question of proper representation: i.e. whether distinct representations should be assigned to a sentence pattern, or whether a single representation would be sufficient in deriving all the possible interpretations of sentence.<sup>9</sup> The Representation Issue may in turn affect the Understanding Issue in an undesirable way. If informants' intuitive judgments are not sharpened and if 'non-ambiguity of representation' is elliptically referred to as 'not ambiguous', then the resulting judgments of the data can be swayed by a theory-internal argument which is not intended to be targeted at the data itself.

In conclusion, with regard to the basic cases (10) and (11), there are at most three possible outcomes for each sentence. Either a sentence is understood to be unambiguous and requires a single representation, or it is understood to be ambiguous and needs to receive distinct representations, or it is understood to be ambiguous but the two senses can be captured by just one single representation. The position I will argue for is that (11) is to be understood as unambiguous and (10) to be taken as ambiguous and should be distinctively represented. The points of difference from the current literature are mainly concerned with (10), as (11) is almost unanimously understood to be unambiguous.<sup>10</sup> So the burden is to defend my points with reference to (10). In doing this I will take up the Representation Issue first. Then I will show that (10) cannot be understood as unambiguous – those who thought so either did not see the other side of the picture due to pragmatic reasons or they simply bought the elliptical version of the Representation story and took it to be the story on Understanding.

#### 4. AGAINST THE ENTAILMENT THESIS

As (11) is understood to be unambiguous, the indefinite subject enjoys wide scope, and the universal object, narrow scope. In terms of dependency relationship, the indefinite subject is independent of the universal object. The point of agreement is that the subject in (11) should never depend on the object, yielding a reading by which for each different book, there was a different person who bought it. The subject is to be understood as being specific: there was only one person who bought each and every copy of the book, either in one transaction or through multiple purchases. This marks a major linguistic difference from the norms of English. Contrary to Chinese,

the equivalent English structure such as (12) can be construed in two ways, with the possibility of the subject being dependent on the object.

- (12) Someone will read every book in the library.

Based on this crucial example, it has been widely held that Chinese does not exhibit object wide scope reading. (13) further supports this claim. The two numeric expressions in the subject and object positions can be construed in 3 ways: object depending on subject (13a), object independent of subject with complete group reading (13b), or with incomplete group reading (13c).<sup>11</sup> But it never admits the reading by which the subject depends on the object, i.e. the object wide scope reading (13d).<sup>12</sup>

- (13)      Liang ge   laoshi   gai   le   liu fen kaojuan  
              two CL teacher mark ASP   six CL script  
              ‘Two teachers marked six scripts.’
- a.      ‘Each of the two teachers marked six different scripts. So twelve scripts were marked by two teachers in all.’
- b.      ‘Two teachers marked six scripts together. e.g. One teacher went through all the scripts. Then the other one went through them again. Or they looked at each page together. Or they were each responsible for certain parts of each script.’
- c.      ‘Altogether, six scripts were marked by two teachers. One teacher marked five scripts. The other only marked one.’
- d. \*    ‘Each script was marked by two different teachers. So six scripts were marked by twelve teachers in all.’

This is again in contrast to the case in English, i.e. (14), which allows all the four readings, including the anomalous (13d).

- (14) Two dogs chased three children.

The above cases led to a generalized hypothesis that in Chinese, the scope of argument QNPs in simplex sentences in the  $\exists\forall\Phi$  sequence is purely determined by

linear order. Hence the translation of such sentences into logical forms is *isomorphic*. No ambiguity of scope arises in understanding nor in representation. Such a hypothesis seems to work well for some other cases where quantifiers take positions other than subjects and objects. We look at two more examples:

- (15) Shang ge xueqi, liang men kaoshi sanshi ge  
 last CL term two CL exam thirty CL  
 xuesheng dou tongguo le  
 student all pass ASP  
 ‘Last term, of the two exams, thirty students passed [them].’
- (16) Yaoshi liang tiao xiansuo bei mei ge ren  
 if two CL clue by every CL man  
 zhaodao le ...  
 find ASP  
 ‘...’

(15) is of the structure [ TOPIC<sub>1</sub>, TOPIC<sub>2</sub>, SUBJECT Verb [e<sub>2</sub>] NP ], where the first topic is an NP functioning as a time adverbial and the second topic as the preposed object of the verb. When the second topic and the subject are QNP's, the QNP in TOPIC<sub>2</sub> enjoys scope wider than the subject QNP. In other words, the interpretation of the subject QNP depends on the TOPIC<sub>2</sub> QNP. Likewise, most native speakers consider (16) as unambiguous, though Aoun & Li (1993) reached the contrary conclusion. But the linear-precedence argument is not a fail-safe criterion. In J. Huang (1993), Lee (1986), S. Shen (1989), Xu & Lee (1989), and Aoun & Li (1993), cases involving two QNP's in a [V-QNP-[P-QNP]]<sub>VP</sub> structure are found to be ambiguous, as shown in (17). In (18), which parallels (17) but introduces a *ba*-construction, i.e. [BA-QNP-V-[P-QNP]], ambiguity is equally detected. In both cases, the QNP as the object of P can take wide scope, i.e. the QNP immediately following *ba* or the verb can depend on the object P, against the linear criterion. Nevertheless, if the PP precedes and lies outside the VP, then the sentence is again found to be unambiguous, as shown in (19).

- (17) Zhangsan fang le liang zhong shiji zai  
 Zhangsan put ASP two CL acid at  
 mei ge shiguanli  
 every CL test-tube-in  
 a. 'There were two types of acid  $x$  such that for every test-tube  $y$ ,  
 Zhangsan put  $x$  into  $y$ .'  
 b. 'For every test-tube  $y$ , there are two types of acid  $x$  such that  
 Zhangsan put  $y$  into  $x$ .'
- (18) Zhangsan ba liang zhong shiji fang zai mei  
 Zhangsan BA two CL acid put at every  
 ge shiguanli  
 CL test-tube-in  
 (Gloss same as (17).)
- (19) Zhangsan zai liang ge shiguanli fang le  
 Zhangsan at two CL test-tube-in put ASP  
 mei zhong shiji  
 every CL acid  
 'There were two test-tubes  $x$  such that for every type of acid  $y$ ,  
 Zhangsan put  $x$  into  $y$ .'

Likewise, Wu (1986) cited ambiguous examples involving interaction between a QNP in a relative clause and the head, which is also a QNP. Here is an example:

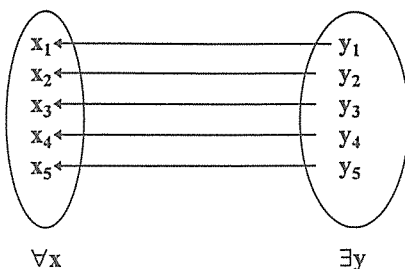
- (20) wo kan le liang ge zuojia xie de mei  
 I read ASP two CL author write DE every  
 ben shu  
 CL book  
 a. 'For every book  $x$ , there are at least two authors  $y$  such that  $y$  wrote  $x$   
 and I read  $x$ .'  
 b. 'There are at least two writers  $y$  such that for every book  $x$ ,  $y$  wrote  $x$   
 and I read  $x$ .'

The cases discussed above all involve ambiguity of scope interpretation and do not conform to the Isomorphic Hypothesis. But the Isomorphic Hypothesis may still be

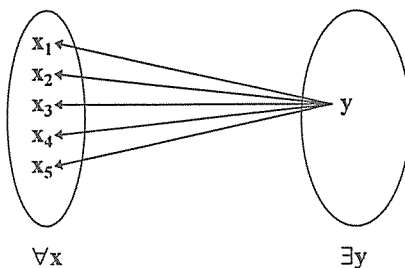
maintained nevertheless. If it can be shown to hold for the  $\forall\exists\Phi$  structure of the basic cases, i.e. (10), then at least it holds for both of the basic cases. If on the other hand, the hypothesis can only be confined to the simplex sentences involving argument QNPs of the  $\exists\forall\Phi$  order, then its power is too weak to be of much value. Unfortunately, (10) is judged to be ambiguous by some and unambiguous by some others. So the feasibility of the Isomorphic Hypothesis remains unsettled.

Now the *Entailment Thesis* comes to the rescue. In first-order predicate logic,  $\exists y\forall x\Phi(x,y)$  entails  $\forall x\exists y\Phi(x,y)$ . That is, the former is a special case of the latter and should be included in the latter as a sub-case. So the mentioning of  $\exists y\forall x\Phi(x,y)$  will necessarily also mention  $\forall x\exists y\Phi(x,y)$ . To illustrate, let us look at the following three relations.

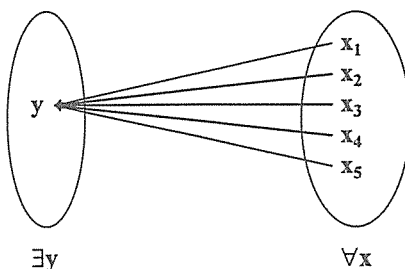
(21)



(22)

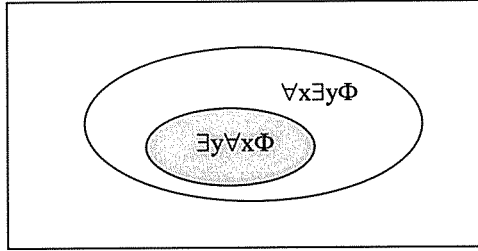


(23)



(21) is the  $\forall x \exists y \Phi(x, y)$  case, in which the value of  $y$  depends on that of  $x$ . But if the set which  $y$  ranges over is a singleton, then although  $y$  depends on  $x$ , its value no longer varies according to  $x$ , as shown by (22). That is, when faced with different values of  $x$ ,  $y$  consistently supplies the same value. This is equivalent to (23), in which  $y$  takes wide scope and is dependent of  $x$ . Therefore, the reading in (23) is not different from (22) and is a special case of (21). The entailment relationship can be captured by the following diagram:

(24)



(25) Every man loves a woman.

(26)  $\forall x ( \text{Man}(x) \rightarrow \exists y ( \text{Woman}(y) \wedge \text{Love}(x, y) ) )$ .

From (26), we can derive both the  $\forall \exists \Phi$  reading and the  $\exists \forall \Phi$  reading. So it is not necessary to represent the  $\exists \forall \Phi$  reading separately. This proposal is henceforth referred to as *the Entailment Thesis*. In fact, advocates of the thesis also went for the Isomorphic Hypothesis, which in English seems even harder to maintain, as we have the  $\exists \forall \Phi$  structure being ambiguously understood, as shown in (27):

(27) A nurse takes care of every patient.

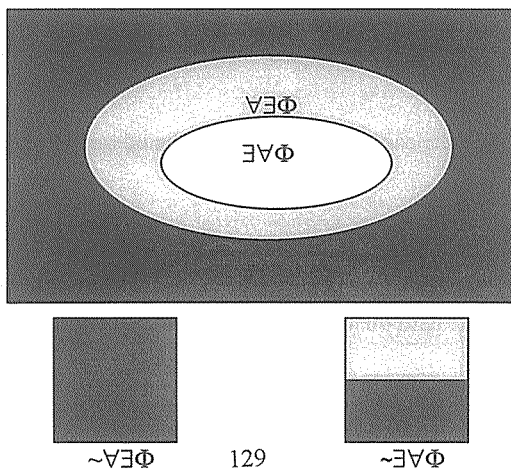
Thus to translate (27) isomorphically into a single logical form  $\exists \forall \Phi$  would miss the  $\forall \exists \Phi$  reading, but to give it a simple representation in the  $\forall \exists \Phi$  sequence would create a sequence adverse to the linear order of the sentence. Reinhart argued that as the  $\forall \exists \Phi$  reading of (27) is not perceived by every native speaker, it is an unnatural reading which can be separately listed as a *marked* case. At this point, we can see the difficulty in maintaining the Entailment Thesis together with the Isomorphic Hypothesis in English. When markedness is admitted as exceptions to a theory, then

the theory becomes rather weak in descriptive power. Note that this only weakens the marriage of the Entailment Thesis with the Isomorphic Hypothesis but the Entailment Thesis itself stands intact. Therefore, it seems that at least the marriage is a happy one in the case of Chinese, for the  $\exists\forall\Phi$  reading in Chinese is never ambiguously understood, and the  $\forall\exists\Phi$  reading, even if ambiguously understood, only requires one single representation. We can at least argue that Chinese quantified sentences translate into logical forms in accordance to the Entailment Thesis and the Isomorphic Hypothesis.<sup>13</sup>

Now the question is whether the Entailment Thesis is really applicable to natural language quantification. Even though to refute the entailment relationship between the  $\exists\forall\Phi$  and the  $\forall\exists\Phi$  formulae in logic would be impossible, it might be still possible to prove the inapplicability of the Entailment Thesis to the analysis of natural language quantification. If we can show that some natural language examples of the  $\exists\forall\Phi$  representation do not have the  $\forall\exists\Phi$  reading at all, then the Entailment Thesis will not be consistent for natural language semantics. Indeed, in three complex situations, the Thesis fails to hold.<sup>14</sup>

The first case is external negation.<sup>15</sup> According to Kempson & Cormack (1981), Chierchia & McConnell-Ginet (1990), and Ruys (1992), negation reserves the entailment relationship and makes  $\sim\forall\exists\Phi$  entail  $\sim\exists\forall\Phi$ . That is to say, as soon as we introduce the negation operator, the sets as defined in (24) are reversed into their complements, as shown in (28):

(28)



Now  $\sim\exists\forall\Phi$  includes  $\sim\forall\exists\Phi$ , so the latter entails the former. Note that the sentential order is still  $\forall\exists\Phi$ , with the negation word appearing either at the beginning of the sentence, or after the subject.<sup>16</sup> As the more inclusive form is the  $\sim\exists\forall\Phi$  structure in the case of negation, maintaining the Entailment Thesis would *entail* the jettisoning of the Isomorphic Hypothesis. Besides, we would have to specify entailment relationships for different types of structures, e.g. the affirmation type, the negation type, and possibly more. If that is the case, the original motivation in proposing the Entailment Thesis is much lost, since it is easier and more direct to assign different representations to an ambiguously understood sentence than studying the intricate entailment relations between sets that are manipulated by various logical operators.

To illustrate the above points with an example in Chinese, let's look at (29):

- (29) Bingfei mei ge xuesheng dou hen yi ge  
 not-that every CL student all hate one CL  
 laoshi  
 teacher  
 'It is not the case that every student hated a teacher.'

Following the Entailment Thesis, we use  $\forall\exists\Phi$  to represent the two readings in its non-negated counterpart. With the addition of the negation word *bingfei*,  $\sim\forall\exists\Phi$  becomes a less inclusive set. So interpreting (29) in the mode of external negation,  $\sim\forall\exists\Phi$  can only represent the reading in (30) but not that in (31):

- (30) It is not the case that every student hated a different teacher.  
 ( $\sim\forall\exists\Phi$ )  
 (31) It is not the case that every student hated the same teacher.  
 ( $\sim\exists\forall\Phi$ )

The second evidence against the Entailment Thesis was provided by Ruys (1992), which involves non-standard quantifiers. Let's look at the following example:<sup>17</sup>

- (32) Banli zhengzheng yiban nanhai wen le  
 class-in exactly half boy kiss ASP  
 130

yi ge nūhai

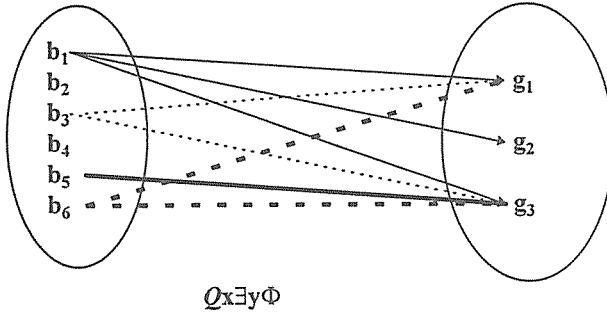
one CL girl

‘Exactly half of the boys in the class kissed a girl.’

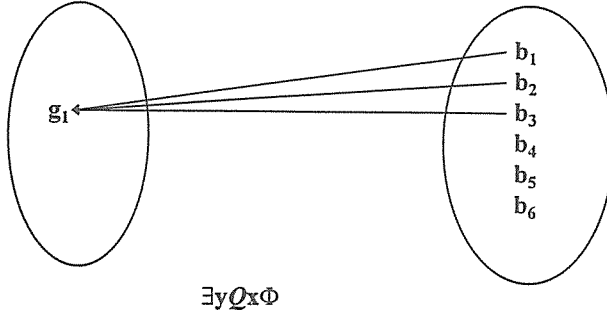
- a. ‘For exactly half of the boys  $x$ , there is a girl  $y$  such that  $x$  kissed  $y$ .’
- b. ‘There is a girl  $y$  such that for exactly half of the boys  $x$ ,  $x$  kissed  $y$ .’

(32) is of the  $Q\exists\Phi$  structure, and (32b) is of the  $\exists Q\Phi$  structure.<sup>18</sup> Neither entails the other, as can be illustrated by the following two diagrams:

(33)



(34)



(33) matches (32a); (34) matches (32b). According to (33), four boys  $b_1$ ,  $b_3$ ,  $b_5$  and  $b_6$  each kissed a girl or more ( $g_1$ ,  $g_2$ , and  $g_3$ ). As four out of six boys kissed girls, so most boys kissed girls, but only  $g_1$  was kissed by exactly half of the boys. According to (34), at least one same girl was kissed by exactly half of the boys. No mention was made as to whether some boys kissed some other girls or whether other girls existed at all. Besides, the exactly half of the boys in (33) need not be the same group of boys as in (34). Thus, (33) does not include (34); vice versa. The

Entailment Thesis does not apply in this case. If we adopt a single representation of (32), then one of the two readings will be missed.

The last point against the Entailment Thesis was raised in Abusch (1994).<sup>19</sup> The Entailment Thesis was mainly restricted to discussions of the  $\exists$ -type QNP co-occurring with another QNP (e.g. the  $\forall$ -type QNP or a non-standard QNP) in the main clause. But if the  $\exists$ -type QNP appears in the restrictive clause, then the scope relationship will be less straightforward. Here is a relevant example:<sup>20</sup>

- (35) Jiang            Jiaoshou biaoyang        le        mei        ge  
        Jiang            Professor praise        ASP        every    CL  
        [ nian    guo        yi    ben you ta    tuijian        de  
          read    ASP        one CL by he    recommend    DE  
          mingzuo        de ] xuesheng  
          masterpiece    DE student  
        ‘Professor Jiang praised every student who had read a masterpiece  
          recommended by him.’<sup>21</sup>

- a. For all students  $x$ , there is a book  $y$  such that Jiang recommended  $y$ ,  
 $x$  read  $y$ , and Jiang praised  $x$ .
- b. There is a book  $y$  such that Jiang recommended  $y$  and for all students  $x$   
 and  $x$  read  $y$ , Jiang praised  $x$ .

Suppose *Professor Jiang* recommended two masterpieces to the students: *Faust* and *Hamlet*, then according to (35a), so long as any student read one book, either *Faust* or *Hamlet*, he was praised by *Jiang*. But (35b) tells us that there is at least one book recommended by *Jiang*, viz. *Faust*, and any student who read it was praised by *Jiang*. At the same time, there may be students who read another book recommended by *Jiang*, e.g. *Hamlet*, but was not praised. Therefore, (35b) does not entail (35a), and the former does not include the latter.

Due to the reasons given above, many linguists reached the conclusion that the Entailment Thesis was not really helpful in the representation of quantified structures in natural language and should better not be adopted.<sup>22</sup> As the thesis was also explicitly promoted in the study of quantification in Chinese,<sup>23</sup> we can hereby appeal to students of Chinese linguistics that the Entailment Thesis be likewise abandoned.<sup>24</sup>

There might be a hidden worry that if we reject the Entailment Thesis and assign (10) two distinct representations, with the  $\forall$ -type QNP in the subject position taking the wide scope as well as with the  $\exists$ -type QNP in the object position taking the wide scope, we will lose an important generalization that Chinese does not allow the QNP in the object position to take wide scope, as typically exemplified by (11), which after all exhibits a major difference between scope-taking in Chinese and that in English.

However, as has been observed in Section 2, *scope* alone does not necessarily determine the manner of dependency. We have to take the type of a QNP into consideration as well. With regard to the basic cases in Chinese, *scope* determines dependency only when an  $\exists$ -type QNP appears in the object position and a  $\forall$ -type QNP appears in the subject position. In other cases, it is not possible to predict dependency relations from the scope relations. The possibilities are given in (36):

(36) SCOPE DEPENDENCY IN CHINESE

	Q-type	Scope 1	Scope 2
Subject	$\forall$	Wide	Narrow
Object	$\exists$	Narrow	Wide
Dependency		Obj. on Subj.	Branching
-----			
	Q-type	Scope 1	Scope 2
Subject	$\exists$	Wide	Narrow
Object	$\forall$	Narrow	Wide
Dependency		Branching	N/A

The only difference between English and Chinese is that in place of the ‘N/A’ in (36), English will have ‘Subject on Object’. Thus it seems that the notion of *dependency* is more useful in revealing the difference of scope interpretation between English and Chinese.<sup>25</sup> Chinese never allows the subject QNP to depend on the object QNP, but English does.<sup>26</sup>

Summarizing the discussions in this section, I have argued against the Entailment Thesis and the Isomorphic Hypothesis. I have also argued that the major difference in basic quantified sentences between English and Chinese is that the latter does not allow the subject QNP to depend on the object QNP.

## 5. BACK TO THE UNDERSTANDING ISSUE

The conclusions reached in the last section are based on a crucial assumption. That is, the  $\forall\exists\Phi$  structure like (10) is ambiguously understood between the object-dependent-on-subject reading and the branching reading. However, as has been pointed out in the last section, although some people consider (10) to have an ambiguous understanding,<sup>27</sup> some others do not.<sup>28</sup> If  $\forall\exists\Phi$  is not ambiguously understood, then there will be no question of multiple representations. Only one representation would suffice, from which only one interpretation is derived. There will be no need to resort to the Entailment Thesis either. But it is fair to say that people judged (10) to be unambiguous for different reasons. One reason might be that they simply mixed up the Understanding Issue with the Representation Issue. Without grasping the essence of the Entailment Thesis, they simply took the non-ambiguity of representation to be non-ambiguity of understanding. This does not necessarily entail that these people never bothered to think about their own intuition. Their intuition might simply be influenced by the mis-interpretation of the Representation Issue, due to the complexity of data judgment as outlined in the introductory section of this paper. A second reason for people to take (10) to be ambiguous is that they simply did not see the other possible interpretation due to pragmatic factors. It is therefore necessary for us to demonstrate the existence of the other reading of (10), i.e. object independent of subject, by studying some special semantic phenomena.

If it is true that (10) can only be unambiguously understood, with the  $\exists$ -type object depending on the  $\forall$ -type subject, then we would never be able to get the *specificity* reading of the indefinite object NP in Chinese. As defined in Cormack and Kempson (1991), an indefinite carries a specific sense if it refers to a specific individual or entity in the mind of the speaker or in the mind of a person of whom a related NP assumes the subject position of an opaque context.<sup>29</sup> A relevant example is (37):

- (37) Zhangsan      xiangxin mei      ge ren dou mongjian      le  
 Zhangsan      believe every      CL man all dream      ASP  
 yi ge nūhai  
 one CL girl  
 ‘Zhangsan believed everyone dreamt of a girl.’

From a logical point of view, in (37), there ought to be at least three interpretations. (A) For each man, there is a girl whom he dreamt of; (B) *Zhangsan* had in mind one particular girl whom he believed that everyone dreamt of, (C) The speaker, not *Zhangsan*, had in mind a particular girl whom he believed that everyone dreamt of. If the object could not be independent of the embedded  $\forall$ -type subject, (B) and (C) would not be possible for Chinese, since the interpretation of the indefinite concerned would have to depend on the value of the universal quantifier and cannot be taken as a fixed constant. People believing in the non-ambiguity of the judgment of (10) may get out of this difficulty by resorting to type similarity. That is to say, although only (A) is available, the speaker of (37) or *Zhangsan* may be aware of the type similarity of the indefinite dependent on the universal subject and has therefore a single entity in mind. Thus the  $\exists$ -type QNP in the object position will turn out to be related to a singleton, and its relationship to the subject QNP will be the same as that in (22).<sup>30</sup> But there seems to be a big difference between a real specific reading and a type-similarity reading. The latter case may not be equivalent to the former, because the speaker may not realize that the related set is a singleton and therefore may not have a specific entity in mind even if a type-similarity is involved. What is more, *type-similarity* is related to interpretation with reference to a model, while *specificity* has more to do with the assumptions in the mind of the speaker.<sup>31</sup> Even if we admit a branching reading of (10) and (37), that will provide a suitable platform to further derive *specific* readings.

The claim that the specificity reading of the  $\forall\exists\Phi$  structure in Chinese should be available can be tested in one more situation, which has to do with pronominal binding. If  $\forall\exists\Phi$  is judged to be ambiguous, then the independent interpretation of the indefinite object will yield a reading by which the indefinite is not bound as a variable by the universal subject. The indefinite object can therefore be co-indexed with a singular pronoun in a following sentence, which I term as *pronominal binding*. It

seems that we do get this interpretation in Chinese, as shown by the following example:

- (38)      zai   women   danweili, mei      ge   nanren   dou ai   zhe yi  
             at   our      unit-in   every      CL   man      all   love ASP one  
             ge   nüren.   Ta   jiushi      Li-Xiaojie  
             CL   woman   She is           Miss Li  
             ‘In our working unit, there is a woman whom everyone loves. She is  
             Miss Li.’

To deny the ambiguity judgment of the  $\forall\exists\Phi$  structure in Chinese would lead to the denial of both the specificity reading and the pronominal interpretation of the object indefinite. My intuition would give me both of the above interpretations, supporting the ambiguity judgment of the  $\forall\exists\Phi$  structure. Those who do not share my intuitions will have to admit the paucity of meaning in Chinese and use or understand like examples with half of the interpretations I got.<sup>32</sup>

Finally, we look at one more claim of interest. In Y. Li (1995), the following two cases were considered to be ambiguous while (10) was not:

- (39)      Ta   jiao      guo de   mei      ge   xuesheng dou kan guo yi  
             he   teach      ASP DE   every      CL   student   all   read ASP one  
             ben   shu  
             CL   book  
             ‘Every student he taught read a book.’
- (40)      Mei      ge   ta   jiao      guo de   xuesheng dou kan guo yi  
             every      CL   he   teach      ASP DE   student   all   read ASP one  
             ben   shu  
             CL   book  
             (Gloss same as (39).)

The crucial point here is that in (39) and (40), the subjects are modified by a relative clause, while the subject in (10) is not. I do not share Li’s intuition and would take (39) and (40) as well as (10) to be similarly ambiguous in understanding. My

judgment aside, at least we have learnt that (39) and (40) can be ambiguous, which are also of the  $\forall\exists\Phi$  structure.

## 6. CONCLUDING REMARKS

What can be derived from the above exercise goes beyond the semantic conclusions I tried to establish. From a methodological point of view, the following inferences can be made. (a) The first intuitive judgments of the informants may not be the correct ones. (b) The well-meditated judgments of the laymen informants may still not be the reliable ones. (c) Spontaneity of data-judgment may not be a decisive factor in eliciting the correct results, especially when complex linguistic cases are involved. (d) Our understanding of the raw idea needs to be sharpened, sometimes with the aid of logical reasoning and analytic reflections.

## NOTES

\* I am deeply indebted to an anonymous reviewer for detailed comments and suggestions on the penultimate version of this paper, which has been much revised as a result. I also thank Ruth KEMPSON, Thomas LEE, Haihua PAN and Liejiong XU for discussing with me issues related to Chinese quantification. None of the people mentioned above has read the final version, of which I am solely responsible for any possible shortcomings. A final thank-you to Yang GU for her efforts in putting this volume together.

<sup>1</sup> Cf. Sperber & Wilson (1986/1995) for details of Relevance Theory.

<sup>2</sup> Cf. Y. Li (1995) for a brief discussion.

<sup>3</sup> A note of caution. The unfolding of the points in the remaining sections purely represents the stages of argumentation and is not meant to be a chronological record of the stages of understanding that have been reached in linguistic analysis.

<sup>4</sup> Lemmon (1965).

<sup>5</sup> Adapted from Sher (1991).

<sup>6</sup> It is possible to state this dependency relationship more explicitly by resorting to a logical mechanism called *Skolemization*. But the details are not crucial to our discussion here. Cf. Jiang & Pan (1998, Chapter 6).

<sup>7</sup> (7) has also been shown to be convertible to first-order representation by Barwise (1979), see Jiang (1995) for a more detailed introduction to the study of branching quantifiers.

<sup>8</sup> This sentence, with an indefinite (which in Chinese assumes the form of a numeral plus a classifier plus a bare noun) as the subject and a universally quantified NP as an object, is alleged to be not in common use (e.g. Duanmu 1988 and Xu & Lee 1989). By starting the sentence with an adverb of time (which is said to serve as the topic here, as in Lee 1986) and prefixing the object with a modifying phrase (thus emphasizing the distributive aspect of the meaning, making it different from an object with *suoyou* 'all' or *quanbu* 'all' as quantifiers only with a collective reading), the sentence is judged to be acceptable.

<sup>9</sup> Cf. Proposals made by Kempson & Cormack (1981), May (1985), and Reinhart (1995).

<sup>10</sup> With the only exception of Yeh (1986).

<sup>11</sup> The notions of *complete* and *incomplete group reading* were proposed by Kempson & Cormack (1981). Here we simply give an informal paraphrase.

<sup>12</sup> When dealing with numeric expressions, we cannot pretend that only  $\forall$  and  $\exists$  quantifiers are involved. But we do not want to go into the detailed representations of numerals either, which have little to do with the topic of discussions here. The minimal explanation is that numerals can be translated into existentially quantified sets, with the number of the members fixed. Moreover, dependency matters when two such existentially quantified expressions appear in one proposition.

<sup>13</sup> In Chinese syntax, the Isomorphic Hypothesis as termed in this paper has been referred to as the Isomorphic Principle, which is phrased in stronger terms than the version here. Various proposals have been made in terms of the exact content of the principle, Cf. S. Huang (1981), J. Huang (1982,1983), Lee (1986), S. Shen (1989), and Xu & Lee (1989). Except for Xu & Lee (1989), none upheld the Entailment Thesis at the same time. All went for the stronger claim that Chinese  $\forall\exists\Phi$  sentences are unambiguously understood. But as pointed out by the reviewer of this paper, 'When some scholars say that [the Chinese equivalent of] "Every student admires some professor" is ambiguous, they really mean the sentence has only one logical representation, though it is possible to derive a reading that looks like the object wide scope reading through entailment.' It remains to be a gray area in the literature as to what exactly the works cited above were claiming, i.e. whether we can presume that the Entailment Thesis was taken for granted in those works or only the Understanding Issue was being addressed.

<sup>14</sup> The points presented below with reference to the Entailment Thesis are based on a summary discussion in Reinhart (1995).

<sup>15</sup> i.e. the focus of negation falls on the whole sentence, not on a particular element in the sentence.

<sup>16</sup> According to Hofmann (1993), in English, external negation can be achieved by using structures like 'It is not the case that S' or by simply stressing the negation word which appears between the subject and the predicate. Similar effects can be achieved in Chinese by either using structures like 'Bingfei S' ('It is not the case that') or by stressing the negation word within the sentence.

<sup>17</sup> The example given here is the Chinese equivalent to the English example in Ruys (1992).

<sup>18</sup> *Q* = *exactly half of*.

<sup>19</sup> I have here simplified the terms and arguments of Abusch (1994).

<sup>20</sup> Again I give the Chinese equivalent to the English example in Abusch (1994).

<sup>21</sup> The string within the brackets is a relative clause.

<sup>22</sup> Cf. Chierchia & McConnell-Ginet (1990), Ruys (1992), and Reinhart (1995).

- <sup>23</sup> For example, by Xu & Lee (1989).
- <sup>24</sup> It seems to me that the views of Chierchia & McConnell-Ginet (1990), Ruys (1992), and Reinhart (1995) have not yet made an impact on the study of quantification in Chinese.
- <sup>25</sup> As indicated by Hintikka (1974) and May (1985), the notion of scope-domain in first-order logic does not give us a precise guideline to the real dependency relations in natural language, since first-order predicate logic is not powerful enough to describe quantification in natural language.
- <sup>26</sup> Cf. Liu (1990) for similar arguments.
- <sup>27</sup> As reported in J. Shen (1985), Lee (1986), Xu & Lee (1989), Yeh (1989), Liu (1990), and Jian (1995).
- <sup>28</sup> Cf. S. Huang (1981), J. Huang (1982, 1983), Duanmu (1988), S. Shen (1989), Xu & Lee (1989), Gao (1989, 1994), X. Li (1991), Aoun & Li (1993), and Y. Li (1995). What I have in mind are more of the people who passed the judgments, not so much as the authors of these works.
- <sup>29</sup> Cf. Jiang, Pan & Zou (1997) for a formalized definition.
- <sup>30</sup> Note that in set theory, the token repetition of a member still counts as one same member.
- <sup>31</sup> Again, see Jiang, Pan & Zou (1997) for more elaborate discussions related to *specificity*.
- <sup>32</sup> The pronominal binding reading was claimed to be unavailable in Chinese by Lee (1986) and Aoun & Li (1993). But Aoun and Li (1993) claimed that the passive counterpart of the  $\forall\exists\Phi$  structure could be ambiguous, which I agree with. I also agree with Liu (1990) that if the passive is ambiguous, the active should be ambiguous as well.

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Efforts in using Dependency Grammar to parse Chinese sentences have adopted an approach that share with other Dependency Grammars the characteristics of being lexicalist and monostratal. Unlike many Dependency Grammars, Robinson's (1970) axioms are used in their entirety in these efforts to constrain dependency structures that can be associated with a string of words. These constraints require that dependency structures should have the single-headedness and projectivity properties, i.e. words in a dependency structure are allowed to have only one head and dependency links in the structure are not allowed to cross one another. We suggest that lexical information defined in terms of these basic dependency relations can be used to further constrain the actual sentences in a language. Semantic analysis can be done in a similar manner. A pilot implementation has been carried out using a unification-based parser.

## 1. INTRODUCTION

Formal properties of Tesnière's Dependency Grammar (Tesnière 1959) are studied by Gaifman (1965) and Hays (1964). Robinson (1970) formulates four axioms to govern the well-formedness of dependency structures. This line of development exploits the affinity of Dependency Grammar with Phrase Structure Grammar. Different approaches to Dependency Grammar have been developed (e.g. Shaumyan 1987).

The Gaifman-Hays-Robinson line of development is not followed by all practitioners of Dependency Grammar. Hudson (1984, 1990) uses Dependency Grammar in his Word Grammar, but his dependency structures do not abide by Robinson's axioms. He (Hudson 1994) thinks that Gaifman's formalization of DG loses basic insights like independence of dependents of a word and the optionality of word-order restrictions. Melcuk's (1988) Dependency Syntax also allows violation of Robinson's Axioms.

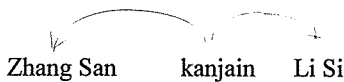
Dependency Grammar has been used in natural language parsing (e.g. Hellwig 1986 and Covington 1990). It has been particularly popular with languages with relatively free word-order like Japanese and Korean (see, for example, Nagao 1993 and Kim et al. 1994). As for Chinese, there have also been efforts in using this formalism in the automatic parsing of sentences (Huang et al. 1992, Yuan et al. 1992, Li et al. 1993 and Zhou and Huang 1994). Though phrase structure rules are generally not used in these efforts in parsing Chinese, Robinson's axioms are used to constrain dependency structures built in the parsing process. This approach to Dependency Grammar is described in this paper.

## 2. DEPENDENCY GRAMMAR

Dependency Grammar is concerned with governor-dependent (head-modifier) relationships between individual words in an utterance. For example, using Hudson's (1984) convention of letting arrows point from heads to modifiers, the Chinese sentence (1a) is analysed as (1b):

- (1) a. Zhang San    kanjian    Li Si.  
        Zhang San    see        Li Si  
        'Zhang San saw Li Si'

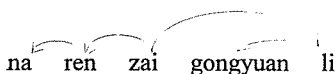
b.



And (2a) is analysed as (2b):

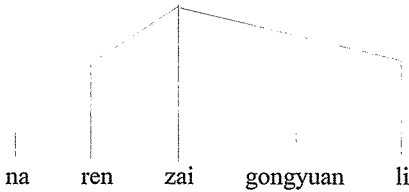
- (2) a. Na    ren        zai    gongyuan    li.  
        that person in    park        inside  
        'That person is in the park'

b.

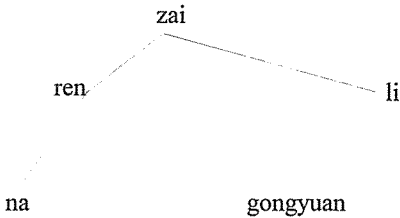


In (2b), for example, the ‘main’ (or ‘central’) element, using Hays' terminology, is *zai*. Its immediate dependents are *ren* and *li*, which, in turn, have dependents of their own. The structure (2b) can also be represented in tree form as (3a) and (3b):

(3) a.



b.



(3a) is in fact a phrase-marker. If the vertical heights to which the vertical edges leading up from the words (leaves) are elevated are taken as indications of hierarchical relationships, then it is a kind of minimal phrase-marker that correspond to the dependency structure (3b) (Lai and Huang 1994a). This form of representation, the *stemma*, has been used in Tesnière (1959).

Based on the work of Gaifman (1965), Hays (1964) suggests that dependency structures can be generated by dependency rules of the following form:

(4) a.  $X(A, B, C, \dots, H, *, Y, \dots, Z)$

b.  $X(*)$

c.  $*(X)$

(4a) stipulates that the governing ‘auxiliary alphabet’  $X$  has dependents  $A, B, C, \dots, H, Y, \dots, Z$  in the linear order given and with  $X$  itself (the governor) situated between  $H$  and  $Y$ . (4b) says that the ‘terminal alphabet’  $X$  occurs without any dependents. (4c) says that  $X$  occurs without any governor. In other words, it is the ‘main’ or ‘central’ element.

Gaifman (1965) proves that the class of languages generated by rules in the form of (4a) to (4c) is the class of context-free languages. He also proves that every Dependency Grammar obtained in this way is 'strongly equivalent' to a Phrase-structure Grammar in the sense that:

- (5) a. they have the same 'terminal alphabet';
- b. for every string over that alphabet, every structure attributed by either grammar corresponds to a structure attributed by the other.

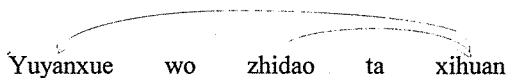
Following Gaifman and Hays' approach to Dependency Grammar, Robinson (1970) formulates four 'axioms' to govern the well-formedness of dependency structures:

- (6) a. one and only one element is independent;
- b. all others depend directly on some element;
- c. no elements depend directly on more than one other;
- d. if A depends directly on B and some element C intervenes between them (in linear order of string), then C depends directly on A or on B or some other intervening element.

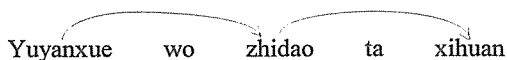
(6c) ensures that a dependency structure is like a tree rather than like a graph. That is to say, in terms of head and modifier, no word in an utterance can have more than one head. This is the 'single-headedness' constraint. (6d) is a constraint on linear word order. It stipulates that no edges should cross in representations like (3a). Thus, sentence (7a) cannot have (7b) for its dependency structure while (7c) and (7d) are possible.

- (7) a. Yuyanxue    wo    zhidao    ta    xihuan.  
linguistics    I    know    he    like  
'I know he likes linguistics'

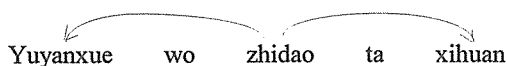
b.



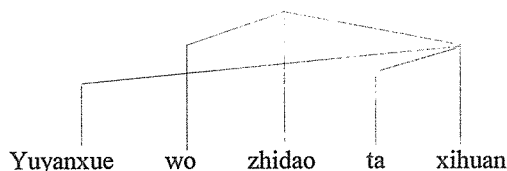
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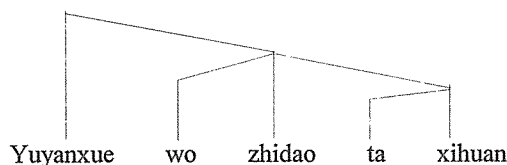
d.



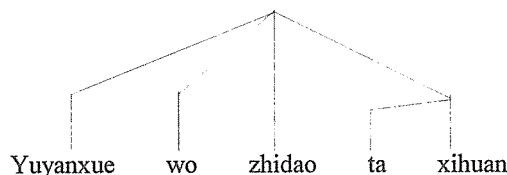
e.



f.



g.



(7b) can be seen to have violated (6d) if we transform it into the phrase-marker (7e). On the other hand, (7f) and (7g), derived from (7c) and (7d) respectively, do not violate the axioms. This is the 'projectivity' property.

It may be noted that Robinson (1970) was written as an investigation of the possibility of using Dependency Grammar as the 'base component' of a transformational grammar. In particular, single-headedness, seen in the parent-daughter perspective, is an essential property of parse trees produced by Phrase Structure Grammars. If the grammar is also context-free then parses will have the projectivity property. Given these two properties, Hays' dependency rules (4a) to (4c) can be regarded as somewhat like an X-bar theory with one bar level (Starosta 1988, and Covington 1990). Single-headedness and projectivity, however, are not considered to be essential for dependency structures by many followers of

## Dependency Grammar.

Hudson allows both single-headedness and projectivity to be violated. In Hudson (1994), he discusses the following four kinds of discontinuous constructions that require such violations:

- (8) a. *It keeps raining.* (raising)
- b. *What did he say he wanted?* (extraction)
- c. *Mary is easy to please.* (tough-movement)
- d. *Students always do well who take syntax.* (extraposition)

Accordingly, (7a) will involve ‘extraction’ and, allowing non-projectivity, will be analyzed as (7b). The Chinese sentence (9a), which involves raising, will be analyzed as (9b):

- (9) a. Zhang San    xiang    da    Li Si  
        Zhang San    want    beat    Li Si  
        ‘Zhang San wants/wanted to beat up Li Si’
- b.



In (9b), *Zhang San* has two heads (governors) as it is subject of both *xiang* and of *da*. Besides, having a dependency link flying over *xiang* from *da* to *Zhang San* violates projectivity.

Melcuk (1988) sees morphological and semantic constraining relationships in language as the motivation to allow ‘double (i.e. multiple) dependency’ and ‘mutual dependency’. For example, there are mutual dependency in (10a) and double dependency in (10b) respectively:

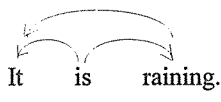
- (10) a. The children are playing.
- b. Wash the dish clean.

In (10a), *are* agrees with its subject noun *children* and is hence dependent on it morphologically. In (10b), *clean* is dependent on *wash* and *dish* at the same time. Melcuk suggests that distinguishing between ‘syntactic dependency’ and ‘morphological and semantic ones’, as he does in his Dependency Syntax, will remove the need to allow multiple and double dependency. Non-projectivity, however, is allowed, though it is claimed that non-projective sentences are usually ‘marked’. Melcuk will thus also allow the structure (7b).

Although Robinson's axioms are not always respected in their entirety, they are nevertheless an effective means to constrain the excessive number of dependency structures that can be conceived of given a number of words. In fact, Hudson (1994), while allowing multiple heads (and even circular dependency) and non-projectivity, introduces a ‘No-tangling Principle’ to constrain dependency structures. He suggests that if ‘tangling’, that is non-projectivity, is found in a structure, then there must be a tangle-free and ‘complete’ substructure --- a ‘structural skeleton’. Thus, while Hudson thinks that the full dependency structure of (11a) should be (11b), the No-tangling Principle is satisfied by the existence of the substructure (11c):

(11) a. It is raining.

b.



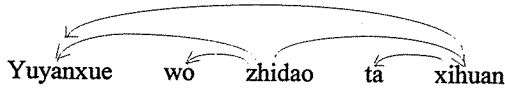
c.



By requiring that the substructure (e.g. (11b)) be ‘complete’, Hudson means that there should be no ‘dangling’ words in the substructure. That is to say, there must be no word without a head (except, of course, for the ultimate head of the substructure).

Hudson will give the Chinese sentence (7a) the full and skeletal dependency structures (12a) and (12b):

(12) a.



b.

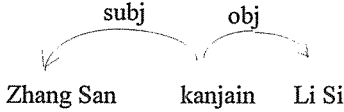


If Robinson's axioms can be violated, what then is the essence of Dependency Grammar? In his forward written for Starosta (1988), Hudson mentions three characteristics of the Dependency Grammar formalism. First, Dependency Grammar is 'monstratal'. There is only one syntactic level of representation --- the surface level, and there are no transformations. Second, dependency relations are basic, not derived. For example, in Starosta's Lexicase theory (1988), dependency structures are represented by means of trees, but the basic nature of dependency relations in this formalism makes it a Dependency Grammar rather than a Phrase-Structure one. Third, the rules of grammar are not formally distinct from subcategorization facts. That is to say, to a certain degree, syntactic structures are derived from subcategorization properties of the individual words. Although there are so many different approaches to Dependency Grammar, it seems that there is indeed a general tendency for Dependency Grammars to be lexicalist in character and to allow no transformations.

### 3. PARSING CHINESE WITH DEPENDENCY GRAMMAR

In China, there have been a number of efforts in using Dependency Grammar to parse Chinese sentences. Corpus-based statistical parsing techniques are used in these efforts. Huang et al. (1992) and Yuan et al. (1992) use a corpus-based algorithm. Very fine-grained knowledge (down to level of the individual words in the lexicon) is obtained from a corpus of Chinese sentences to guide the parsing process. Dependency structures of the sentences in the training corpus are worked out manually. Dependency links are labelled with 'grammatical functions'. Let us consider the sentence (1a) again. This sentence will be given the labelled dependency structure (13):

(13)



Manually analyzed dependency structures provide statistical information including whether and how often a particular word has been the main element of a sentence; whether and how often other words have been governors (and what kinds of governors) of a particular word and whether they are to the left or to the right of the word; whether and how often other words have been dependents (and what kinds of dependents) of a particular word and whether they are to the left or to the right of the word. When given a sentence for parsing, the above-mentioned information is used to build up a number of possible dependency links, subject to a filter implementing the constraints embodied in Robinson's axioms. Finally, an evaluation process gives the best solution(s) in statistical terms. This is a very true Dependency Grammar approach. Lying in the heart of the algorithm is very fine-grained statistical information about dependency relations between individual words. Word order is taken care of to a certain degree. No phrase-structure rules are used, but Robinson's axioms are used to constrain dependency structures.

Going down to the level of the individual words makes the task of obtaining reliable statistical data excessively difficult. In later efforts, word classes are often used instead of the actual words. Li et al. (1993), continues to use Robinson's axioms to constrain dependency structures. Rules specifying whether or not it is possible for words belonging to two particular word classes to have a certain dependency relation, as well as certain heuristics, are also used to cut down the number of possibilities. The nature of the Dependency Grammar framework has, however, remained substantially the same.

Zhou and Huang (1994) describe a shift-reduce parsing algorithm with learning capability. Word classes of words encountered in the input are pushed onto the stack. Reduction rules are sensitive to the context of the top elements of the stack. At the end of a reduction process, i.e. the very act of establishing a dependency link, the head of the link established is put on the top of the stack. Note that though the context of these rules goes beyond the two words in question, they are not phrase structure rules. The Dependency Grammar framework is still the same.

To sum up, the Dependency Grammar used in Chinese parsing has the following characteristics. First, it may or may not group words into syntactic classes, but its basic unit of analysis is always the word. There are no 'empty categories' and sublexical units (e.g. morphemes) do not feature in syntactic dependency relations. Second, dependency structures are constrained by Robinson's axioms. That is to say, multiple heads and crossing of dependency links are not allowed. As we have seen, dependency structures with these properties can be transformed into well-formed phrase markers like (7f) and (7g) ((7f) actually). But it must be noted that in this Dependency Grammar, phrase markers are only derived entities. The basic entities are dependency relations. Third, this Dependency Grammar is monostratal. There is no place for transformations. In this sense, this grammar has the same position as Phrase-Structure Grammars like LFG (Bresnan (1982), GPSG (Gazdar et al. 1985) and HPSG (Pollard and Sag 1994). This Dependency Grammar is purely syntactic. In fact, no semantic analysis has been done in the parsers reviewed above.

#### 4. SUBCATEGORIZATION AND CONTROL

The Dependency Grammar described above is not much more constrained than a context-free Phrase-Structure Grammar. By itself, obviously, it will not be adequate for a natural language like Chinese. Actually, the parsers described above all have mechanisms for additional constraints on the language. Huang et al. (1992) makes use of linguistic information embodied in a corpus. In theory, if one had a dictionary containing *all* the words of a language and if the statistical data had been derived from the *whole* language (if only these two feats were accomplishable), the resulting statistical parser would be the true grammar of the language. As a theory of language, however, such a grammar does not try to go beyond the level observatory adequacy.

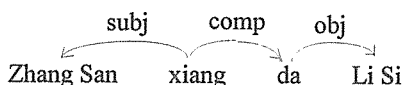
Dependency structures sanctioned only by Robinson's axioms are underconstrained. For a Dependency Grammar, the additional constraints, such as subcategorization, should, whenever possible, come from the lexicon. Predicate words in Chinese, as in other languages, subcategorize for the arguments of the predicate they represent. Or, in non-semantic terms, they subcategorizes for subjects, objects and other kinds of complements. In sentence (1a), for example, the verb *kanjian* subcategorizes for a subject and an object. In keeping with the requirements of a

Dependency Grammar, we may say that this word subcategorizes for two dependency relations, one of a ‘subject’ type, and the other of an ‘object’ type. The Grammar may also require that dependents in these two types of relations should belong to a certain class of words (viz. nouns). In a language like Chinese, where word order is important, information about the relative positions of the head and the different dependents it subcategorizes for should also be accounted for. Now let us consider the more difficult sentence (9a). The important thing to note here is that *xiang* is a ‘control’ verb. We can say that it subcategorizes for a subject relation and, let us say, an ‘open-complement’ relation. This will allow us to build the dependency structures (14a) and (14b):

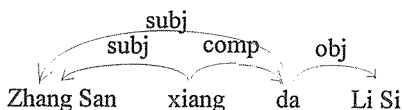
(14) a.



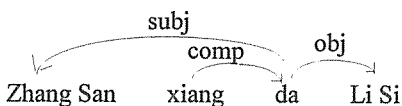
b.



c.



d.

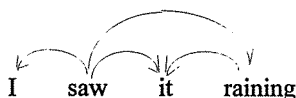


Note that in order to save projectivity, the subcategorization requirements of the verb *da* that it should have a subject is not represented explicitly in (14b). But the ‘complement’ relation subcategorized by *xiang* carries the prefix ‘open’. This enables us to work out that the ‘dangling’ subject relation can be satisfied by pointing at the subject dependent of control verb itself. Here, we must be careful. We must not allow the dependency structure (14c), in which all subcategorization requirements are satisfied, or else we will have led ourselves to a multiple-head and non-projective structure. (14d) is also impossible, because projectivity is violated.

We have not gone with Hudson (1994) and give up Robinson's axioms. We let the process of resolution of dangling relations remain a process. We do not require that all dangling relations be satisfied in the dependency structure (14a) itself. We only require that dangling relations (unsatisfied subcategorization requirements) be satisfied by reference to the dependency structure (cf. Lai and Huang 1995). In the case of (14b), for example, the missing subject of *da* (as subcategorized for by this verb) will trigger the process of resolution at some appropriate time. The complement relation leads from *da* to *xiang*, and the lexical of *xiang* as a subject-control verb will finally allow *Zhang San* to be interpreted as the missing subject of *da*.

Technically, we have managed to maintain our position, but we must not say that our approach is necessarily different from Hudson's in substance. For one thing, if we admit a second layer of *saturated* dependency structure, then this second structure will be exactly Hudson's structure. Besides, we should also note that Hudson's (1994) no-tangle and complete structural skeleton differ from our Robinson-style of dependency structure substantively only in that it may have multiple heads as in (15):

(15)



Conceptually, our approach seems to be different from Hudson's. So, we will keep to our approach and see what it will lead us to.

We must also be aware that the mechanism we employ to satisfy dangling relations is essentially the same as that used in LFG (see Lai and Huang 1994b). The fundamental difference between the two formalisms is that Dependency Grammar is based on dependence relations while the constituent structure of Lexical-Functional Grammar is based on a phrase-structure grammar.

## 5. PROPERTIES OF THE GRAMMAR

Dependency structures in the Dependency Grammar we have arrived at conform to Robinson's (1970) axioms. How these structures are obtained by a parser is an

implementation issue. Huang et al. (1992) uses the axioms as filters when creating dependency structures by reference to knowledge derived from a corpus. In fact, one may also use Hays' (1964) dependency rules to generate these structures (Lai and Huang 1994b&c). For example, 'generation' of the Chinese (1a) will require the dependency rules (16a) to (16c):

- (16) a.  $*(TV)$
- b.  $TV(N, *, N)$
- c.  $N(*)$

and the lexical information that *kanjian* is a TV and that *Zhang San* and *Li Si* are N's. As is normally the case with Dependency Grammars, the boundary between syntactic rules and subcategorization is not very clear. For example, the lexical information that *kanjian* belongs to the word class TV (transitive verb) can be regarded as an index into the dependency rule (16b).

Dependency links in our Dependency Grammar are labelled with names like 'subj' and 'obj'. Using such labels in the grammar gives it a functional character. If we want to use Hays' dependency rules, we may have to add functional annotations as in (17a) to (17c):

- (17) a.  $*(TV)$
- b.  $TV(N[subj], *, N[obj])$
- c.  $N(*)$

There are no transformations in our Dependency Grammar. But as we have seen, lexical constraints like the control mechanism discussed in the previous section can do the job done by transformations in other theories. In mathematical terms, our dependency structures are trees (not graphs) with the projectivity property. They represent 'syntactic dependencies' (cf. Dependency Syntax, Melcuk 1988). Lexical constraints, including subcategorization and morphological constraints, are operative during the process of generating the sentence, but once it is established that a string of words has associated with it a legal dependency structure so that all linguistic constraints are satisfied, the result is a (labelled) syntactic dependency structure.

The result of syntactic analysis in our Dependency Grammar are labelled

dependency structures like (13) and (14b). (14b) in particular makes it clear that our dependency structures may be unsatisfied functional constraints, though it has been made sure that such constraints are satisfiable.

Word order is important in our Dependency Grammar. In Huang et al. (1992), positions of modifiers are only noted relative to their heads, and their positions relative to one another are not taken into account. But if one is to use Hays' dependency rules, for example, with the Grammar, then all word-order relationships are to be accounted for.

We would like all linguistic constraints to reside in the lexicon, but it seems this is not possible. Topicalization by 'extraction' (Hudson 1994), for example, seems to be global in character. In the Chinese sentence (7a), the word *yuyanxue* is the topic of the sentence. Different languages topicalize in different ways, but in a specific language, topicalization is not governed by the particular words in the sentence. To the extent that a particular word may be more or less likely to be topicalized, to the extent that particular words more or less readily allow themselves to intervene between the topicalized element and its 'original' place, and to the extent that particular predicates (like *zhidao* in (7a)) are more or less ready to pass on information about the topicalized word to interested parties, there may be some point in using statistical methods to capture this constraint. As for rules, it does not sound right to account for phenomena like topicalization with subcategorization facts.

Dependency structures in our grammar are built from words. There are no sub-lexical units like the morpheme. There are also no 'empty categories'.

Given labelled dependency structures as the result of syntactic analysis, semantic analysis can be performed by reference to lexical information either directly or indirectly by completing a functional analysis first.

Of course, in psychological terms, all linguistic constraints, syntactic, functional, semantic, morphological or anything else, may be at work at the same time when 'generating' the utterance.

## 6. SEMANTIC INTERPRETATION

Lai and Huang (1994) uses the Dependency Grammar described above to perform semantic analysis. To minimize efforts, we use a PATR parser (Shieber 1986, and

Gazdar and Mellish 1989) implemented in PROLOG. Linguistic constraints are thus dealt with by means of unification. We use Hays-style dependency rules, but, because of the PATR parser, functional annotations are implemented as constraint equations. In an updated version of this pilot implementation, we have "annotated" dependency rules (18a) to (18d) and lexical entries (19a) to (19c) for the analysis of the Chinese sentence (1a):

(18) a. \*(TV)

b. TV(N1, \*, N2):

N1 = subj(TV), N2 = obj(TV) %functional 'annotation'

TV.ds.subj.filler = N1.ds %dependency structure

TV.ds.obj.filler = N2.ds

TV.fs. = TV.ds %functional structure

TV.sem.arg0.role = TV.fs.subj.role %semantic structure

TV.sem.arg0.filler = N1.sem

TV.sem.arg1.role = TV.fs.obj.role

TV.sem.arg1.filler = N2.sem

c. N1( \*)

d. N2( \*)

(19) a. Zhang San:

cat = n

ds.head = 'Zhang San'

sem = ds.head

b. Li Si:

cat = n

ds.head = 'Li Si'

sem = ds.head

c. kanjian:

cat = tv %index into rule (18b)

ds.head = 'see'

ds.subj.role = exp %thematic information in lexicon

ds.obj.role = pat

sem.prop = ds.head

The output of the analysis is (20):

(20)      ds:    subj: filler:head:'Zhang San'  
                role:exp  
               obj:    filler:head:'Li Si'  
                      role:pat  
                      head:'kanjian'  
fs:    same as *ds*  
sem: arg0: role: exp  
                filler: 'Zhang San'  
               arg1: role: pat  
                      filler: 'Li Si'  
                prop: 'see'

For all the technical details given (they are incomplete anyway), we need only note that there are mechanisms to generate distinct ‘dependency’, ‘functional’ and ‘semantic’ structures. ‘Dependency structure’ is a functionally labelled Robinson-conforming dependency structure, the output of syntactic analysis. ‘Functional structure’ is a saturated functional structure like that of Hudson’s, which may violate Robinson’s axioms. In our Dependency Grammar, we do not build this structure, but as a matter of expediency in this pilot experiment, we do so to minimize to efforts in the adaptation of PATR. The semantic structure is derived from the ‘functional structure’. Again, this is an expediency.

Now, let us see how control is dealt with. Let us consider sentence (9a). The lexical entry for *da* is similar to that for *kanjian* in (19c). The control verb *xiang* requires rule (21a) to (21c) and lexical entry (22):

- (21) a. \* (CV)  
 b. CV(N, \*, VS):  
     slash(VS) = subj  
     subj(CV) = N  
     comp(VS) = VS  
     subj(CV) = subj(comp(CV))  
     %details re. semantic analysis omitted for brevity

c. VS(\*, N):

slash(VS) = subj  
%details omitted for brevity

(22) xiang:

cat: cv %index into rule (21b)  
ds.head = 'want'  
sem.prop = ds.head  
ds.subj.role = exp %thematic information in lexicon  
ds.comp.role = pat

Output for the sentence is:

(23) ds: subj: filler:head:'Zhang San'

role:exp

comp: filler:head:'beat'

obj:role:pat

filler:head:'Li Si'

role:pat

head:'want'

fs: same as *ds* except that the *subj* of *ds:comp:filler* is filled

by *filler:head:'Zhang San'*

*role:ag*

sem:arg0:role:exp

filler:'Zhang San'

arg1:role:pat

filler:prop:'beat'

arg0:role:ag

filler:head:'Zhang San'

arg1:role:pat

filler:'Li Si'

prop:'want'

Because we have used PATR in our pilot implementation, we have deviated from our Dependency Grammar considerably for the sake of expediency. The

semantic analysis in (23) is derived from a saturated functional structure, which is derived from a skeletal dependency structure but has a separate existence. Adherence to our Dependency Grammar will require semantic analysis, and satisfaction of functional constraints, to be performed on the skeletal dependency structure directly. This will be exactly the case when one wants to perform semantic analysis on outputs of syntactic parser of, for exempt, Huang et al. (1992).

In psychological terms, one may envisage the process of sentence generation as a word-oriented process which requires that an acceptable dependency structure, a la Robinson, be constructed and that other linguistic constraints be satisfied. The role of semantic constraints during the process of generation and the existence of a valid semantic interpretation afterwards are in fact two sides of the same thing.

## 7. CONCLUSION

We have described an approach to Dependency Grammar that has been used in natural language processing efforts in China. This approach uses Robinson's (197) axioms to ensure that functionally labelled dependency relations are tree-like and projective. Further linguistic constraints, including functional and semantic ones, operate, where necessary, by means of a control mechanism. As a word-oriented Dependency Grammar, this approach is close to Hudson (1994) and Starosta (1988). Its control mechanism, on the other hand, is like that employed in LFG. This approach to Dependency Grammar has been found to go well with corpus-based statistical parsing techniques. Further work has yet to be done on details its theoretical foundation and its usefulness or otherwise has yet to be confirmed by further application to linguistic data analysis.

## NOTES

- \* This project is supported by National Foundation for Natural Science, China.

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## 1. INTRODUCTION

One crucial way in which Radical Underspecification (Kiparsky 1982, 1985, Archangeli 1984, 1988, Pulleyblank 1986, Van der Hulst 1988, Archangeli and Pulleyblank 1989) and the recently developed Combinatorial Specification Theory (Archangeli and Pulleyblank 1994) depart from other feature and underspecification theories is that the former posit features instead of segments as primitives of phonological representation. This enables phonological analysis to access and encode universal generalizations in a simpler and more constrained manner than accounts based on segmental inventories. The theory makes an even stronger claim if universal generalizations and constraints are built directly into the formalism, such as in the case of a monovalent feature geometry (Van der Hulst 1988, 1989, Avery and Rice 1989, Rice and Avery 1991, Wang 1993). It is found that application of such recent theoretical findings to the analysis of Beijing segmental phonology has not only brought solutions to a series of long-existing controversies, but also lent support to the theories by new evidence (Duanmu 1990, Wang 1993).

In light of the advancement in the study of Beijing phonology as well as in the development of phonological theories, this paper attempts to provide a formal representation of the underlying forms and the derivation mechanism of Beijing high vowels. The proposal departs from previous studies by a completely feature-based approach, and I argue that underlying representation of a lexical string (in Beijing this being a monosyllabic morpheme) contains no segmental roots but just features or feature sets. High vowels are derived by a mechanism where one single or two combined place features are licensed to dock to the Head Root under the head mora of the syllable. A Head Feature Licensing Hierarchy is developed according to the universal principles of Sonority Hierarchy (cf. Selkirk 1982) and Prosodic Licensing (cf. Itô 1988). This approach provides a unified account for the derivation of all five high vowels and has significant implications for related issues in Beijing phonology.

Subsequent to this introduction, Section 2 of the paper outlines main points of the theory of Radical Underspecification and presents, as the basis for this study, a monovalent feature

geometry model developed for Beijing consonants and vowels (Wang 1993). Section 3 introduces the facts about Beijing high vowels and discusses strengths and weaknesses of previous analyses. Section 4 provides a detailed account of the present proposal, including the underlying representation, the prosodic docking mechanism, and a relevant issue to be highlighted. Section 5 is the conclusion summarizing the proposal and the discussions in the paper.

## 2. RADICAL UNDERSPECIFICATION AND A MONOVALENT FEATURE GEOMETRY

The development of the theory of Underspecification was motivated by the need to establish an evaluation metric in Universal Grammar which provides a means of selecting between possible grammars for a particular language (Archangeli 1988). This concept originated in Chomsky and Halle's *The Sound Pattern of English* (1968), where representations fully specified for all features are supplemented with a theory of markedness and linking rules whose effect is to weight both derived and underived representations in the direction of unmarked systems. According to Chomsky and Halle, this evaluation metric prefers the grammar in which only the idiosyncratic properties are lexically listed, while predictable properties are derived. In the later advanced non-linear and autosegmental phonology, the concept was developed into various versions of Underspecification theories.

In an earlier review of aspects of Underspecification theory, Archangeli (1988:190-3) observes the distinction among three major views: Inherent Underspecification, Contrastive Specification, and Radical Underspecification. While Inherent Underspecification refers to underspecification due to properties of the features themselves, as in the cases of Inherent Monovalent Underspecification and Inherent Node Dependent Underspecification, Contrastive Specification and Radical Underspecification differ by their views on which values of which features should be specified. The former view, held by phonologists such as Clements (1987), Steriade (1987), and Mester and Itô (1989), maintains that specific feature values should be assigned in underlying representation only where that feature is being used to distinguish segments in the respective contexts; non-contrastive values are left blank. The latter view, held by phonologists such as Kiparsky (1982, 1985), Archangeli (1984, 1988), Pulleyblank (1986), Van der Hulst (1988), and Archangeli and Pulleyblank (1989), maintains that underlying representation should contain only unpredictable feature values whereas

predictable values are inserted by rules during the course of derivation. Values are considered predictable if either a context-free or a context-dependent rule can be formulated to insert the absent values.

In that review article, Archangeli (1988:193-8) argues for the view of Radical Underspecification by two crucial points. One point rests on a distinction between features vs. segments as phonological primitives that comprise the language-particular inventory, and the other point makes reference to markedness and the formal properties that account for cross-linguistic patterns in languages. She compares the feature specification of a standard five-vowel system by a Radical Underspecification approach with that by a Contrastive Specification approach and concludes that Radical Underspecification gains a simpler representation by allowing features to stand and move freely according to the requirement of the specific language, whereas such a representation could not be obtained by Contrastive Specification due to its heavy reliance on the contrasts of segmental inventories. Radical Underspecification contains both default rules which directly represent cross-linguistic markedness considerations and language-specific redundancy rules which encode intralinguistic generalizations, whereas in Contrastive Specification, feature specification rules merely correspond to surface generalizations about the segmental inventory.

In a later study (Archangeli and Pulleyblank 1994), Archangeli and Pulleyblank revise their view of Radical Underspecification into a stronger and more general theory of Modularity and Combinatorial Specification, in which 'constraints on combination (of features) derive not from intrinsic properties of a theory of 'underspecification,' but from the interaction of feature theory with other phonological modules (p12).' Their model of Combinatorial Specification is motivated mainly by a balance between simplicity and recoverability, the latter of which they define by the assertion that 'phonological representations and phonetic content are related (1994:103).' They relate this newer model with Radical Underspecification by the following remarks.

The central difference between the Radical and Combinatorial models is that Radical Underspecification *requires* the elimination of phonological redundancy; Combinatorial Specification *prefers* such elimination (Representational Simplicity) but counteracts the tendency toward such elimination by the principle of Recoverability (1994:110).

The tension between Recoverability and Representational Simplicity is such that phonological representations are as impoverished as possible, yet are still rich enough that they relate unambiguously to phonetic content (1994:103).

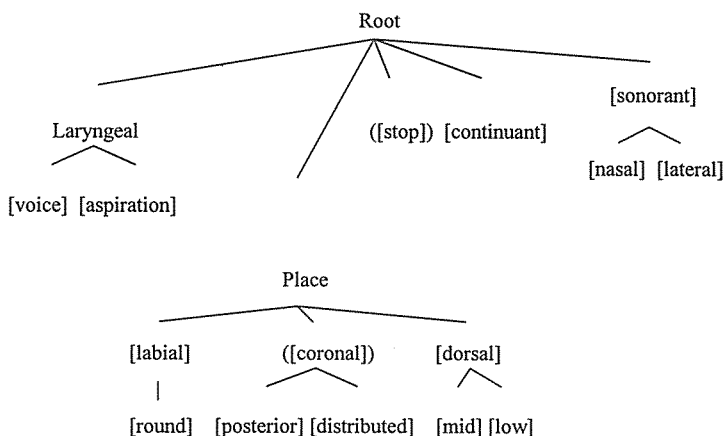
While Archangeli and Pulleyblank employ a set of Grounding Conditions as formal representation of Recoverability, emphasizing that the conditions are 'physically *grounded*' (1994:167), other models of phonetic and phonological feature representations also reflect this empirical phase of phonology, that is, to seek the grounding of phonological representations on phonetic facts. The Gestural Phonology model developed by Browman and Goldstein (1989), for instance, maintains that the basic 'atoms' out of which phonological structures are formed are primitive actions of the vocal tract articulators, termed 'gestures.' Such gestures characterize the actually observed articulator movements (thus obviating the need for any additional implementation rules), and they also function as units of contrast (and more generally, capture aspects of phonological patterning). Van der Hulst (1988), following earlier models of Dependency Phonology (Anderson and Ewen 1987), Government-based Phonology (Kaye, Lowenstamm and Vergnaud 1985), and Particle Phonology (Schane 1984), has developed a model using a single-valued feature system for vowels. He uses letters such as [i], [a], [u], to represent vowel parameters and relies on phonetic interpretations to define the government-dependency relations between features. These models may reflect different degrees of emphasis on either the recoverability or simplicity, in Archangeli and Pulleyblank's terms, but they conform with the general observation that 'the conditions on the ways in which segments are created from features are intrinsically built into the theories in question (Archangeli and Pulleyblank 1994:11).' To the extent that representational simplicity does not conflict with the phonetic content, and that the structural expressions of a given theoretical model does incorporate cross-linguistic as well as intra-language phonological patterns, the basic concepts of Radical Underspecification, i.e., that phonological redundancy be maximally eliminated from representations, that features instead of segments be regarded as phonological primitives, and that markedness considerations be reflected in the formalism of the model, should still be maintained.

It should be noted that these basic concepts of the theory of Radical Underspecification have not only been incorporated in different theoretical models, but also been borne out and supported by evidence from a variety of natural languages (Archangeli 1984, Pulleyblank 1986, Van der Hulst 1988, Archangeli and Pulleyblank 1989, Wang 1993). If Combinatorial

Specification is one way of enhancing the theory of Radical Underspecification by a formal representation of the balance between simplicity and recoverability, or, to put it more precisely, to counteract the tendency toward simplicity by recoverability, then efforts toward more constrained models of simplicity which nonetheless rely on phonetic facts for their grounds and interpretations should just as well be regarded as enhancement of the theory. It is found that feature models using single-valued (or monovalent) features, such as those proposed by Van der Hulst (1988), by Avery and Rice (1989), and by Wang (1993), all involve advancement of the theory of Radical Underspecification in this direction.

Van der Hulst makes a special observation that the use of single-valued features represents an attempt to express directly the notion of marked value introduced in Prague-school phonology. It makes a stronger claim than Radical Underspecification using binary features in that it enables markedness considerations to be expressed directly in the primitives and principles of the theory, or, in other words, to be 'built into' the formalism. In such a system, the default value is eliminated as a phonological entity altogether, so that the feature is single-valued at all stages of the phonological derivation, and it is always the same member of the opposition that represents the marked phonological property. It is in light of such a theoretical position that Wang's (1993) monovalent feature geometry model for Mandarin consonants and vowels was developed. This model, shown in (1), is used as the basis of the Beijing high vowel analysis in this paper.

(1) Monovalent Feature Geometry (Wang 1993)



Note that in this feature geometry model, not only are features of articulators, i.e., [labial], [coronal], and [dorsal], single-valued, as suggested by Sagey (1986) and later supported by McCarthy (1988) and Halle (1994), but all other features, including terminal features, are also monovalent. The entire structure is so highly constrained that each dichotomous configuration in the geometry potentially expresses a four-way opposition. This is shown in (2).

(2) Four-way Opposition in Dichotomous Configuration

a)	b)	c)	d)
$F_{\alpha}$	$F_{\alpha}$	$F_{\alpha}$	$F_{\alpha}$
			/ \
	$F_{\beta}$	$F_{\gamma}$	$F_{\beta}$ $F_{\gamma}$

The term 'potentially' is crucial here since for certain dichotomies in the geometry, only a three-way opposition actually exists and (2d) never occurs. The two instances of such 'incompatible dichotomy' are [sonorant] and [dorsal] whose dependent features never cooccur. Thus the interpretation of the different specifications of [sonorant] and its dependent features will be as follows. If [sonorant] appears alone, as in (2a), it means that the segment is a non-nasal, non-lateral sonorant, which is a vowel or a glide.<sup>1</sup> If there is either [nasal] or [lateral] under [sonorant], as in (2b) or (2c), then it is exclusively a nasal or a lateral. If the feature [sonorant] is not specified at all, then the segment is an obstruent, so we see that the presence vs. absence of a feature expresses a contrast.

The other two dichotomies in the geometry, those under Laryngeal and [coronal], are compatible and allow the two dependent features to cooccur. This is of relevance to the representation of the three coronal high vowels, since we use [coronal] alone with no dependent features to represent the dental articulation, [posterior] under [coronal] for retroflex articulation, and the cooccurrence of [posterior] and [distributed] for palatals. [Distributed] alone would mean an anterior coronal articulation with a broad contact area of the tongue tip, like the English *th*-sound, but since Beijing consonants and vowels do not involve such an articulation, the configuration of [coronal]-[distributed] is not used, and for the contrast between palatal sounds and other coronals, we generally use the feature [distributed] alone, suggesting that this is a posterior distributed articulation -- the only [distributed] class in Beijing.

The feature [coronal] is put in parentheses because it is posited as the default articulator feature for Beijing, among the three articulators. That means if a segmental root is not specified for any Place feature, hence the disappearance of the Place node from the geometry, then it is a coronal sound. Furthermore, it suggests that this is a dental sound within the coronal class, since only when a non-terminal feature is not specified for any dependent features can it disappear. Any non-default dependent feature implies its dominant feature, but not the other way round. For instance, if a segment is [round], then it is necessarily a labial sound, but if it is specified as merely [labial], it is, necessarily, non-round. The structural implication is 'bottom-up', not 'top-down.' Only with default features, the 'top-down' implication holds, which means, for instance, that an empty Root node is a stop sound by default, and an empty Place node is a non-specified coronal, i.e., dental. The dental place is considered the least marked articulation for Beijing Mandarin.

One of the most important consequences of this monovalent feature geometry is a unified representation of both consonants and vowels. Vowels are represented in terms of [labial], [coronal], and [dorsal] together with their dependent features, but not exclusively by [high], [mid], and [low], as in most feature geometry models. This is shown in (3). Later, in Section 4, I will explain specifically how the high vowel features are specified and underspecified.

### (3) Vowels Place Features in Beijing Mandarin

#### a) High vowels

ɿ		ʊ		i		ü			u	
/	\	/	\	/	\	/		\	/	\
[cor]	[dor]	[cor]	[dor]	[cor]	[dor]	[lab]	[cor]	[dor]	[lab]	[dor]
			/\				/	\		
		[pos]	[pos] [dis]			[rd]	[pos] [dis]		[rd]	

#### b) Non-high vowels

ɛ			ə/ɤ		o		a	
/	\				/	\		
[cor]	[dor]		[dor]		[lab]	[dor]	[dor]	
/\								
[pos] [dis] [mid]			[mid]		[rd]	[mid]	[low]	

### 3. THE BEIJING HIGH VOWELS: FACTS AND PREVIOUS ANALYSES

Studies of Beijing segmental phonology as early as Hartman's (1944) and as latest as Lin's (1989) all agree that Beijing Mandarin has five surface high vowels, as shown in the vowel chart in (4).

(4) Beijing Vowel System (Wang 1993)

ɿ	ʮ	i	ü		u
		ɛ	ə	ɤ	o
			a		

The high vowel inventory differs from those in many other languages by the existence of the two 'apical vowels' ɿ and ʮ, which occur exclusively after their homorganic onset consonants. As such, they are always single rime nuclei and are never followed by any postvocalic segments. The other three high vowels, i, u, and ü, are commonly seen in all other languages. In (5), I provide a list of all possible syllables (one example morpheme for each syllable, among a group of homonymous morphemes with various tones) where these five high vowels occur as 'single rimes', i.e., rimes with no prevocalic nor postvocalic segments.

(5) Beijing High Vowels as Single Rimes: All Possible Syllables\*

a.	tsɿ	'capital' (zǐ)	e.	pu(4)	'no' (bù)
	ts'ɿ(2)	'word' (cí)		p'u	'spread' (pū)
	sɿ	'silk' (sī)		mu(3)	'mother' (mǔ)
				fu(4)	'father' (fū)
b.	tʂɿ	'weave' (zhǐ)		wu	'room' (wū)
	tʂ'ɿ	'eat' (chǐ)		ku(3)	'drum' (gǔ)
	ʂɿ	'wet' (shǐ)		k'u	'cry' (kū)
	rɿ(4)	'sun, day'(rǐ)		xu	'exhale' (hū)
				tu	'big city' (dū)
c.	tɕi	'chicken' (jǐ)		t'u	'bald' (tū)
	tɕ'i	'seven' (qǐ)		nu(2)	'slave' (nú)
	ɕi	'west' (xǐ)		lu(4)	'road' (lù)
	yi	'clothes' (yǐ)		tsu	'rent' (zū)
	ti	'low' (dǐ)		ts'u	'coarse' (cū)
	t'i	'kick' (fǐ)		su	'crisp' (sū)
	ni(3)	'you' (nǐ)		tʂu	'pig' (zhū)
	li(4)	'stand' (lǐ)		tʂ'u	'exit' (chū)
	pi	'compell'(bǐ)		ʂu	'book' (shū)
	p'i	'split' (pǐ)		ru(4)	'enter' (rù)
	mi(3)	'rice' (mǐ)			
d.	tɕü	'reside' (jū)			
	tɕ'ü	'district' (qū)			
	ɕü	'need' (xū)			
	yü(2)	'fish' (yú)			
	nü(3)	'women' (nǚ)			
	lǜ(4)	'green' (lǚ)			

\* Note: In this chart and all subsequent examples, I use numbers in parentheses following the phonetic transcription of each syllable to mark tones. The first tone is not marked. In the parentheses following the gloss of each item, I provide the *pinyin* form for reference.

Only the syllables in (5) are recognized as 'high vowel syllables', whereas the prevocalic *i*, *u*, *ü* and the postvocalic *i*, *u* are treated as glides or semi-vowels, transcribed as *y*, *w*, and *y<sup>w</sup>*. Syllables containing *i*, *u*, and *ü* followed by nasal endings, such as *lin*(2) 'forest', *sun*

'grandson', and *yün(2)* 'cloud' are not seen as 'high vowel syllables' in the present system, since the rime nuclei of these syllables are recognized as the mid vowel ə. It appears as *i*, *u*, or *ü* as a result of phonetic coarticulation with the preceding glide elements, but not as a result of phonological assimilation. In my other works (Wang 1993, 1994), I suggest that these syllables be represented with 'phonological invariance', as, for instance, *ɖən(2)* 'forest', *sʷən* 'grandson', and *yʷən(2)* 'cloud', for the above examples.

Because of the limited distribution of the two apical vowels ɿ and ʅ, forming a conspicuous pattern of complementary distribution between themselves and with the other two high front vowels *i* and *ü*, no previous studies posit all five high vowels as underlying. At most four underlying forms are assumed. In (6), I list a variety of assumptions, found in major analyses reviewed for this study.

(6) Previous Assumptions of Underlying Beijing High Vowels

<i>Surface Forms</i>			ɿ	ʅ	i	ü	u	
<i>Underlying Forms</i>					i			(Hartman 1944)
	#							(Hockett 1947)
		i						(Hsueh 1986)
		i			i	ü	u	(Cheng 1973)
					i	ü	u	(Li 1984, Lin 1989)
			ɿ		i	ü	u	(You et al 1980, Zhou 1990)

These six assumptions could be roughly divided into two views, the upper three differing from the lower three by not having *i*, *u*, and *ü*. Although Hartman's (1944) and Hockett's (1947) studies were done in a 'pre-generative- phonology' or phonemics stage, their views capture an important generalization that Beijing syllable rimes (called 'finals' in traditional terms) composed of high vowels are allophonic variants of just one phoneme, and more crucially, the variation is caused by preceding elements. The high vowel phoneme may be a concrete segment, as posited by Hartman, or it may be just a position without any segmental representation, as posited by Hockett.

What is worth noticing in Hockett's analysis is his basing his position upon a sonority hierarchy and a fixed syllable structure. This is explained by the following remarks.

If a monosyllabic microsegment contains a vowel, there is a peak of sonority simultaneous with the vowel. If it contains no vowel, but contains a semivowel /i/ u/ or the cluster /iu/ in position [2], there is a peak of sonority simultaneous with the /i/ or /u/ or with the second phase of the cluster /iu/. If it contains no vowel and no semivowel /i/ u/, the peak of sonority is simultaneous with the last phase of the microsegment, whatever it may be (e.g., with the /t/ of /sr<sup>4</sup>/ 'is', (or) with the terminal vocalic phase of /s<sup>4</sup>/ 'four') (1947:261-2).

It turns out, upon inspection, that if Hartman's high vowel is omitted, the remaining set of symbols with which such a microsegment is written, together with the fact that they constitute a single microsegment, defines unambiguously both the location of the peak of sonority and the vowel quality which occurs there. It is therefore redundant to indicate, with a separate symbol, the location and high-vowel nature of the peak of sonority in such microsegments (1947:266).

In these statements, Hockett's term 'microsegment' is in fact a syllable, the cluster /iu/ equals to *ü*, and 'position [2]' refers to the position of a prevocalic glide in the syllable. The symbols he uses are features (instead of segments) which he calls 'determining features (p258)'. For example, he uses *i* to represent 'high front tongue position', *u* for 'lip rounding', and *r* for 'tongue retroflexion.' This reflects a considerable degree of abstractness and generalization, providing good insights for my present feature analysis of Beijing sound system in the framework of generative phonology and underspecification.

Hsueh's (1986) position draws heavily on Hartman's (1944), though not without reservations. He revises Hartman's representation of the high vowel phoneme by *i* into a more general choice of a central non-round high vowel *ɨ*, arguing that the surface high vowels are all derived from this phoneme by rules. Following Hartman's (1944) and Hockett's (1947) tradition, he uses this phonemic symbol directly in his representation of the high vowels, writing *i*, *u*, and *ü* as /y<sub>i</sub>, w<sub>i</sub>, yw<sub>i</sub>/.

The reason for Hsueh's insistence on using just one vowel as the underlying representation is his belief in the function played by the prevocalic elements in deriving the surface vowels. He argues that the distinction between *Kai* and *He* (open vs. rounded mouth shapes) and that between *Hong* and *Xi* (non-palatal vs. palatal articulations) as reflected by *Shisan Zhe* 'The Thirteen Rhymes'<sup>2</sup> should be the basis for the patterning of Beijing syllable

rimes. These two dichotomous distinctions make up the so-called *Si Hu* (four rime types), namely *Kai-Qi-He-Cuo* (open, even, round, protruded; or open, palatal, round, round-palatal), which began to be recognized by Chinese traditional phonologists many centuries ago. To put the *Si Hu* under our present feature analysis, we find that the four-way contrast is best characterized by four different combinations of simply two place features: *Kai* [-round, -palatal], *Qi* [-round, +palatal], *He* [+round, -palatal], and *Cuo* [+round, +palatal]. With reference to the syllable structure, the *Kai* type of rimes are defined by the absence of a prenuclear glide, the *Qi* type by the presence of a palatal glide *y*, the *He* type by the presence of a round glide *w*, and the *Cuo* type by the presence of a round-palatal glide *y<sup>w</sup>*. Thus in this sense, Hsueh's (1986) position relying on traditional classifications of *Kai-Qi-He-Cuo* for the representation of high vowel qualities correctly captures the relationship between prevocalic glides and the rime nuclei.

Hsueh does not agree, however, with Hockett's (1947) position of two underlying high vowels, on the grounds that Hockett 'has broken the principle that a syllable should necessarily contain a vowel (1986:19, translation by present author)'. To me, this criticism falls unjustifiable since Hockett does unambiguously describe the occurrence of /c/ or /s/, /i u r/, and /iu/ as a vowel when no other (non-high) vowels follow them in the syllable. The following descriptions cited from Hockett will help illustrate the point. For the purpose of arguments, I underline the parts to be emphasized.

/c/ or /s/ as the only residual constituent of a microsegment has two successive phases. Phase one is, in each case, consonantal, . . . The second phase is vocalic, identical for /c/ and /s/, and composed entirely of determined features: an unrounded high back vowel, with tongue as for the consonantal phase and the throat muscles still tense (1947:262).

In the arrangement /Ci/ (no vowel), /i/ begins with the consonant as palatalization (as above), continues after the consonant optionally as high-front-unrounded glide, then in all cases as high-front-unrounded vowel simultaneous with the peak of sonority (ibid).

In the arrangement /Cu/, /u/ is a high-back-rounded vowel . . . (ibid).

In the arrangement /Cr/, /r/ begins with the consonant as retroflexion thereof (as above), and continues after the consonant as retroflex vowel simultaneous with the peak of sonority (p263).

Clearly, Hockett has not 'broken the principle' for a syllable to have a vowel nucleus which is 'simultaneous with the peak of sonority', but has only omitted the representation of the high vowel as a segment from his underlying assumption. This theoretical position will be borne out by our present approach (to be illustrated in Section 4) which does not rely on the concept of segment for underlying representation.

The second view on Beijing's underlying high vowels as represented by the three lower versions in (6) is related with those authors' assumptions of the prevocalic glides in the syllable. Since they treat glides in this position as high vowels, they necessarily posit *i*, *u*, and *ü* as underlying forms in order to represent lexical contrasts involved. The five cited authors differ in their accounts for the two apical vowels ɿ and ʅ. While Cheng (1973) posits the unrounded central high vowel *ɨ* and You et al (1980) and Zhou (1990) have ɿ, Li (1984) and Lin (1989) have no extra forms but *i*, *u*, and *ü*. Li and Lin differ in that Li treats these two vowels as allophonic variants of *i*, whereas Lin derives them by spreading the feature Coronal from their preceding consonants to an epenthetical vowel root. Lin characterizes these derivation steps as Stray Epenthesis and Sibilant Assimilation (1989:70).

To sum up, the essence of the differences among the above views lies in whether they regard the three prevocalic glides in Beijing syllables as glides or as vowels, and further, if as glides, as merely glide features or as glide segments. It is quite obvious that the first three authors have gained a simpler representation by seeing the glides as glides and by capturing the generalization that high vowel nuclei are but taking features from their preceding glides. Hockett's (1947) representation of zero segment for all five surface forms is the simplest, and its reliance on Sonority Hierarchy and the syllable structure helps reduce the redundancy involved to a maximally possible extent.

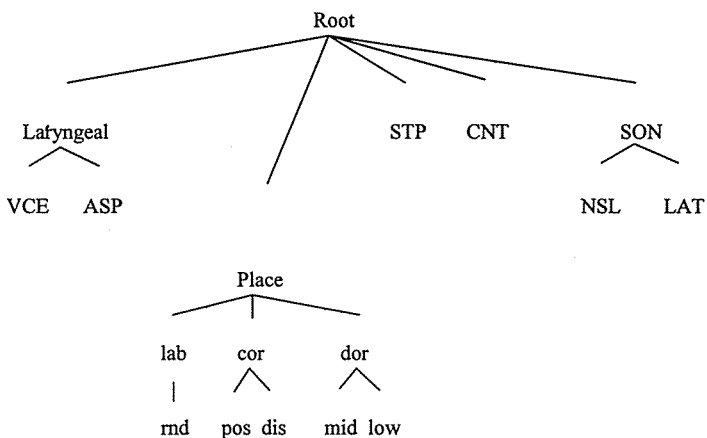
#### 4. A FEATURE-BASED APPROACH

In what follows, I present an account based on features instead of segments as the basic units of representation. I will first explain, in 4.1, the interpretations of the feature specifications in the underlying representation. Then, in 4.2, I will illustrate how the features and feature sets dock to their prosodic positions and what constrains the prosodic docking. Finally, in 4.3, I will discuss a special issue concerning the derivation of the round high vowel *u*.

##### 4.1. *Underlying Representation*

As stated in Section 2, the representation of high vowels in the present approach is based on the monovalent feature geometry proposed in Wang's (1993) study of feature geometry and Beijing segmental phonology. The feature geometry was given in (1) above. In (7), I repeat this geometry but abbreviate the names of the features and remove the square brackets, so that each feature becomes a special name for an individual phonological primitive. In (8), I list the fifteen feature primitives by their classifications. For simplicity, the three major class features and the two manner features are grouped under the general heading of Root Features. The Root features and the Laryngeal features are capitalized in order to be distinguished from the Place features.

##### (7) Features as Phonological Primitives



(8) Inventory of Beijing Phonological Primitives

a) Root Features:	SON	NSL	LAT	STP	CNT				
b) Laryngeal Features:	VCE	ASP							
c) Place Features:	lab	cor	dor	rnd	pos	dis	mid	low	

These feature primitives are exclusively distinctive, in the sense that each individual primitive represents a natural class and its interpretation is defined by the geometry configuration. For instance, SON represents exclusively the class of vowels or glides, whereas nasals and the lateral are represented exclusively by NSL or LAT. The absence of SON, NSL, and LAT means an oral obstruent, and only obstruents can be specified by STP or CNT. Therefore when the underlying representation has CNT alone, it suggests a fricative but not a vowel or glide. The continuancy of the latter is implied by a redundancy rule (see (22) below). The same is true with place features. For instance, although the feature [dorsal] represents both vowel features and velar consonants, it is entirely underspecified for vowels: it is implied by [mid] and [low] for non-high vowels, and by SON for high vowels. Thus when an underlying representation has dor, it exclusively represents a velar consonant.

The underlying representation of a surface segment is, in general, a feature set containing only idiosyncratic features. All predictable features are omitted, or underspecified, from the set. However, not all surface segments have a corresponding feature set; sometimes more than one surface segments can be derived from one underlying feature set. The high vowels, for instance, are derived in this way.

Structurally, a feature set is like an impoverished feature tree, but without a root, so the set is not to be viewed as an underlying segment. Within the set, the features are arranged linearly according to the order of Root-Laryngeal-Place, connected by hyphens in between. For instance, the underlying feature set for the surface segment *r* appears as SON-pos, which means a non-nasal non-lateral sonorant with retroflex articulation. A feature set usually has a Root feature in the beginning, marking what type of root the set may fit best, but this feature may be underspecified, too, like STP. When it does not appear in a set, such as -dor, the set should be interpreted as a potential velar stop *k*. If the set is headed by the laryngeal feature ASP, like ASP-lab, then it will make an aspirated labial stop *p'*. In the case of the least marked segment *t* in Beijing, whose root, laryngeal, and place features are all default and underspecified, the root feature STP is triggered to appear before prosodic docking.

The linear order of Root-Laryngeal-Place is of no special significance, since the three (actually four) classes of features are parallel under the Root. Within each class, no dominant and dependent features will cooccur, since the dominant feature is usually implied by the dependent feature. The only possibility for two features of one class to appear together is when the two features belong to sister branches of the tree, as in the case of STPCNT, representing an affricate, or corrnd, representing a dental sound with round secondary articulation. In such cases, the linear order of the two features is again unimportant and the two features can still be separated even though they are written as one, with no hyphens in between. In other words, the features in a set are freely stringed together, since they are not bound by the general organization node Root. They rely on the monovalent feature geometry for their interpretations, however.

In the underlying representation, feature sets are combined into larger strings to represent lexical units. Each 'lexical string' is a potential monosyllabic morpheme. (In Beijing Mandarin, an overwhelming majority of morphemes are monosyllabic.) A space is used between two feature sets in a string. For example, -dor -mid is the underlying string for the syllable *kə* 'older brother', and STPCNT-ASP-pos -mid NSL-dor is the underlying string for *tʂ'əŋ(2)* 'city'.

In (9), I show the underlying strings of the 43 high vowel syllables presented in (5). It will be shown that the surface high vowel segments do not really have their corresponding feature sets in the underlying strings. Their derivation will be discussed in the following section.

(9) Underlying Strings of High Vowel Syllables

a.	tsɿ	STPCNT	e.	pu	-lab
	ts'ɿ	STPCNT-ASP		p'u	ASP-lab
	sɿ	CNT		mu	NSL-lab
				fu	CNT-lab
b.	tʂɿ	STPCNT-pos		wu	SON-rnd
	tʂ'ɿ	STPCNT-ASP-pos		ku	-dorrnd
	ʂɿ	CNT-pos		k'u	ASP-dorrnd
	ɾɿ	SON-pos		xu	CNT-dorrnd
				tu	STP-rnd

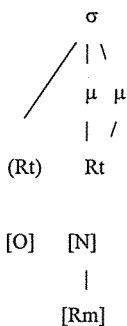
c.	tɕi	STPCNT-dis	t'u	ASP-rnd
	tɕ'i	STPCNT-ASP-dis	nu	NSL-rnd
	ɕi	CNT-dis	lu	LAT-rnd
	yi	SON-dis	tsu	STPCNT-rnd
	ti	STP-dis	ts'u	STPCNT-ASP-rnd
	t'i	ASP-dis	su	CNT-rnd
	ni	NSL-dis	tɕu	STPCNT-posrnd
	li	LAT-dis	tɕ'u	STPCNT-ASP-posrnd
	pi	-labdis	ɕu	CNT-posrnd
	p'i	ASP-labdis	ru	SON-posrnd
	mi	NSL-labdis		
d.	tɕü	STPCNT-disrnd		
	tɕ'ü	STPCNT-ASP-disrnd		
	ɕü	CNT-disrnd		
	yü	SON-disrnd		
	nü	NSL-disrnd		
	lü	LAT-disrnd		

#### 4.2. Prosodic Docking

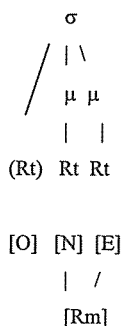
In this section, I examine how the underlying strings in (9) are mapped to their prosodic positions. The syllable structure assumed for this study is shown in (10).

#### (10) Beijing Syllable Structure (Wang 1993, following Duanmu 1990)<sup>3</sup>

a. Single Rime



b. Compound Rime



This syllable structure reflects two significant departures from previous studies. First, it contains maximally three instead of four segmental positions. This is because the traditionally recognized prevocalic glide has been moved to the onset and has become a secondary articulation of the onset consonant (cf. Duanmu 1990, Wang 1993). Secondly, it has abandoned the skeletal tier of CV-slots or X-slots, in light of Selkirk's (1990) observation that the root tier forms an interface between feature structure and prosodic structure. Following Selkirk, Wang (1993) views the root as both an organizational and a prosodic anchor for features. 'It is at the same time the highest unit of the segmental structure and the lowest unit of the prosodic structure, mediating between the features and the moras or the syllable node dominating the moras (p40).'

The prosodic docking mechanism to be presented here is based on Wang's (1993) proposal of a Head Priority and a Head Generation mechanism which are constrained by a Head Feature Licensing Hierarchy. However, the present proposal differs considerably in the following aspects. First, the two separate mechanisms -- Head Priority for non-high vowels and Head Generation for high vowels -- are combined into one unified, and more general, mechanism. Secondly, an underlying feature set is no longer viewed as the representation of an underspecified segment, with the heading root feature as a representation of the root node. Rather, the root nodes are viewed as part of the syllable structure. Features from the underlying feature sets dock directly under the appropriated roots according to docking procedures defined by the mechanism and to relevant constraints. Thirdly, it is proposed that not only are the root nodes at the end of the syllable structure part of the prosodic representation, but the root feature SON of the head root is also an inherent part of the prosodic structure. This is in accordance with the general understanding of the nature of a syllable, whose head should inherently be sonorant. The structural representation of this conception is shown in (11).

(11) Root Feature of Syllable Head

$$\begin{array}{c}
 \sigma \\
 | \backslash \\
 \mu \quad \mu \\
 | \\
 \text{Rt} \\
 | \\
 \text{SON}
 \end{array}$$

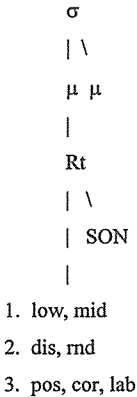
The motivation of this representation is in order for the inherent root feature SON to imply other important properties of the head segment derived by feature mapping, such as the manner feature [continuant] and the place feature [dorsal], with its default values [high] and [back].

The general prosodic docking mechanism of Head Priority is specified in (12), and the Head Feature Licensing Hierarchy is given in (13).

(12) Head Priority Docking Mechanism

1. Dock features to Syllable Head according to Head Feature Licensing Hierarchy.
2. Dock other features in the string.

(13) Head Feature Licensing Hierarchy (Wang 1993:81)



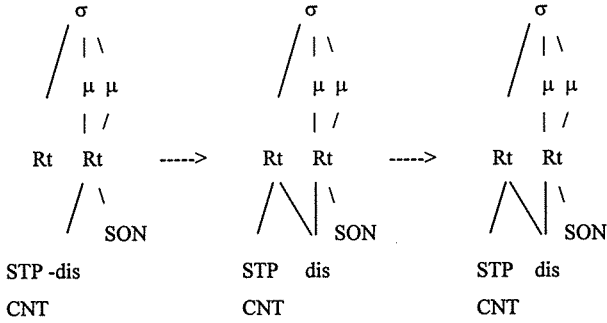
This Head Feature Licensing Hierarchy was developed according to the universal phonological principles of Sonority Hierarchy (cf. Selkirk 1982) and Prosodic Licensing (cf. Itô 1988). Its interpretation is that when the underlying lexical string contains features on Level 1, then these features should dock to the Head Root. In the absence of features at Level 1, features at Level 2 should be allowed to dock under the Head Root. Finally, if the string contains neither features ranked as Level 1 nor those ranked as Level 2, then the Level 3 features are licensed to dock under the Head Root. We could see from (9) that three of the five Beijing high vowels have features at Level 2, and the two apical vowels have features at Level 3. I will explain in 4.3 why the round vowel *u* in syllables with non-round labial onsets are derived from the feature lab instead of rnd.

In (14), I present five sample diagrams to illustrate the docking procedures of the Head

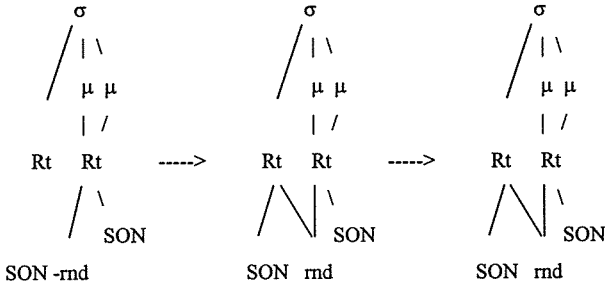
Priority mechanism, and how each high vowel syllable is derived from its underlying feature representation.

(14) Sample Derivation of Beijing High Vowels

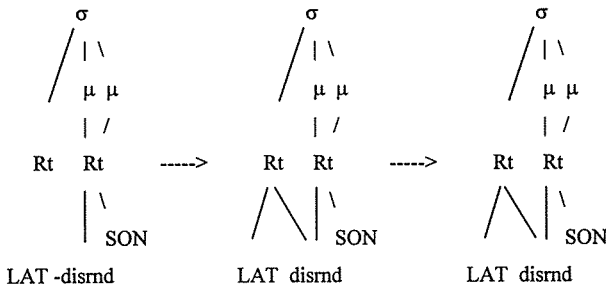
a. STPCNT-dis ----> tçi 'chicken'



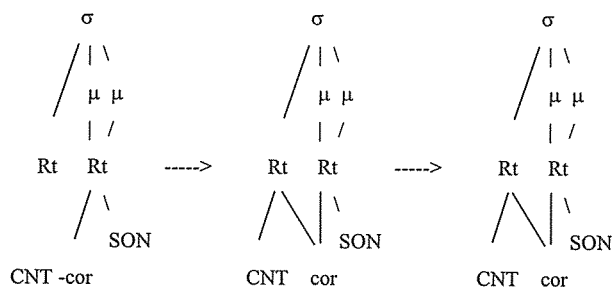
b. SON-rnd ----> wu 'room'



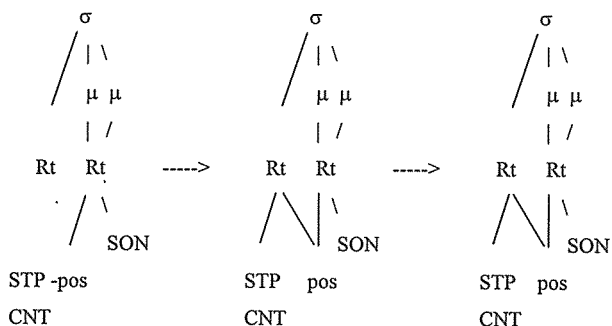
c. LAT-disrnd ----> l'wü (4) 'green'



d. CNT(-cor) ----&gt; sɿ 'silk'



e. STPCNT-pos ----&gt; tʂɿ 'weave'

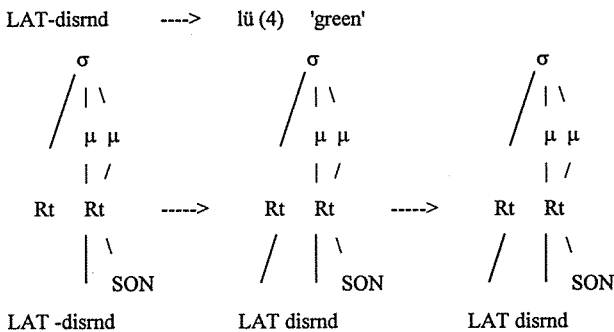


In each of the five docking processes above, only two steps are involved, as defined by the Head Priority mechanism given in (12). Although the place feature representing the high vowel is already in a set, combined with the root feature of the onset, this does not prevent it from being attracted by the head root of the syllable, since it is the feature ranked highest by the Head Feature Licensing Hierarchy and no other feature in the set can possibly dock to the head root. After the head mapping is finished, this same feature together with the onset root feature is associated with the onset root, thus forming an adequate representation of the homorganic onset and rime of the syllable. Such a docking procedure crucially differs from Wang's (1993) Head Generation mechanism for high vowels, where the onset feature set docks prior to the mapping of the head, and then the head root is generated and the high vowel feature is spread to this root from the onset. Chen M (1993, personal communication) correctly pointed out that the account was a bit 'counter intuitive', since the vowel should be the major carrier of the shared place feature, while with a great number of the onsets, the high vowel or glide feature is merely a secondary articulation. In the present account, the Head Feature Licensing Hierarchy applies in the first step of the docking mechanism, which

assures the mapping of the syllable head prior to the docking of all other features in the underlying string.

It should be pointed out that for those onsets with which the shared high vowel feature is secondary rather than primary articulation, such as in the case of (14c) above, the coarticulation between the onset and the rime is not as crucial as in the cases of primary articulation. In a strict sense, the secondary articulation could be viewed as phonetic effect or a low level phonological process, which may or may not be included in the representation of phonological derivation. For this reason, I have omitted the transcriptions of such secondary articulations from the data in (5) and (9), although in (14c) I have kept it and have represented the derivation in the same way as (14a), (14b), (14d), and (14e) where the high vowel feature is the primary articulation of the onset. In (15), I provide an alternative account for (14c), where it is suggested that the association of the high vowel feature with the onset root in the second step of the docking procedure be omitted, hence no phonetic transcription of the secondary articulation should appear in the surface result. This account applies to all those high vowel syllables whose onset has a primary articulation other than that of the high vowel place. In (16), I list such syllables selected from (5) and (9), where the coarticulation (or assimilation) of the onset with the high vowel is optionally represented either by (14c) or by (15), though the latter is more preferable.

(15) Alternative Account for Onset Secondary Articulation



(16) High Vowel as Secondary Articulation of Onset

a.	ti	STP-dis	'low'	c.	ku(3)	-dorrnd	'drum'
	t'i	ASP-dis	'kick'		k'u	ASP-dorrnd	'cry'
	ni(3)	NSL-dis	'you'		xu	CNT-dorrnd	'exhale'
	li(4)	LAT-dis	'stand'		tu	STP-rnd	'big city'
	pi	-labdis	'compell'		t'u	ASP-rnd	'bald'

p'i	ASP-labdis	'split'	nu(2)	NSL-rnd	'slave'
mi(3)	NSL-labdis	'rice'	lu(4)	LAT-rnd	'road'
			tsu	STPCNT-rnd	'rent'
b. nü(3)	NSL-disrnd	'women'	ts'u	STPCNT-ASP-rnd	'coarse'
lü(4)	LAT-disrnd	'green'	su	CNT-rnd	'crisp'
			tʂu	STPCNT-posrnd	'pig'
			tʂ'u	STPCNT-ASP-posrnd	'exit'
			ʂu	CNT-posrnd	'book'
			ru(4)	SON-posrnd	'enter'

This account shows that a feature set is just an organization of underlying features but not an underlying segment. There are simply no underlying segments in the present representation system. A feature set is not unbreakable since it does not contain a root node. Departing from Wang's (1993) framework where a root feature in a set stands for a root node and the features in the same set necessarily dock under the same root, the features in the present set are more loosely stringed together and, where necessary, can dock under different roots. This also enables the Head Feature Licensing Hierarchy to become a more general constraint, in the sense that once a feature is licensed to dock under the head root, it completely breaks off from the set and may not, phonologically, have any further relations with the other features in the set. In other words, the features are freer and the constraint is more powerful.

#### 4.3. Round Vowel from the Feature lab

In this section, I discuss a special issue concerning the derivation of the round high vowel *u*. It should be noticed that among the possible syllables with the round high vowel *u* given in (9e), the four with labial onsets have a different underlying place feature than the rest. They have lab instead of rnd. In other words, rnd is a derived rather than underlyingly specified feature for these syllables. This is shown in (17), repeated from (9e).

(17) High Vowel *u* with Labial Onsets

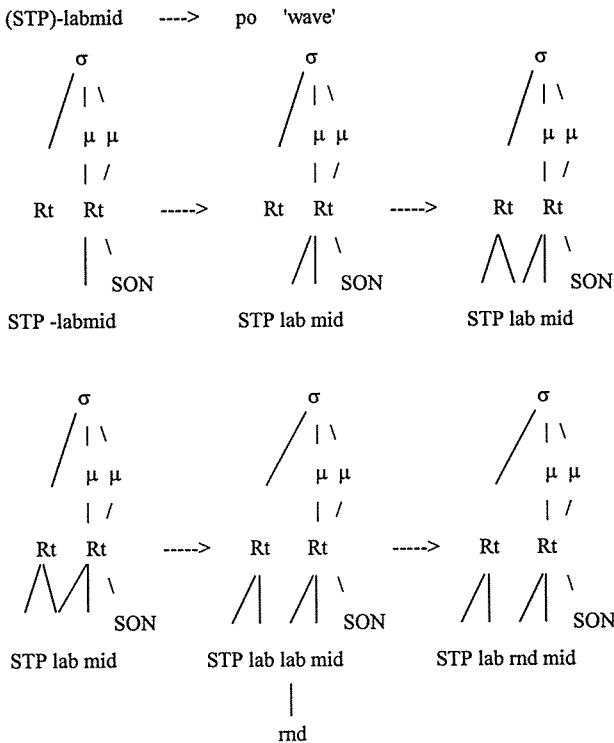
pu	-lab
p'u	ASP-lab
mu	NSL-lab
fu	CNT-lab

This underlying representation is posited in relation with a parallel case with the round mid vowel *o*, where the feature *rnd* is also derived from *lab*. The syllables with this vowel and their feature representations are given in (18). A sample derivation of these syllables is given in (19), where the final step of the derivation is constrained by a Labial Rime Condition, shown in (20).

(18) Mid Vowel o with Labial Onsets

po	-labmid	'wave'
p'o	ASP-labmid	'slope'
mo	NSL-labmid	'touch'
fo(2)	CNT-labmid	'Buddha'

(19) Sample Derivation of Mid Vowel *o* from the feature lab



(20) Beijing Labial Rime Condition (Wang 1993:86)

σ		σ
\		\
μ μ		μ μ
/		/
lab	----->	lab
		rnd

This condition is language specific. It says that when a syllable has a single rime, i.e., a bimoraic single vowel not followed by an ending, and when this vowel is specified by the feature [labial], this vowel must be round. (19) shows that after the feature lab docks under the head root after the feature mid, according to Head Feature Licensing Hierarchy, it creates a configuration that meets the requirement of the Labial Rime Condition in (20), so the condition applies, making the labial vowel a round one. But notice that before the condition applies, lab is doubly linked with both the rime root and the onset root. In order for the condition to apply exclusively to the rime, the doubly linked lab feature has to split into two.

The same condition applies to the derivation of high round vowel *u*, with the same procedures as are exemplified by (19), only short of the feature mid.

The Labial Rime Condition is motivated by the lack of contrast between round and nonround labial onsets, as shown in (21), where the retroflex onset has contrastive round and nonround forms, followed respectively by their homorganic vowels.

 (21) Labial vs. Non-labial Onsets

a.	* pɣ		p <sup>Wo</sup>	'wave'
	pa	'eight'	* p <sup>Wa</sup>	
b.	ʂɣ	'luxurious'	ʂ <sup>Wo</sup>	'speak'
	ʂa	'kill'	ʂ <sup>Wa</sup>	'brush'

In fact, the contrasts shown in (21b) exists with onsets of all other articulation places but the labials. There is also no corresponding non-round labial high vowel with the non-round labial onsets. In other words, if a vowel has labial articulation, it must be round. Therefore the feature rnd does not need to be underlyingly specified.

### 5. CONCLUSION

In this paper, I have discussed issues concerning the phonological representation and derivation of Beijing high vowels in light of the theory of underspecification as well as insights from previous studies. I have proposed that the underlying representation of the five Beijing high vowels are five place features from the same Place geometry as is used for consonants. These five features are summarized in (22).

(22) Underlying Representation of Beijing High Vowels

<i>Vowel</i>	ɿ	ʮ	i	ü	u
<i>UR</i>		-pos	-dis	-disrnd	-rnd
<i>Interpretation</i>	dental	retroflex	palatal	round palatal	[round]

Since the present representation system is based on the theoretical premise of Radical Underspecification and a monovalent feature geometry, the highly impoverished underlying representation of the five vowels in (22) actually stands for a fully specified representation as summarized in (23).

(23) Complete Specification of Beijing High Vowels

<i>Vowel</i>	ɿ	ʮ	i	ü	u
<i>Major Class Feature</i>	[son]	[son]	[son]	[son]	[son]
<i>Manner Feature</i>	[cont]	[cont]	[cont]	[cont]	[cont]
<i>Laryngeal Feature</i>	[voice]	[voice]	[voice]	[voice]	[voice]
<i>Place Feature</i>	Pl	Pl	Pl	Pl	Pl
	/ \	/ \	/ \	/   \	/ \
	[cor] [dor]	[cor] [dor]	[cor] [dor]	[lab] [cor] [dor]	[lab] [dor]
		/ \	/ \		
	[pos]	[pos] [dis]	[rnd] [pos] [dis]	[rnd]	

The underspecified features in (22) vs. (23) are all implied in the structure of the feature geometry itself (e.g., dependent feature implies dominant feature, etc.) and in implicational conditions such as summarized in (24a-c).

(24) Implication Conditions for High Vowel Features

- |    |            |      |              |
|----|------------|------|--------------|
| a. | [sonorant] | ---> | [voice]      |
| b. | [sonprant] | ---> | [continuant] |
| c. | [sonorant] | ---> | [dorsal]     |

Unlike representation systems where underspecified features are filled in by rules during the process of derivation, the present system relies on conditions such as (24a-c) just for interpretations of the underspecification; default features are built into the feature geometry, and redundant features are predictable from the interpretations. No predictable features need to be filled in unless any step of the derivation incurs ambiguity.

In the underlying representation, the features in (22) are combined with preceding onset features into feature sets. A Head Priority docking mechanism and a Head Feature Licensing Hierarchy define the docking of the underlying features to the prosodic structure -- the segmental roots dominated by the fixed syllable structure. Docking procedures are illustrated by sample derivation of certain high vowel syllables, and a special issue involving a Labial Rime Condition is addressed at the end of the discussion.

This account for Beijing high vowels departs from previous accounts by a highly impoverished feature representation and a highly simple, highly constrained docking mechanism. It draws heavily from Hartman's (1944), Hockett's (1947), and Hsueh's (1986) studies, but is made more formal than those studies by a completely feature-based approach in the theoretical framework of Radical Underspecification. It provides strong evidence for the conception of using features instead of segments as phonological primitives, and suggests that other phonological issues in Beijing Mandarin, as well as in other languages, can be addressed in the same approach.

## NOTES

<sup>1</sup> In our present system, vowels and glides are not distinguished by feature specifications but solely by their syllabic positions.

<sup>2</sup> The 'Thirteen Rhymes (*Shisan Zhe*)' is a popular rhyming pattern followed by folklore producers since around the 16<sup>th</sup> century but not recorded in formal phonology books (cf. Hsueh 1986:16-7). This rhyming pattern is regarded by many Chinese phonologists as a good reflection of Beijing native speakers' intuition about the qualities of the syllable rimes of the language.

<sup>3</sup> Since high vowels are used only as single rimes, our analysis is focused on the structure of (10a).

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In the literature of reflexive binding, the Chinese reflexive *ziji* is said to have the following properties: (a) it allows long distance binding with an antecedent outside of its minimal governing category; and (b) it is subject oriented. To account for this phenomenon, Cole and Sung (1994) put forward the Head Movement Analysis which stipulates that *ziji*, being morphologically simplex, undergoes cyclic head-to-head movement to acquire the relevant  $\Phi$ -features for interpretation at LF. However, this analysis has been challenged by certain cases where the interpretation of *ziji* seems to be oriented toward the object. This paper attempts to study this phenomenon within the framework of Bower's Predication Theory (1993); in particular, how this theory may account for the interpretation of Chinese control sentences. Based on our preliminary analysis, we conclude that this framework provides an insightful perspective for the analysis of subject orientation in Chinese reflexives.

## 1. INTRODUCTION

A reflexive pronoun is a member of the class of anaphors, which, following the Principle A of the Binding Theory (Chomsky 1981), is bound in its governing category (GC). A governing category should satisfy the following conditions:  $\alpha$  is a GC for  $\beta$  iff  $\alpha$  is the minimal category containing  $\beta$ , a governor of  $\beta$ , and a subject/SUBJECT accessible to  $\beta$ . The Chinese reflexive pronoun *ziji* reveals two interesting properties. First, it allows long distance binding in the sense that the antecedent may be found outside of the minimal GC. Second, the antecedent is typically the subject. This phenomenon is documented in the literature as "subject orientation". However, it has been pointed out by some Chinese linguists that this phenomenon is far from being simple. A detailed list of counterexamples can be found in Chen (1992) and Xu (1994), both of whom argue that the interpretation of *ziji* in Mandarin Chinese cannot be determined by syntactic factor alone, semantic and pragmatic factors may override structural considerations in a principled way.

This paper attempts to analyze the interpretation of Chinese *ziji* in control sentences. Intuitive judgments from 144 native speakers of Chinese show that while the antecedent of *ziji* in embedded subject control sentences is the matrix subject, both the matrix subject and the direct object can be the antecedent in object control

sentences. It seems that neither the control theory nor the head movement analysis alone can account for the results. We show that an alternative account may be found in Bowers (1993) in which he argues that the direct object is both structurally and semantically similar to the subject. In his framework of analysis, Bowers introduces a new functional category, PrP, which is assumed to exist between I and V. The conventional subject is generated in [SPEC, Pr] while the direct object, which he refers to as the secondary subject, is generated in [SPEC, V]. Following Bowers' analysis, the subject control and the object control sentences have different D-structure representations; the object of a object control verb is the secondary subject, generated in [SPEC, V] whereas the object of a subject control verb is actually a complement of V. While the matrix object in subject control sentences fails to c-command *ziji*, the matrix subject and object in the object control sentences do, thus satisfying the c-commanding condition for anaphor binding of *ziji* in Mandarin Chinese.

## 2. SOME BINDING FACTS

In English, the binding of the reflexive pronoun 'X-self' is said to be local and both the subject and object can be the antecedent of it, as shown by the following examples:

- (1) John said that Tom<sub>i</sub> hurt himself<sub>i</sub>.
- (2) \* John<sub>i</sub> said that Tom hurt himself<sub>i</sub>.
- (3) John<sub>i</sub> promised Tom to discipline himself<sub>i</sub>.
- (4) John expected Tom<sub>i</sub> to discipline himself<sub>i</sub>.
- (5) John<sub>i</sub> gave Tom<sub>j</sub> a book about himself<sub>ij</sub>.

In Chinese, the corresponding anaphor is the bare reflexive *ziji*. It has the following properties. First, it has long been established (for instance, Y.-H. Huang 1984; Huang et al. 1984; Battistella & Xu 1990; Huang & Tang 1991; Cole et al. 1993; Cole & Sung 1994, and Sung & Cole 1992) that *ziji* may be long-distance as well as locally bound, i.e., the antecedent may be found both inside and outside of the minimal GC of *ziji*, as shown in example (6):

- (6) Xiao Ming<sub>j</sub> yiwei Yin Yin<sub>i</sub> bu xihuan zijí<sub>i/j</sub>.  
 Xiao Ming think Yin Yin not like self  
 'Xiao Ming thought that Yin Yin didn't like himself.'

Second, it has been argued that the bare reflexive *ziji* can only take the subject as its antecedent, which is typically known as "subject orientation", as in example (7):

- (7) Miao Ming<sub>i</sub> songgei Yin Yin<sub>j</sub> yi-ben guanyu zijí<sub>i/\*j</sub>-de shu.  
 Xiao Ming gave Yin Yin one-CL about self's book  
 'Xiao Ming gave Yin Yin a book about himself.'

Adopting a typological perspective, Pica (1987) argues that long distance binding tends to be subject-oriented. Supporting evidence has been found in a number of languages including Korean and Japanese. The focus of this paper is on the issue of subject orientation in the interpretation of Chinese *ziji*, especially with regard to such interpretation in the control sentences. This phenomenon is rarely discussed in the literature and certainly deserves some attention. A preliminary analysis is made within the theory of predication as proposed by Bowers (1993). We conclude that this framework may serve as an insightful departure in the analysis of subject orientation in Chinese reflexives.

### 3. SUBJECT ORIENTATION

Various proposals have been made to account for subject orientation in the interpretation of Chinese *ziji*. The parameterization approach as adopted by Manzini and Wexler (1987) ascribes this phenomenon to the Proper Antecedent Parameter where languages may vary between taking either the subject or the subject and object as the proper antecedent of the reflexive. This is later criticized by Cole and Sung (1994) as failing to capture the relationship especially between long distance (LD) reflexives and subject orientation. Cole and Sung, drawing evidence from Chinese, claim that subject orientation is a consequence of LF  $X^0$  movement in which *ziji* in Chinese undergoes successive cyclic  $X^0$  movement from INFL to INFL as far as possible and possibly until the matrix INFL of the highest IP c-commanded by the antecedent. Subject orientation is accounted for as *ziji* gets the  $\Phi$ -features, i.e. person, number and gender, through Spec-head agreement from the subject it is co-indexed with.

Another way to account for subject orientation is to assume that the subject is relative according to X-bar compatibility along the line of Rizzi (1990). Assuming that there is a morphologically null AGR in Chinese which is anaphoric, Progovac (1993) argues that  $X^0$  reflexives, i.e., bare reflexives rather than pronominal reflexives such as *taziji* ‘himself’, will take AGR as their antecedent and assign the subject through Spec-head agreement.

#### 4. COUNTER EXAMPLES: SOME OBSERVATIONS

It has been pointed out by a number of Chinese linguists that the phenomenon of subject orientation is far from simple. Huang & Tang (1991) cites that in the case of a sentence in which a psychological verb is used, a non-c-commanding subject may be the antecedent. In other words, an experiencer argument may bind a reflexive even though it does not occupy the surface subject position of the sentence, as in example (8):

- (8) [ *ziji<sub>i</sub> -de xiaohai mei de jiang de xiaoxi* ] *shi Lisi<sub>i</sub>*  
       self's child not receive prize of news make Lisi  
       hen nanguo.  
       very sad  
       'The news that his own child didn't receive the prize made Lisi very sad.'

(taken from Huang & Tang 1991)

In fact, similar cases are also found with English psych-verbs, for instance:

- (9) a. Pictures of herself<sub>i</sub> pleased Mary<sub>i</sub>.  
       b. Each other<sub>i</sub>'s stories annoyed [Bill and Tom]<sub>i</sub>.

The psych-verbs in (8) and (9) are causative in nature and the binding phenomenon involved is known as ‘backward binding’ (Pesetsky 1990). It has been proposed that backward binding possibility in sentences with a Causer subject may reflect a consequence of LF object movement triggered by the minimalist Case requirement (Chomsky 1993, 1995). Under such a proposal, (8) and (9) can still be captured by the Binding Theory and retain the property of subject orientation. For details, see the discussion in Fujita (1993).

In addition, assuming that only an animate NP can antecede *ziji*, a non-c-commanding animate NP in the Spec of an inanimate NP may take over the role of a potential binder, as in (10):

- (10) [ *wo<sub>i</sub> -de jaoao* ]<sub>j</sub> *hai-le zijí<sub>i/\*j</sub>*.  
           my       pride     harm-asp self  
           'My own pride harmed myself.'

In this situation, Huang and Tang (1991) resort to the notion of "sub-command" as stated below:

- (11) "β sub-commands α iff β is contained in an NP that c-commands α or that subcommands α, and that any argument containing β is in subject position."

In (10), *wo* being an animate element will antecede *ziji* in place of *wo de jiaobao*, a c-commanding but inanimate NP.

Chen (1993) cites counter examples to show that the object of *ba* and *bei* can be the potential binder in the following sentences:

- (12) a. *Lao Wang<sub>i</sub> ba Lao Li<sub>j</sub> suo zai zijí<sub>i/j</sub> -de wuzili.*  
           Lao Wang BA Lao Li lock at self's house  
           'Lao Wang locked Lao Li inside his own house.'  
       b. *Lao Wang<sub>i</sub> bei Lao Li<sub>j</sub> suo zai zijí<sub>i/j</sub> -de wuzili.*  
           Lao Wang BEI Lao Li lock at self's house  
           'Lao Wang was locked up in his own room by Lao Li.'

(taken from Chen 1993)

We will return to these examples in section 8.

Xu (1994) makes the claim that non-subject antecedent can be found beyond the minimal clause boundaries in long distance binding in a number of constructions:

#### Relative Clauses

- (13) [ *renmen gei ta<sub>i</sub> de pingjia* ] *bi zijí<sub>i</sub> yuliao de hao.*  
           people give him DE comments than self expect DE better  
           'The comments that people gave him are better than what he had expected.'

Sentential Subjects

- (14) [ zhexie hua chu zi ta<sub>i</sub> -de kouzhong] hui dui ziji<sub>i</sub>  
 this saying out from his mouth will to self  
 bu li.  
 not advantage  
 'That these words were from his mouth will not be to his advantage.'

Complement Clauses

- (15) zhejian shi gaosu ta<sub>i</sub> [ yiqian ziji<sub>i</sub> -de xiangfa bu dui].  
 this matter tell him before self's thought not right  
 'This matter tells him that his previous thinking is incorrect.'

Adjunct Clauses

- (16) [ zhiyao ziji<sub>i</sub> renwei dui ], shui ye guanzuhi-bu-liao ta<sub>i</sub>.  
 only-if self think right whoever control not him  
 'So long as he thinks (something is) correct, no body can control him.'

(taken from Xu 1994)

Both Chen and Xu agree that the interpretation of *ziji* cannot be determined by syntactic factor alone; semantic and pragmatic factors may override structural considerations in a principled way. Adopting a functional perspective, Chen argues that [+pivot] and [+topicality] are the two factors that regulate the interpretation of *ziji*. In other words, a potential binder of *ziji* has to be pivot and stands high in topicality. Given this background, a non-subject that stands comparatively higher in topicality may become the antecedent, as illustrated in the *ba* and *bei* constructions in (12b) where the oblique object assumes an agentive role.

Xu (1994), on the other hand, attempts to argue against a strong version of subject orientation in the interpretation of *ziji*. He maintains that syntactic and discourse binding should be treated separately. As such, c-command may not be a necessary condition for anaphor binding in Chinese. Using the thematic hierarchy, Xu argues that it can be used "to predict which NP is qualified, or more qualified than other NPs, to be interpreted as the antecedent of a given reflexive" (P.125). Therefore, any NP that directly or indirectly assumes a thematic role of agent, the highest member on the

thematic hierarchy, can become the potential binder of *ziji*. Where an agent is not available in the sentence, the next comes on the thematic hierarchy. For instance, the experiencer, if found, will become the potential binder. This may explain why a non-c-commanding NP in a psych-verb sentence as illustrated in (8) can act as a binder of *ziji*. However, Xu is careful not to dismiss the superiority of subject NP being the potential binder of *ziji*. Note that a patient argument occurring in the syntactic subject position can be the potential antecedent:

- (17) Xiao Zhang<sub>i</sub> bei ziji<sub>i</sub> dashang le.  
 Xiao Zhang BEI self wound asp  
 'Xiao Zhang was wounded by himself.'

(taken from Xu 1994)

We are aware of the fact that not all reflexives are confined to the Binding Theory. As noted by a number of researchers searching in the direction of pragmatic conditions on pronouns (Clements 1975; Sells 1987; Koopman & Spotiche 1989; Pan 1997, among others), certain reflexives are logophoric, of which the interpretation conditions are at variance with the Binding Theory. In our ensuing discussion, we shall concentrate on the interpretation of *ziji* which is subject to binding conditions.

## 5. INTERPRETATION OF REFLEXIVES IN THE CONTROL SENTENCES

In English, the subject of an infinitival clause may be a non-overt pronominal referred to as PRO, which is often characterized as [+anaphor, +pronominal]. It is [+anaphor] because it is co-referential with the preceding NPs in the matrix clause, as shown by the following examples:

- (18) a. John<sub>i</sub> threatened [ PRO<sub>i</sub> to kill himself<sub>i</sub> ].  
 b. \* They<sub>i</sub> threatened [ PRO<sub>i</sub> to kill himself<sub>i</sub> ].

These examples seem to indicate that PRO must be bound. But PRO is not a full-fledged anaphor, as it cannot be truly bound; otherwise, the grammar will wrongly rule in cases like (19) which contains a bound PRO:

- (19) \* John<sub>i</sub> saw pictures of PRO<sub>i</sub>.

When PRO behaves like an anaphor in being co-referential with a preceding NP, the relation is known, in terms of the Control Theory (Chomsky 1981), as one of obligatory control. (18b) is ruled out not by the Control Theory, since PRO can in effect be co-referential with the subject NP *they*. The sentence is barred by the Binding Theory. The reflexive *himself* fails to agree with its antecedent PRO in  $\Phi$ -features. The former is singular, while the latter, being controlled by the matrix subject *they*, is plural. In general, the controller of PRO may either be the subject (Subject Control) or the object (Object Control) depending on the verbs' subcategorization feature.

PRO is [+pronominal] because in certain situations it behaves like a pronoun, i.e., it is not bound. Consider the example in (20):

- (20) The troops stopped PRO walking in the street at night.

Here the reference of PRO is ambiguous. On the one hand, it may be controlled by the matrix subject *the troops*. In that sense, PRO is anaphoric. On the other hand, its reference is free. It may mean pedestrians at night. Given these two interpretations of PRO, it may mean something on a par with a pronoun. For instance, (20) may be interpreted as (21):

- (21) The troops stopped their walking in the street at night.

The possessive pronoun *their* can refer to the troops or pedestrians at night. Hence, PRO parallels pronouns in this regard.

PRO is an anaphor in the sense that it lacks the potential for independent reference. At the same time, it is like a pronoun in that its antecedent apparently can never be in the same clause. With this dual status, PRO needs to be constrained in order not to violate Conditions A and B of the Binding Theory. A well-known condition on PRO is that it must be ungoverned as stated in the PRO Theorem (Chomsky 1981). The structural distribution of PRO follows automatically from the Binding Theory. The reason is straightforward: if PRO is ungoverned then it is not bound nor free in the so-called governing category, as there isn't one.

## 6. OBSERVATIONS FROM CHINESE

In a recent second language acquisition study, we attempt to compare the interpretation of English and Chinese reflexives by Chinese learners of English. In

this paper, we will present results from the Chinese version of the experiment only. Four groups of subjects were invited who were students from Beijing and Mandarin speaking. The sentences used in the experiment involve control relations as well anaphoric binding, as shown in (22) - (29):

Subject Control Sentences

- (22) Xiao Zhang<sub>i</sub> dayin Xiao Cheng zhaogu ziji<sub>i</sub>.  
Xiao Zhang promise Xiao Cheng take care of self  
'Xiao Zhang promised Xiao Cheng to take care of himself.'
- (23) Lili<sub>i</sub> dayin Yun Yun baohu ziji<sub>i</sub>.  
Lili promise Yun Yun protect self  
'Lili promised Yun Yun to protect herself.'
- (24) Ping Ping<sub>i</sub> dayin Yao Yao zhunzhong ziji<sub>i</sub>.  
Ping Ping promise Yao Yao respect self  
'Ping Ping promised Yao Yao to respect herself.'
- (25) Xiao Wang<sub>i</sub> dayin Xiao Li yuanliang ziji<sub>i</sub>.  
Xiao Wang promise Xiao Li forgive self  
'Xiao Wang promised Xiao Li to forgive himself.'

Object Control Sentences

- (26) Xiao Li<sub>i</sub> jiao Xiao Zhang<sub>j</sub> yuanliang ziji<sub>i/j</sub>.  
Xiao Li ask Xiao Zhang forgive self  
'Xiao Li asked Xiao Zhang to forgive himself.'
- (27) Lili<sub>i</sub> yao Ping Ping<sub>j</sub> zhaogu ziji<sub>i/j</sub>.  
Lili yao Ping Ping zhaogu self  
'Lili wanted Ping Ping to take care of herself.'
- (28) Yao Yao<sub>i</sub> yunxu Yun Yun<sub>j</sub> piping ziji<sub>i/j</sub>.  
Yao Yao allow Yun Yun criticize self  
'Yao Yao allowed Yun Yun
- (29) Lili<sub>i</sub> mingling Xiao Zhang<sub>j</sub> zhunzhong ziji<sub>i/j</sub>.  
Lili order Xiao Zhang respect self  
'Lili ordered Xiao Zhang to respect himself.'

To overcome the methodological problems as discussed in the binding research (Finer and Broslow 1986, Eckman 1994), we adopt a different elicitation format in

which we require the subjects to give categorical judgment to both grammatically acceptable and unacceptable antecedents. A sample test item is shown below:

- (30) Xiao Li jiao Xiao Zhang yuanliang ziji. (26)
- a. 'ziji' keyi shi Xiao Li ma? keyi / bu keyi  
(‘Can *ziji* be Xiao Li?’ yes/no)
- b. 'ziji' keyi shi Xiao Zhang ma? keyi / bu keyi  
(‘Can *ziji* be Xiao Zhang?’ yes/no)
- c. 'ziji' keyi shi qi ta ren ma? keyi / bu keyi  
(‘Can *ziji* be another person?’ yes/no)

In order to tap internal consistency of individual subjects in terms of the acceptability of grammatical antecedents, we score the items also in a different way. Scoring is based on a specified response pattern in the form of:

- (i) subject only -- ‘keyi’ to (a), ‘bu keyi’ to (b) and ‘bu keyi’ to (c);  
(ii) subject and object -- ‘keyi’ to (a), ‘keyi’ to (b) and ‘bu keyi’ to (c), and  
(iii) object only -- ‘bu keyi’ to (a), ‘keyi’ to (b) and ‘bu keyi’ to (c).

In the table below, we present the percentage scores of the response patterns from these four groups of Mandarin speaking subjects differentiated by the year of education in Beijing.<sup>1</sup>

Table 1. Interpretation of *ziji* in Chinese Control Sentences

	Interpretation of ‘ziji’					
	SUBJECT CONTROL			OBJECT CONTROL		
	Subject Only	Subject/Object	Object Only	Subject Only	Subject/Object	Object Only
Level 1 (n=46)	75.5	20.7	1.7	31.0	63.6	4.3
Level 2 (n=53)	70.8	21.2	1.0	24.1	69.3	2.9
Level 3 (n=45)	82.2	11.1	4.5	29.5	57.2	10.0
Level 4 (n=31)	81.4	17.0	0.8	20.2	78.2	0.8

The results suggest that the potential binder of *ziji* is typically the matrix subject in the subject control sentences. Note that few of them regard *ziji* as ambiguous between subject and object and the percentage of students choosing object as the only

antecedent is almost insignificant. These results pose no problem to either the Control Theory or the Head Movement Analysis. As discussed above, in English control sentences, the minimal GC of reflexives is the infinitival clause since the syntactic non-overt subject PRO c-commands the reflexive whose governor is the verb preceding it. Likewise, in Chinese, in a subject control sentence like (31) below, the antecedent of *ziji* would be *Xiao Wang* but not *Xiao Li*.

- (31) Xiao Wang<sub>i</sub> dayin Xiao Li [ PRO<sub>i</sub> yuenliang zij<sub>i</sub> ].  
 Xiao Wang promise Xiao Li forgive self  
 'Xiao Wang promised Xiao Li to forgive himself.'

Following the head movement analysis as proposed by Cole and Sung (1994), *ziji* will be adjoined to the INFL of the embedded clause and c-commanded by a controlled PRO, then it is adjoined through COMP to the INFL of the matrix clause. This movement assumes that co-indexation and feature-checking will not take place until *ziji* is adjoined to I of the matrix clause at LF.<sup>2</sup>

The problem emerges when we turn to the object control sentences. The Control Theory predicts that the matrix object is the antecedent of *ziji* in object control sentences. As presented in Table 1, the prediction is not borne out; as just about 0.8% to 10% of the subjects regard the object as the only antecedent of *ziji*. In fact, around 25% to 30% of the subjects in our experiment select subject as the only possible antecedent in object control sentences; and around two third of them regard *ziji* as ambiguous between subject and object. Clearly, the Control Theory fails to account for such ambiguity as only the object, not the subject, is the controller of PRO, hence the potential binder of *ziji*. As in (32) below, if Control is restricted to the local domain, only *Xiao Zhang* but not *Xiao Li* would be the potential binder of *ziji*.<sup>3</sup>

- (32) Xiao Li<sub>i</sub> jiao Xiao Zhang<sub>j</sub> yuanliang zij<sub>i/j</sub>.  
 Xiao Li ask Xiao Zhang forgive self  
 'Xiao Li asked Xiao Zhang to forgive himself.'

Obviously, this prediction is incorrect, as (32) and the findings above show that both the subject and the object are prominent binders of *ziji*.

On the other hand, the Head Movement analysis is also inadequate unless it assumes that before movement of *ziji* takes place, PRO has already acquired its features through Control relations, because the matrix object cannot be in c-commanding relation with *ziji* while the matrix subject can. When *ziji* is adjoined to the matrix INFL, co-indexation and feature checking will take place, resulting in the

ambiguity in interpretation. In fact, only 20-30% of the subjects select only the subject as the potential binder of *ziji*, as standardly assumed by the Head Movement Analysis and a possible outcome as well by the analysis.

In sum, we observe in our data that there is heavy subject orientation in the interpretation of *ziji* in Chinese control sentences, which cannot be adequately explained by the Control Theory or the Head Movement Analysis. In what follows, we propose to examine this phenomenon from the perspective of Predication Theory. We argue that the matrix object in object control sentences forms a secondary predicate with the object base generated in the Spec of VP as an internal subject.

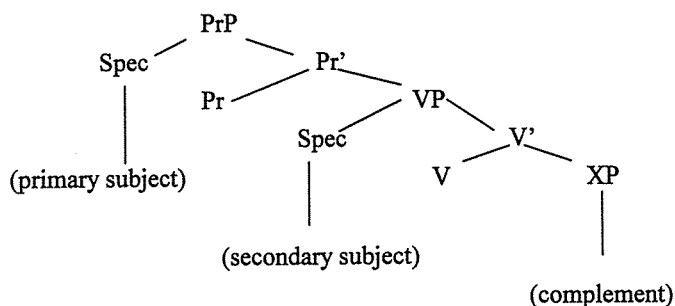
## 7. A PREDICATION ACCOUNT OF THE CHINESE ZIJI

In the course of developing a general theory of predication, Bowers (1993) argues for a new functional category, PrP, which is assumed to exist between I and V, or as a complement to V and has the following properties: <sup>4</sup>

- (i) The canonical D-structure position for external arguments is [Spec, Pr];
- (ii)  $Pr^{\circ}$  selects the maximal projection YP of a lexical category Y ( $Y=V/P$ )
- (iii) Either PrP is selected by I, or it can be subcategorized as a complement by V;
- (iv) The semantic function of Pr is predication.

A formal representation of PrP is given below:

### (33) The Internal Structure of PrP



The external argument is generated in [Spec, Pr], the internal argument (the canonical direct object) in [Spec, V], and the complement (oblique object or a secondary predicate) internal to V. To satisfy the  $\theta$ -role assignment, V must be raised

obligatorily by head to head movement into the Pr position so that theta-roles can be assigned to the primary subject locally and through Spec-head agreement. Nominative case is assigned by I through Spec-head agreement. The primary subject assumes overt movement from Spec of Pr to [Spec, I]. The secondary subject receives structural case from V by being governed by V through V-raising to Pr. The predication relation thus holds between the verb and the external argument in [Spec, Pr], the secondary argument in [Spec, V], and the complement of V.

Bowers also argues for a certain parallelism between the subject and object relation, both structurally and semantically. What he refers to as the secondary subject is the traditional direct object. According to Bowers, it is an internal argument generated in [Spec, V] and in a c-commanding relation with V in the clause, similar to the position of subjects in [Spec, Pr] after V raising. Further parallelism may be found, namely, both primary and secondary subjects are assigned structural case and are possible theta-positions, and they can agree with the verb.

One advantage of associating the subject and object with projections of different categories, Pr and V respectively, is that one can differentiate the semantic properties of PrP from those of VP. A PrP is a complete functional complex (CFC), standing on its own as a complete 'information unit' or a proposition assigned with truth values of its referents, whereas the transitive VP is only a property, following Chierchia and Turner (1988).

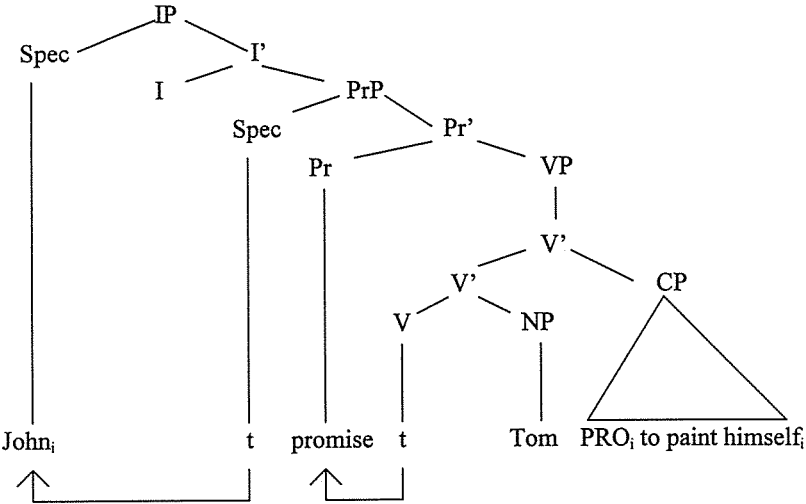
It has been observed in the literature that transitive subject control verbs do not passivize whereas transitive object control verbs do, which is known as Visser's Generalization, as in (34) and (35):

- (34) a. John<sub>i</sub> promised Tom [ PRO<sub>i</sub> to paint himself<sub>i</sub> ].
- b. \* Tom was promised by John<sub>i</sub> [ PRO<sub>i</sub> to paint himself<sub>i</sub> ].
- (35) a. John persuaded Tom<sub>i</sub> [ PRO<sub>i</sub> to paint himself<sub>i</sub> ].
- b. Tom<sub>i</sub> was persuaded by John [ PRO<sub>i</sub> to paint himself<sub>i</sub> ].

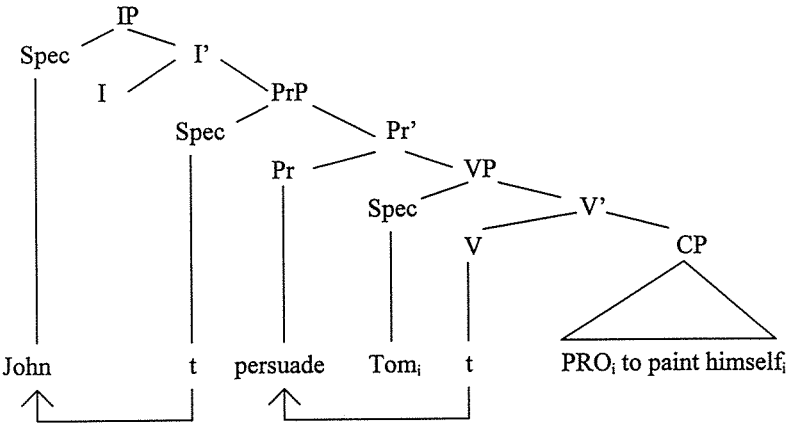
To account for this asymmetry, Bowers argues that the apparent object of subject control verb is the complement of V whereas the object of the object control verb is a true direct object based generated in [Spec, V]. In other words, only true direct object generated in [Spec, V] can undergo passivization and A-movement is thus restricted to Spec-to-Spec movement. Furthermore, if PRO is said to be controlled by the nearest c-commanding NP, it follows that the controller of subject control is the primary subject in [Spec, P] while that of object control is the secondary subject in [Spec, V]. This, according to Bowers, is an instance of subject-oriented predication. Control relation, as well as passivization patterns in control verbs, can, therefore, be

accounted for on a unified structural basis. The structural representation of these two control constructions are presented in (36) and (37), respectively.

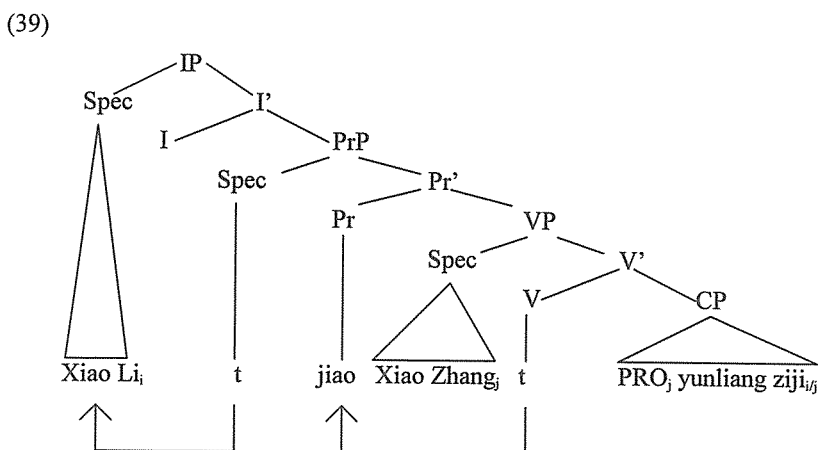
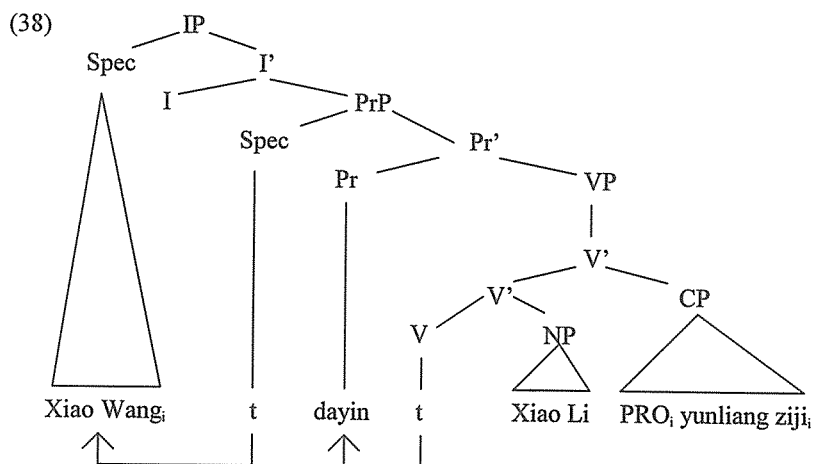
(36) Subject Control



(37) Object Control



In Chinese, the subject and object control sentences as shown in (31) and (32) will then have the following structures:



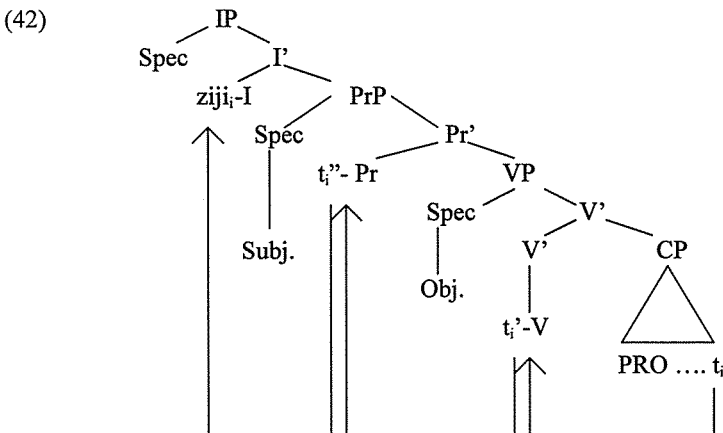
In (38), since the apparent object *Xiao Li* of the subject control structure fails to c-command PRO by virtue of being in the complement of VP position, it cannot be the controller of PRO and in turn the binder of *ziji*. On the other hand, in (39), the direct object *Xiao Zhang* of the object control structure occupies a position asymmetrically c-commanding the V' complement, CP, and the constituents under it. This partially explains why both the subject and the object, i.e., the primary subject and the secondary subject in Bowers' terms, can be the antecedents of *ziji* in (39) since both

of them c-command PRO which subsequently binds *ziji*, in contrast with the object *Xiao Li* in (38).

With regard to *ziji*, we would like to propose that it is base-generated as the complement of V but not in [Spec, V] since [Spec, V] is restricted to passivizable objects and reflexives cannot by default be passivized, as reflected in the following examples:

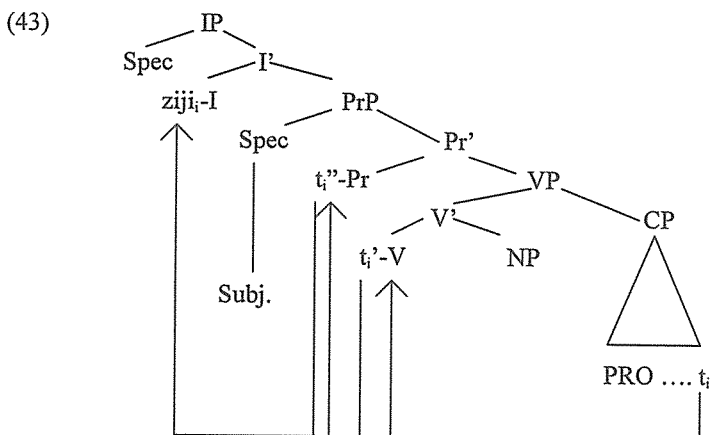
- (40) a. Tom expects himself to win.  
 b. \* Himself is expected (by John) to win.
- (41) a. Tom promised himself a break after the test.  
 b. \* Himself was promised (by Tom) a break after the test.

Clause types should not affect the range of antecedent for LD reflexive interpretation since Chinese COMPs are, as argued in Sung and Cole (1991), not specified for [+/-indicative], hence not a barrier for head movement. As the complement of V, *ziji* undergoes LF head to head movement first adjoining to V, Pr and I of its own clause, and finally to V, Pr and I of the next clause up.<sup>5</sup> Crossing PrP should not constitute a violation of the Head Movement Constraint since I L-marks PrP.<sup>6</sup> In other words, although PrP is a functional category, it is not a barrier to government since the head Pr becomes lexical via V-raising and it L-marks VP. While we posit an additional category for NP-adjunction, feature checking through Spec-head agreement as postulated in Sung and Cole is consistently observed at every adjunction site throughout the derivation. See (42) below for the structure involving an object control PRO.



PRO, we argue, is generated in [Spec, I] in the embedded clause [CP], since V-raising to Pr may render PRO being head-governed if generated in [Spec, V]. Details aside, in (42), the movement of *ziji* is one of adjunction. It starts in the embedded clause and first adjoins to the head position of the V, then to that of Pr, and subsequently to that of I. When *ziji* is adjoined to I in the embedded clause, feature checking between PRO and *ziji* may take place.<sup>7</sup> Further adjunction of *ziji* to V of the next clause up will enable feature checking between the direct object (Obj.) of the object control verb generated in the matrix [Spec, V] and *ziji*.<sup>8</sup> *ziji* continues its adjunction to the matrix Pr and to I, as V-raising from V to Pr to I by substitution makes Spec head relation possible. *ziji* can eventually check features with the matrix [Spec, I].

Consider also (43) for the structure involving a subject control PRO:



As indicated in (43), *ziji* is raised through a subject control construction. After feature checking between PRO and *ziji* at the lower clause, it will move directly to V. But since the object of the subject control sentence is a complement of V, i.e., [NP], there is no Spec-head relationship between the NP and *ziji*. As a result, feature checking will not take place. *ziji* further raises to adjoin to the matrix Pr and then to I, and feature checking will eventually take place between [Spec, I] and *ziji*.

## 8. SOME FINAL REMARKS

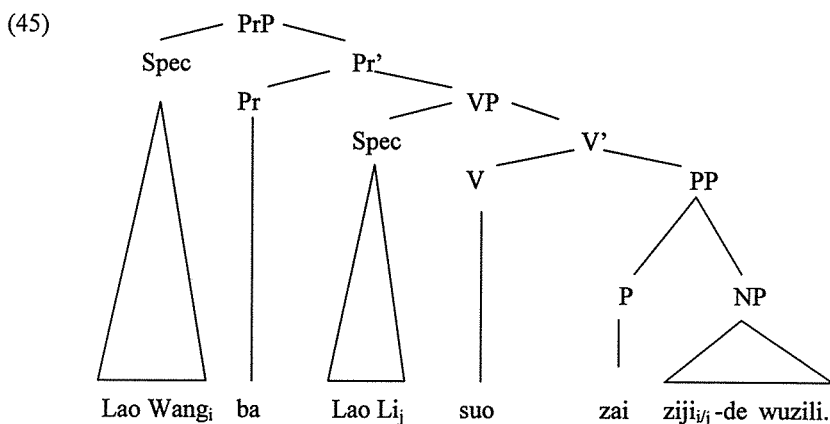
Given these structural analyses, coupled with the fact that Chinese allows long distance anaphoric binding, the answer to the puzzles in (32) and the strong tendency of both subject and object orientation in interpreting *ziji* of the so-called object control

sentences in Chinese becomes straightforward. The direct object, having a structural status of a secondary subject, naturally participates in control relation with PRO as well as binding relation with *ziji*. It is not long distance control, but long distance binding that renders the difference between the English sentences in (35b) and the Chinese sentences in (32).

Extending the present analysis to the cases raised by Chen (section 4, (12)), we can see that these cases can be well subsumed under subject orientation of the Binding Theory. We repeat them in (44) for convenience:

- (44) a. Lao Wang<sub>i</sub> ba Lao Li<sub>j</sub> suo zai *ziji*<sub>i/j</sub> -de wuzili.  
 Lao Wang BA Lao Li lock at self's house  
 'Lao Wang locked Lao Li inside his own house.'  
 b. Lao Wang<sub>i</sub> bei Lao Li<sub>j</sub> suo zai *ziji*<sub>i/j</sub> -de wuzili.  
 Lao Wang BEI Lao Li lock at self's house  
 'Lao Wang was locked up in his own room by Lao Li.'

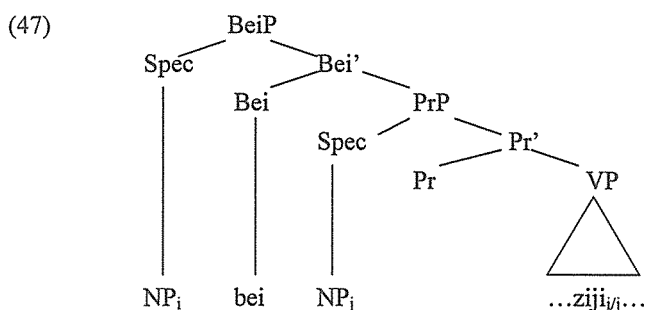
In (44a), if *ba* marks the direct object NP, then it may well be the case that *ba* designates the Pr in the Chinese syntax. In the presence of *ba*, the verb does not assume overt raising to Pr. The direct object NP *Lao Li*, being the secondary subject of the sentence, c-commands the reflexive in the complement phrase *ziji de wuzi-li*, hence a valid binder of *ziji*. The primary subject NP *Lao Wang* is also a binder of *ziji*, as expected:



As for (44b), assume that the passive maker *bei* heads its own phrasal projection and selects a PrP. This can be evidenced by the following example where *bei* precedes *ba*:

- (46) Lao Li bei Lao Wang ba yachi da dao le.  
 Lao Li BEI Lao Wang BA teeth hit fall asp  
 (Lit.) 'Lao Li was hit by Lao Wang and as a result he (Lao Li) lost his teeth.'

The structural configuration of (44b) can therefore be something along the line of (47). The NPs in the specifier positions of the BeiP and the PrP can both serve as binders of *ziji*:



The present analysis also explains why in a double object construction such as (7) seen in section 2, *ziji* exhibits "subject orientation". *Yin Yin* in (7) is an indirect object, presumably base generated in the complement position of VP, rather than in the specifier position of VP, hence failing to be a potential binder of *ziji* contained in the direct object *yi ben guanyu ziji de shu* "a book about oneself". We assume that (7) involves a derived structure where the preposition *gei* "to" is incorporated into the verb *song* "give" and the indirect object *Yin Yin* subsequently moves into a higher position as a result of preposition incorporation. If our assumption is on the right track, the failure of the indirect object to bind *ziji* in (7) indicates that some kind of LF reconstruction (for instance, Huang 1993) is being operative here, complying with the view that the Binding Theory applies at LF rather than at overt syntax (Chomsky 1993, 1995).

## NOTES

\* The original version of this paper was read at the LSHK Syntax and Semantics Workshop held at City University, 1994. We thank the audience there for their comments. We would like to express our gratitude to an anonymous reviewer whose comments and suggestions have been incorporated into the final version of the paper. We are solely responsible for the remaining errors.

<sup>1</sup> The year of education as a way of dividing the students up is not at issue in the Chinese test but useful when analyzing the English test.

<sup>2</sup> Recently, Pan (1997) argues that PRO is already coindexed with the controller at D-structure and therefore will not be deleted at LF. Any further movement beyond the infinitival clause would appear to be vacuous since Binding Condition A already predicts the anaphoric relation between the matrix subject and PRO, a consequence of the Control Theory.

<sup>3</sup> Therefore, the second movement analysis is necessary in order to explain why the matrix subject is also a potential binder. However, a problem exists with this movement analysis. The fact that the lower I with  $\Phi$ -features acquired will render a violation of the PRO-theorem since I may become a governor of PRO, a violation of Condition A of the Binding Theory. It is based on the assumption that number is also an instantiation of AGR, together with person. Therefore the following control sentence may also pose problem to the head movement analysis:

- (i)  $Ta_i$  quan             $tamen_j$      $yuenliang$      $ziji_{*i/j}$   
       he persuade        them        forgive       self

‘He persuaded them to forgive themselves./He persuaded them to forgive him.’

If person is the only requirement for  $ziji$  [+3<sup>rd</sup> person], further movement is possible since there is no person conflict between the binder  $ta$  and  $tamen$ .

<sup>4</sup> Bowers’ proposed predication structure is also seen as an attempt to resolve the asymmetry in terms of the X-bar internal structure between the main clause and the small clause construction.

<sup>5</sup> We take no position as to whether or not reflexives move directly from I to C, as suggested by Katada (1989). Following Cole and Sung (1994), movement via head of maximal projection may be necessary in order to meet the requirement of the Head Movement Constraint.

<sup>6</sup> The Head Movement Constraint stipulates that A head X can move into a head Y only if Y governs XP.

<sup>7</sup> We maintain that PRO is controlled at both D- and S-Structure.

<sup>8</sup> Although Spec-head agreement is generally taken to occur between [Spec, I] and I, we assume that Spec-head agreement is not only morphological but may also be semantically driven.

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# TRIGGERING THE UNLEARNING OF NULL ARGUMENTS IN SECOND LANGUAGE ACQUISITION

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## 1. INTRODUCTION

An assumption underlying the UG approach to language acquisition is that the attainment of the target grammar by the learner is the result of an interaction of UG with the linguistic data he or she is exposed to. Then one of the crucial issues that follows is to determine which data, given a particular property or parameter of the target language, can trigger the acquisition or fixing of this property or parameter. In other words, 'what kind of linguistic experience is crucial in revealing the characteristics of the target property or the parameter? The issue of triggering data has received considerable attention in the domain of first language acquisition, as in Hyams (1986) and Lightfoot (1992), among others. It has been argued that, in order to determine certain parameter values of the target language, the child will rely on some specific structures which reveal the nature of those values. A consensus in the field is that triggers constitute a subset of the learner's total linguistic evidence and are highly specific, relatively simple, and readily available to the learner.

This report is a preliminary study on the triggering issue in second language acquisition. It examines whether the triggers identified in the unlearning of null arguments in the L1 acquisition of English, namely, INFL and English expletives, are utilized by Chinese L2 learners of English in their unlearning of null arguments in the interlanguage development.

## 2. NULL ARGUMENTS IN LANGUAGE ACQUISITION AND THE TRIGGERING EXPERIENCE

Studies of the null argument phenomenon within the UG paradigm have resulted in a rich body of observation concerning the nature of null arguments. Various

formulations of the relevant parameters in UG have been proposed to capture this cross-linguistic phenomenon, among which are the null subject parameter (Chomsky 1981; Rizzi 1982; Saleemi 1992), the AGR/PRO parameter (Hyams 1986), the Morphological Uniformity Hypothesis (Jaeggli and Hyams 1988; Jaeggli and Safir 1989) and the Null Argument Parameter (Lillo-Martin 1991). The research on the null argument issue in first language acquisition within GB framework was pioneered by Hyams (1986). Studies of this kind have helped to explain the child language development as well as provided psychological basis for theoretical formulations. They show that null arguments appear at the initial stages of first language development regardless of whether the target language allows null arguments such as Italian, Spanish, Dutch, Chinese, or disallows null arguments such as English, German and French (Clashen 1991; Hyams 1986, 1992; Man 1992; Nakayama 1994; Wang et al 1992; Weissenborn 1992). They also show that for children learning a language prohibiting null arguments, although there is a period during which null arguments occur in their early grammar, such elements will finally disappear. A question immediately arises: how do null arguments get unlearned? For our purpose, we would briefly sketch Hyams' (1986) explanation and the Morphological Uniformity account.

In accounting for the unlearning of null subjects in the L1 acquisition of English, Hyams appeals to the 'expletives-as-trigger' hypothesis. Based on the observation that null subjects decrease with the emergence of English expletives in the child's production data, she argues that the existence of overt expletives in English which have only purely grammatical functions would indicate to the child that lexical subjects in English are obligatorily overt, hence leading to the change for the correct value of the parameter.

Under the Morphological Uniformity Hypothesis (Jaeggli and Hyams 1988, Jaeggli and Safir 1989), null subjects are licensed by morphological uniformity and identified by rich agreement (as in Italian and Spanish) or by topic or involving control (as in Chinese). It follows that once the English-learning child learns the properties of the English inflectional system and realizes its weak nature, he or she will retreat from the null-subject grammar. That is to say, INFL will trigger the shift from [+null subject] to [-null subject]. This prediction is borne out by the fact that when the child begins to use inflectional markers, there is a decrease in the use of null subjects.

The investigation into the null argument phenomenon in first language acquisition has found its parallel in the second language acquisition context (White 1985b, 1986; Hilles 1986, 1991; Liceras 1988; Chen 1988; Yuan 1993). Most of previous attempts focus on the clustering properties associated with the relevant parameter. Studies on the triggering issue include Hilles (1986, 1991) and Lakshmanan (1994), which have researched on the relationship between the development of expletives, that of verbal inflections, and the unlearning of null subjects. The results from such studies, however, haven't yielded a clear picture of the triggering status of expletives and INFL in L2 acquisition, at least in adult L2 acquisition. Considering the significance of the triggering issue in UG-based research, Eubank once claims that '... such data must be considered when the question of learning is brought up, since without them, one would be left with a potentially excellent theory of grammar, but one that is potentially unlearnable.' (1991:17) We believe that studies along the lines of Hilles and Lakshmanan will have important implications for the status of UG in L2 acquisition.

### 3. RESEARCH PREDICTIONS

Concerning null arguments and related structures, one may find sharp contrasts between Chinese and English. Firstly, in terms of null arguments, Chinese permits both null subjects and null objects while English allows neither. It has been argued that this is due to the topic-oriented properties of the two languages (Huang 1982, 1984; Li and Thompson 1981). Secondly, Chinese fails to exhibit AGR and TENSE, but English has an overt INFL system, albeit weak. Lastly, Chinese doesn't show lexical expletives<sup>1</sup> while English, as a subject-predicate language, is characteristic of lexical expletive.

Following White (1985a, 1985b), Hilles (1986), and Flynn (1987), we assume that the L2 learners are guided by UG via the L1. In other words, the L2 learner will start from the L1 values and later switch to the target values when exposed to the triggering experience.<sup>2</sup> Therefore, we make the following predictions:

- a. The Chinese L2 learners of English will be expected to use both null subjects and null objects at the initial stages of their interlanguage development.

- b. If INFL as well as English expletives act as triggers indicating the correct values of the L2 grammar, a correlation should exist between the development of these two structures and the unlearning of the null arguments in the Chinese learners' interlanguage development. That is to say, when the learners have acquired INFL and/or expletives, they are likely to retreat from using null arguments.

#### 4. PROCEDURE

The subjects involved in the study were 119 Chinese-speaking students learning English as a foreign language in a typical classroom environment. Of them, 60 were middle-school students and 59 were college students. They were divided into four levels of proficiency based on the results of a standardised proficiency test and the number of years of instruction received. These subjects constituted the experimental groups. The distribution and background information of the subjects is given in Table 1. Apart from the experimental groups, 18 native speakers of English also participated in the study as controls.

Table 1 Background Information for the Subjects by Proficiency Level  
(in mean unit)

Prof Level	Level 1	Level 2	Level 3	Level 4
Number	30	30	30	29
Grade	Junior 2	Senior 1&2	College 1	College 2
Prof. score	11.4	26.4	44.1	65
Years EFL*	2	4.5	7	9

\* years of learning English as a foreign language in the formal context

All the subjects were asked to perform three written tasks: the timed grammaticality judgment, sentence error correction (i.e., correcting the ungrammatical sentences) and discourse error correction. Task 1 and 2 included both grammatical (as controls) and ungrammatical sentences (as test items) in randomized order. Task 3 required the subjects to correct errors in 4 short passages. Examples of test items are given in Table 2.

As can be seen from Table 2, under the category of 'Null Expletives', we have three subcategories, namely, *there*, *weather it*, and *raising it*. Our purpose in splitting the expletives into three subcategories is to see whether the three types of expletives

have the same status as the triggering experience in Chinese L2 learners' interlanguages.

The three written tasks were presented to the subjects in one test. Level 3 and 4 subjects

Table 2 List of Sample Test Sentences by Category

Categories	Examples
<u>I. Null subjects</u> 1. in matrix sentence  2. in embedded sentence	1) Jimmy has bought a new computer. <i>e</i> is made in America. 2) After he had finished his job, <i>e</i> went home.  3) They thought this girl was my sister. However, I told them <i>e</i> was my friend. 4) He gave me a call as soon as <i>e</i> got home. 5) Mike said <i>e</i> hated Alice.
<u>II. Null objects</u> 1. in matrix sentence  2. in embedded sentence	6) He's bought a new car. He really loves <i>e</i> .  7) This is really a good film. I think you should go to see <i>e</i> . 8) I don't have the book now because someone has borrowed <i>e</i> . 9) The thieves thought nobody would recognise <i>e</i> .
<u>III. Null Expletives</u> <i>there</i> 1. in matrix sentence  2. in embedded sentence  <i>weather it</i> 1. in matrix sentence 2. in embedded sentence  <i>raising it</i> 1. in matrix sentence 2. in embedded sentence	10) <i>e</i> is perhaps no life on the moon. 11) If you get there late, <i>e</i> will be nothing to eat. 12) People in this city are afraid <i>e</i> may be more rain in a few days. 13) Trees will stop growing if <i>e</i> is no sunshine.  14) <i>e</i> is going to rain. Don't go out. 15) I think you should leave now because <i>e</i> is too late.  16) <i>e</i> seems that he is good at singing. 17) He says <i>e</i> seems that Mary is unhappy.
<u>IV. INFL</u>	18) He work in a hospital in Beijing in 1980. 19) Peter and his sister was very young when their mother died. 20) The cat is looking for meat when I got home from school yesterday.

finished the test within one hour while Level 1 and 2 subjects spent a longer time on the test. Native speakers of English reported that they spent approximately half an hour on the test.

## 5. RESULTS

### 5.1. *Null Elements in the Interlanguages of Chinese Learners of English*

As stated earlier, we predict that Chinese L2 learners of English transfer null elements to their L2 grammar. That is, at the initial stages of their interlanguage development, they allow null elements, which are prohibited in English. To test this prediction, we may look at whether our subjects can recognize the ungrammaticality of null elements in English. Their failure in doing so should provide evidence supporting our prediction.

#### 5.1.1. *Null Subjects and Null Objects*

Figure 1 displays the subjects' mean performance on the rejection of sentences with null subjects and null objects. It shows that the subjects at Level 1, 2 and 3 accepted sentences with null subjects and null objects to some degree. Level 4 subjects' performance was almost on a par with that of the native control group in terms of the rejection of null subjects and objects.

There were significant group differences in the performance on the rejection of null subjects and null objects (One-way ANOVA: Null subjects,  $F_{\text{ratio}}=70.40$ ,  $F_{\text{prob}}=.0000$ ,  $D.F_{\text{total}}=136$ ; Null objects,  $F_{\text{ratio}}=115.74$ ,  $F_{\text{prob}}=.0000$ ,  $D.F_{\text{total}}=136$ ). The SCHEFFE test shows no significant difference between the Level 4 data and native data. Obviously Level 1 and Level 2 learners were poor at rejecting null subject and objects. They tended to accept more null pronouns than those at higher levels of proficiency. An interpretation of this would be that the null argument forms the initial hypothesis of the L2 grammar. The target-like performance of Level 4 subjects indicates that the learners will gradually abandon the use of null pronouns. These findings are consistent with our predication. This again confirms what has been observed in the L2 acquisition of English by Chinese learners in previous studies (Yuan 1993, Chen 1988).

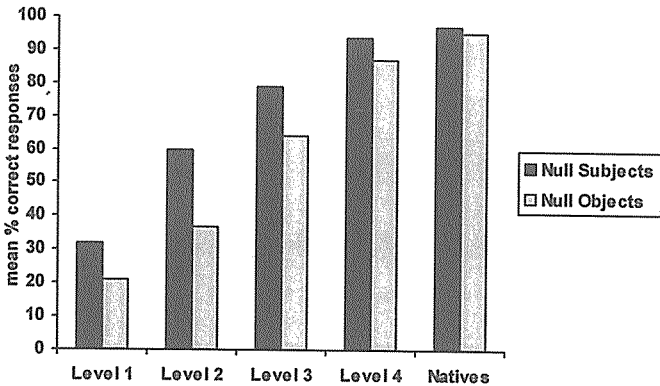


Figure 1 Mean Performance in Rejecting Null Subjects/Objects

### 5.1.2. *Null Expletives*<sup>3</sup>

In addition to null subjects and null objects, our subjects were also found to omit expletives, as shown in Figure 2. The subjects' performance in rejecting null expletives shows a gradual improvement. Low level subjects, especially those at Level 1, had more difficulty in rejecting null expletives, whereas the higher level subjects were better in doing so. The differences among groups are significant (One-way ANOVA:  $F_{\text{ratio}}=84.5$ ,  $F_{\text{prob}}=.0000$ ,  $D.F_{\text{total}}=136$ ), with no significant difference found between native performance and Level 4 subjects' performance. This suggests that, similar to their response to null subjects/objects, the learners also permit null expletives at the initial stages of interlanguages and will gradually retreat from using them. In addition, if the learners' performance is examined carefully, it can be found that even low level subjects do not have much difficulty in acquiring English expletives, and Level 2 learners had achieved more than 60 % accuracy in rejecting null expletives. This implies that English expletives don't pose much difficulty for Chinese learners and can be acquired at relatively early stages. Then the question becomes why it is the case since English expletives have got no counterparts in Chinese. This is one of the issues that we will address in the discussion.

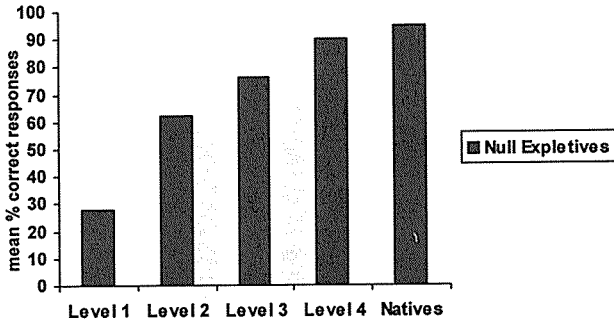


Figure 2 Mean Performance in Rejecting Null Expletives

So far the results show that Chinese learners use null subjects/objects initially and tend to retreat from them later. The report that follows will suggest how and why the unlearning of null arguments is made possible.

### 5.2. *INFL and Null Subjects*

We have predicted, based on L1 acquisition studies, that INFL might also be connected with null subjects in the L2 acquisition of English by Chinese learners of English. Consequently one would expect to find a positive correlation between the acquisition of INFL and the unlearning of null thematic subjects: when INFL in English is acquired, the learner will tend to use overt subjects. For our data, therefore, the rejection of incorrect inflection is expected to be correlated with that of null subjects.

As Table 3 reveals, INFL is significantly correlated with null subjects at Level 1 and Level 2, but it is not so at the two higher levels. The correlation between INFL and null subjects diminishes as the subjects' level of proficiency improves. No one is likely to take such a result as evidence supporting our predication. Rather one possible explanation for this is that the acquisition of INFL and the unlearning of null arguments may be two independent issues in the interlanguage development.

Table 3 Correlations between the rejection of null subjects and incorrect INFL by level

	Level 1	Level 2	Level 3	Level 4
Correlations	.7079**	.4470*	.2838	.1562
1-tailed Signif: * - .01 ** - .001				

English INFL appears to be a late-acquired aspect of grammar for Chinese learners. Figure 3 shows that the learners at Level 4 still had problems with INFL, but they behaved just like the native speakers concerning the rejection of null subjects. Why INFL is difficult for Chinese learners is not clear, but it seems that the difficulty in learning English INFL is experienced by other L2 learners of English. Although it has been attested that INFL is important in unlearning null subjects in L1 acquisition, our data indicates that this is not true in the interlanguage development of Chinese L2 learners. Thus learners will probably rely on earlier acquired structures as triggering experience, such as expletives.

Superficially, the two variables are correlated for Level 1 and 2. We believe INFL happens to be correlated with null subjects at this stage because subjects at these two levels are at the initial stage of interlanguage development and have problems with both null subjects and INFL.

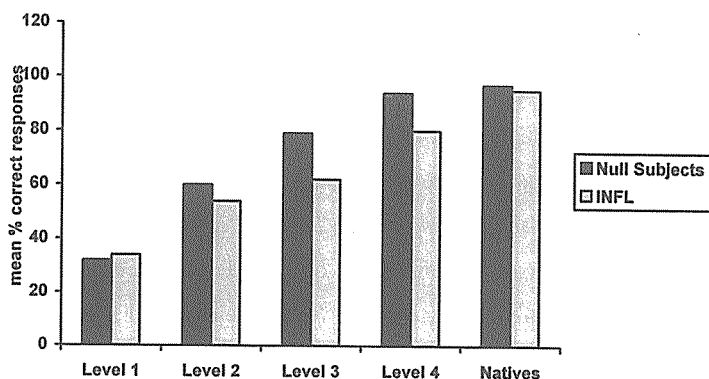


Figure 3 Mean Performance in Rejecting Null Subjects and Incorrect INFL

### 5.3. Expletives and Null Arguments

Hilles (1986) has reported that null subjects began to decrease after lexical expletives appeared in her L2 learners' interlanguage. If expletives are a trigger causing change,

we would expect our subjects to reject null expletives at the same time (or prior to the time) they reject null arguments. As Figure 4 and Table 4 show, while subjects are generally more accurate in rejecting null expletives, the two variables, the rejection of null expletives and that of null arguments (null subjects and null objects), are highly correlated at each level. Our prediction thus gains support.

Table 4 Correlations between the rejection of null expletives and null arguments by level

	Level 1	Level 2	Level 3	Level 4
Correlations	.7146**	.7222**	.5792**	.6215**
1-tailed Signif: * - .01 ** - .001				

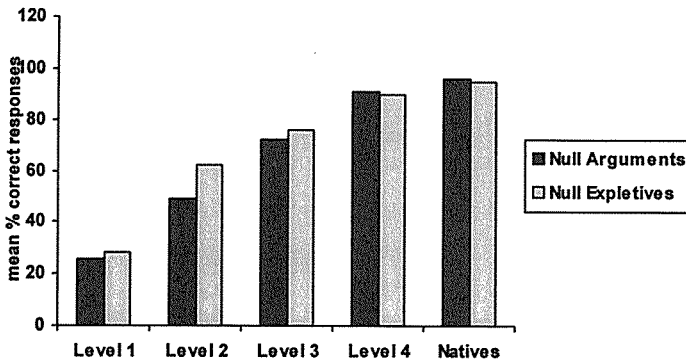


Figure 4 Mean Performance in Rejecting Null Arguments and Null Expletives

What is revealing is that, when expletives are split into three types, the rejection of missing *there*, and *weather it* are still highly correlated with the rejection of null arguments, but not for missing *raising it* (See Table 5). In addition, when we compare the learners' performance on the three types of expletives, as presented in Figure 5, we notice that they generally have problems with the rejection of *raising it*.<sup>4</sup> Hence it is clear that the three types of expletives do not have the same status as the triggering experience.

Table 5 Correlations between the rejection of null arguments and three types of null expletives

	Level 1	Level 2	Level 3	Level 4
There	.6251**	.6750**	.6136**	.6312**
Weather It	.7378**	.7801**	.5057**	.7272**
Raising It	.2564	.4604	.3897	.3683
1-tailed Signif: * - .01 ** - .001				

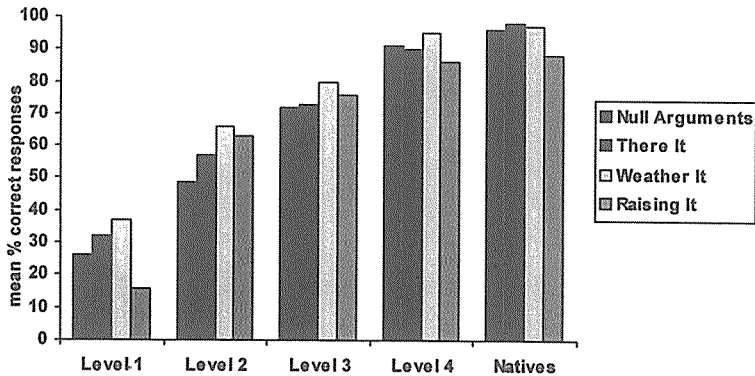


Figure 5 Mean Performance in Rejecting Null Arguments and Three Types of Null Expletives

These findings show that Hyams (1986) is right in pinpointing the expletives as a trigger in the acquisition of English. The fact that *raising it* does not correlate highly with null arguments as *there* and *weather it* do indicates that the "expletives-as-trigger" issue is more complicated than we expect. We will address this issue in more detail in the following section.

## 6. DISCUSSION

It is clear from the results presented above that expletives are more likely to serve as potential triggering experience in the unlearning of null arguments by Chinese learners of English. However, two problems remain to be solved, which are the concerns of this section: (a) why English expletives can stand out as a potential trigger in the unlearning of null arguments by Chinese learners, and (b) why different types of experience exhibit different behavior as the triggering experience.

### 6.1. Expletives as Triggering Experience

As has been mentioned earlier, Chinese has no lexical expletives. However, this does not mean that Chinese is void of expletives. If Chinese observes the Extended Projection Principle (EPP) that requires that every clause have a subject (Chomsky 1981), then, for the sentence in (1), one would expect that the subject positions of

these sentences are filled by null expletives in the way lexical expletives fill in the subject positions in the corresponding English sentences.

- (1) a. *e* you yi ge ren zai wu li  
           have one CL man at room inside (CL = classifier)  
       "There is a man in the room."
- b. *e* xia yu le  
           fall rain LE (LE = aspect marker)  
       "It is raining."

In addition, there are arguments independent of the EPP that null expletives do indeed exist in Chinese (Gao et al, 1994)<sup>5</sup>. If this is the case, Chinese learners of English have already tapped the concept of expletives in acquiring the L1 Chinese. Thus the task of acquiring lexical expletives in English would be relatively easy. This explains why even our low level subjects do not have much difficulty in rejecting null expletives. However, as Chinese is characteristic of null expletives, the learners may assume that it is so in English, resulting in their acceptance of null expletives in their early L2 grammars.

Following Hyams (1986), we assume that the lack of overt lexical expletives in Chinese may be a result of the interaction of its topic-oriented property and a specific pragmatic principle: the Avoid Pronoun Principle (Chomsky 1981, Hyams 1986). As a topic-oriented language, Chinese allows the omission of subject/objects argument pronouns. When the appropriate discourse context has been established, pronouns are usually omitted unless they are used to emphasize, contrast, change topics, etc. In Li and Thompson's (1981) words, such overt pronouns in the discourse context are used to 'highlight'.<sup>6</sup> By the Avoid Pronoun Principle, lexical pronouns are avoided when they are not needed for pragmatic reasons, such as emphasis, contrast, change of discourse topic. It then follows that lexical expletive pronouns, which are not used for any of the pragmatic reasons, do not exist in Chinese. Given that lexical expletives occur in English, a language prohibiting null arguments, they may serve as a special kind of triggering evidence that English is distinct from Chinese (i.e. there is a gap between English and Chinese) with respect to the null argument property.

## 6.2. Differences between 'raising it' and 'there', 'weather it'

Now we will turn to the question of why *raising it* is different from the other two expletives, *there* and *weather it* as potential triggering experience.

One possibility is related to the ordered input. It seems that *there* constructions and weather-time expressions are frequently used in the input to the L2 learner. Sentences like *There are 30 students in the classroom* or *It is five o'clock* are among the constructions that are presented to the learners at an early stage. Therefore the L2 learner will probably 'attend' to expletives *there* and *weather it* early. *Seem+clause* structures don't occur as commonly and frequently as *there* constructions and weather-time expressions in the input. Consequently the learner may acquire *raising it* in *seem+clause* constructions relatively later. However, one may ask whether the early occurrence of certain input plays a crucial role in the interlanguage development.

Another possibility is that the different internal syntactic and semantic structures of these expletives contribute to their differences as triggering experience. Although *raising it* is identified as nonreferential just like *there* and *weather it*, there is a discrepancy between the former and the latter two. We will first discuss the difference between the two *its*.

*Weather it* is identified as a quasi-argument because it may control PRO, whereas *raising it* is a nonargument which can not control PRO (Chomsky 1981), as shown by examples (2), (3), and (4).

- (2) It sometimes rains after PRO snowing.
- (3) It is too stormy PRO to last long.
- (4) \* It seems that John was guilty after PRO appearing that he had a strong motive.

In weather-time expressions, both *it* and the predicate are talking about the same thing, weather or time. In other words, although *it* in such sentences is nonreferential, it is in fact underlyingly referring to the weather and time known to the speaker and hearer. However *raising it* does not have this feature.

From the above discussion, it is clear that *weather it* is different from *raising it* in that the former is a quasi-argument and has an underlying referent.

The difference between *raising it* and *there* is characterized by their relation with the postverbal elements, although both are identified as nonarguments, different from quasi-arguments. As we will see soon, *there* is associated with the postverbal elements whereas *raising it* does not appear to be so.

It has been suggested that expletive *there* in English is the target of a movement operation, with the associate of the expletive ( *a man* in (5) and *men* in (6)) moving to the position of the expletive.

(5) There is a man in the room.

(6) There are men in the room.

It follows that a new element combining the relevant features and its associate, [*there, a man*] in (5) and [*there, men*] in (6) is produced, namely 'Amalgamated Expletive'. This is known as the Amalgamated Expletive Hypothesis (Chomsky 1991, Chomsky and Lasnik 1991) or what Shlonsky (1989) calls the Expletive Replacement Hypothesis. The amalgamated expletive or the replacement of expletive by the postverbal NP argument is required by the Full Interpretation (FI), which demands that every element of the LF representation of an expression be subject to interpretation at the interface. Given FI, the LF representation of (5) and (6) is (7) and (8) respectively, with *t* being the trace of the element moved to the amalgamated expletive. Under this analysis, one of the central properties of *there* constructions is that there is an argument, which is usually the postverbal NP, associated with the expletive *there*. Therefore *there* is always closely related to the postverbal NP and inherits its features that agree with the inflected verb. Interestingly enough, *there* constructions indeed have referential analogues like (9) and (10) although they are not as natural as *there* constructions.

(7) [*there, a man*] is *t* in the room.

(8) [*there, men*] are *t* in the room.

(9) A man is in the room.

(10) Men are in the room.

The amalgamated expletive analysis can be easily extended to *it* expletives: i.e., they are associated with the postverbal clauses, and have referential analogues, as shown in (11) and (12) (Chomsky 1991, Shlonsky 1989).

- (11) a. It was decided to travel by plane.
- b. [it, to travel by plane] was decided *t*.
- c. To travel by plane was decided.
- (12) a. It is unlikely that anyone will agree.
- b. [it, that anyone will agree] is unlikely *t*.
- c. That anyone will agree is unlikely.

This analysis, however, fails when it is operated on *raising it* in *seem+clause* structures. For sentence (13), although the LF representation (13b) looks well-formed, (13c) is not a possible S-structure representation. Why (13c) is ill-formed is not clear.<sup>7</sup> However what is clear is that this kind of raising *it*, i.e., *it* in *seem+clause* structures, is not as closely associated with the postverbal element as other expletives are since the replacement of the expletive by the postverbal element does not produce a well-formed sentence.

- (13) a. It seemed that John left early.
- b. [it, that John left early] seemed *t*
- c. \* That John left early seemed.

Following this line of discussion, we can see that although *there*, *weather it* and *raising it* all belong to the category of nonreferential elements, they are not the same in terms of the degree of nonreferentiality. *Weather it* and *there* seem to be less nonreferential because they are either underlyingly referential or closely associated with a postverbal argument. *Raising it* seems to be more nonreferential in that it does not have an underlying referent nor appear to be associated with the postverbal element. If the degree of nonreferentiality indeed distinguishes these expletives, it may have an impact on the acquisition of these structures. The less nonreferential expletives (*weather it* and *there*) should be easier to acquire. This seems to be the case. The expletives that occur in child data in Hyams (1986) are *there* and *weather it*. No *raising it* is reported to appear in early child data. In Hilles' (1986) study, the first

instance of expletives in the child data of learning English as an L2 is *weather it*. Therefore, since *there* and *weather it* are easier to acquire (and may be acquired early), they are more likely to serve as triggers in the unlearning of null arguments in the process of learning English by Chinese learners.

## 7. CONCLUSION

The present study is a preliminary analysis of what structures may serve as the potential triggering experience in the unlearning of null arguments by Chinese learners of English. The results show that the acquisition of INFL is not related to the unlearning of null subjects although it has been argued to be closely connected with the unlearning of null subjects in L1 acquisition. The results indicate that expletives play a crucial role in their unlearning of the null arguments. However, not all expletives have the same status as potential triggers. Among the three types of expletives investigated, *there*, *weather it* may provide triggering experience, but *raising it* does not. We argue that this is due to the semantic and structural differences between the former and the latter. However, at the present stage, it is still too early to draw conclusions and several problems remain to be solved. First, the test items on INFL may not be representative enough to test the true status of INFL in Chinese learners' interlanguages. As one anonymous reviewer pointed out, why should test sentences containing 'was/is/went', and the like, be relied upon where inflection is transparent and probably the learner has such items as unanalyzed items at earlier stages? This may obscure the results. Also, INFL consists of various features, and we don't know yet what the results will be like if we split INFL into various features. Third, for *raising it*, we have included *seem*+clause structures. What about *it* expletives in sentences like (11a), (12a), and also in sentences like *It seems likely (clear) that he will lose the contest* and *It is believed that he is honest*? It is clear that one must have a more refined analysis of expletives and INFL and should include longitudinal data in order to have a clear and complete picture of the triggering experience in the unlearning of null arguments.

## NOTES

\* I would like to thank Dr Gladys Tang whose guidance and patience has led me to the completion of my M.Phil thesis, on which the present paper is based. My thanks also go to an anonymous reviewer for helpful remarks on an earlier version of this paper.

<sup>1</sup> However, see the discussion section.

<sup>2</sup> This is known as the 'indirect-access' hypothesis or the transfer hypothesis. Such a view attributes considerable importance to the L1 grammar. Following this claim, the L1 parameter settings have an impact on L2 acquisition in that L2 learners will assume that the L1 settings are appropriate for the L2 as well, unless positive evidence from the input indicates otherwise. Language transfer errors arise because the L2 learner assumes the L1 parameter setting still holds when the L2 setting is in fact different from the L1 setting. In this view, parameter resetting to the L2 value is possible. This view is shared by a number of researchers, such as White (1985a, 1985b, 1986), Hilles (1986), and Flynn (1987), among others.

<sup>3</sup> Here we look at 'expletives' as one category. In Section 5.3. we will look at different types of 'expletives'.

<sup>4</sup> Even the native performance on *raising it* is not that good. This may be a result of the fact that *it* can be omitted in such sentences in informal conversation.

<sup>5</sup> Although Li and Thompson (1976) argue that Chinese lacks expletive subjects, Gao et al. (1994) maintain that Chinese exhibits examples of expletive null subjects. They argue that null expletives only occur in positions which do not take a thematic subject, such as *lun* 'turn' or *zhide* 'worth'.

<sup>6</sup> Li and Thompson (1981) argue that when both an overt pronoun and a missing pronoun can occur in the discourse, the principle of highlighting will be a guideline to decide whether the overt pronoun is used or not. Generally, a missing pronoun is used when there is no reason to highlight the reference to the speaker or the hearer, while the overt pronoun is used when there is some reason to highlight the reference to the speaker or the hearer. Here to 'highlight' may be to emphasize, to change a topic, to contrast, or show politeness (See examples cited in the last chapter in Li and Thompson 1981).

<sup>7</sup> A possible solution to this problem is proposed in Shlonsky (1989). There Shlonsky claims that "the question of what bars sentential subjects of certain predicates is related not to their characters as raising predicates but to their semantics: seem and appear are inherently presentational, non-predicational verbs, perhaps even 'copulas', ..." (1989:34). The difference between a presentational sentence and a predicational sentence is that the subject is the nucleus of focus in the former while the VP is focused in the latter. Therefore Shlonsky suggests solving this problem in terms of semantics or pragmatics rather than syntax. He says, "... the sentential subject of seem is not focused, and hence the entire clause can not be interpreted as presentational but only as a predication. A predicational interpretation is made available when seem is followed by a predicational element, but is rendered unavailable with seem alone" (1989:34).

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