

# Modification with *De* in Mandarin Chinese

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Submitted to the graduate degree program in Department of Linguistics and the Graduate Faculty of the University of Kansas in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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Modification with *De* in Mandarin Chinese

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## Abstract

This dissertation looked at the **de construction** in Mandarin Chinese, in which the morpheme *de* connects two meaningful parts and conveys a modification relation between the two. The **de construction** can be used in both the nominal domain and the verbal domain. In nominal **de constructions**, the categories of the modifier vary. In verbal **de constructions**, the modifier can either precede *de* or follow it. There is no unifying account for all the variations of the **de construction** in the previous literature. This dissertation adopts a unified approach to **de constructions** in order to examine the degree to which analyses applied to nominal *de* phrases can be extended to verbal *de* phrases. To this end, I focused on the distribution, the headedness and the symmetry of the nominal and the verbal **de constructions** to see whether we can generalize the **de constructions** across the two domains.

In Chapter 3, I investigated the frequencies of different grammatical categories in the pre-*de* and the post-*de* positions of the **de phrases** found in the Sinica Treebank, a parsed corpus of Chinese built by Chinese Knowledge and Information Processing (CKIP). The results showed that the nominal **de constructions** greatly outnumber the verbal **de constructions**. The features of the head determine the distribution of their modifiers. Only V and VP are found in the pre-*de* position in both the nominal and the verbal **de constructions**.

In Chapter 4, I employed several tests to determine the position of the head in both the nominal **de constructions** and the verbal **de constructions**. From the test results, we conclude that that the nominal **de constructions** and the pre-verbal **de constructions** are headed by the post-*de* component while the post-verbal **de constructions** are headed by the pre-*de* component.

In Chapter 5, I applied the *de*-reflection test to determine whether the syntactic structure

and the semantic composition of **de constructions** are symmetrical or not. The results indicate that the nominal and the verbal **de constructions** are both asymmetrical. However, the conditions for passing in the nominal domain and in the verbal domain are different, which is an obstacle for generalizing the **de constructions** across the two domains.

In this dissertation, I set out to see whether we could generalize the **de constructions** across the nominal and the verbal domain. Through the distribution test, the headedness test, and the *de*-reflection test, I could not find enough evidence for any generalization.

## Acknowledgements

I would like to thank all the people who made this dissertation possible.

At the beginning, I would like to express my deepest gratitude to my advisor, Professor Clifton Pye. Without his expert guidance, generous support and constant encouragement throughout my graduate years, I cannot make this far. My appreciation extends to my other committee members, Professor Andrew McKenzie, Professor Utako Minai, Professor Jie Zhang, and Professor Yan li, for their willingness to join the committee and their helpful suggestions.

I am also grateful to Professor Robert Fiorentino, Professor Alison Gabriel, Professor Isaac Gould, Professor Allard Jongman, Professor Jason Kandybowicz, Professor Joan Sereno, Professor Harold Torrence, Professor Annie Tremblay, for their excellent teaching and warm-hearted help throughout the years.

Besides, I would like to thank the Department of Linguistics at KU for providing me with the opportunity of studying linguistics and the financial support. My gratitude also goes to Corinna Johnson for her precious help.

Thanks also extends to my friends and colleagues, Ruoxi Cheng, Yufu Chien, Lauren Covey, Philip Duncan, Nicholas Feroce, Charles Redmon, Lena Rosener, Seulgi Shin, Wenting Tang, Tingting Wang, Xiao Yang and all others. They have been an important part of my life throughout the years.

Last but not least, I am deeply grateful to my husband Hang Xu and my family for their unconditional love and support.

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# Chapter 1

## Introduction

The particle *de* in Mandarin Chinese has three written forms – 的, 地, 得, and occurs in a wide variety of phrases that have the shape of XP *de* YP. The construction also expresses a variety of modification relationships between XP and YP. This simple construction holds many mysteries that have bewildered linguists who have worked on Chinese languages for decades. Analyses of the *de* construction typically divide between discussions of nominal and verbal *de* phrases. Nominal *de* phrases are headed by an NP in the YP position, while verbal *de* phrases are headed by a VP in either the XP or YP position. Examples of nominal *de* constructions are shown in (1) and examples of verbal *de* constructions are shown in (2). In (2a), the pre-*de* component modifies the post-*de* YP, while in (2b), the post-*de* YP modifies the pre-*de* component, exhibiting two types of verbal *de* constructions.

- (1) a. N *de* NP
- 熊猫 的 眼睛  
xiongmao de yanjing  
panda DE eye  
'the eyes of panda'
- b. VP *de* NP
- 会 飞 的 昆虫  
hui fei de kunchong  
can fly DE insect  
'flying insects'
- c. PP *de* NP

在 家 的 好 处  
zai jia de haochu  
at home DE advantage  
'the advantage of being home'

d. DP de NP

他 们 的 家 人  
tamen de jiaren  
they DE family  
'their families'

(2) a. Adv de VP

欧 阳 悄 悄 地 离 开 了。  
Ouyang qiaoqiao de likai le.  
Ouyang quiet DE leave PERF.  
'Ouyang left quietly.'

b. V de AdvP

艾 米 跑 得 快。  
Aimi pao de kuai.  
Amy run DE fast  
'Amy runs fast.'

The main puzzle of **de constructions** is due to the variety of different phrases that can appear as either the XP or YP. The variety of phrase types creates a puzzle in accounting for the variety of modification types. The diversity of **de phrases** leads to the fundamental question of whether it is possible to provide a uniform treatment for both nominal and verbal **de constructions**. A unified analysis would explain the similarities of form and function across the different types of **de constructions**. A non-unified treatment has to explain why different constructions in the nominal and verbal domains have similar **XP de YP** forms and serve modification functions.

Standard accounts of the **de constructions** propose non-unified treatments of nominal and verbal **de phrases** as well as non-unified treatments of the two types of verbal **de phrases**. While non-unified accounts of nominal and verbal **de phrases** may turn out to be

correct, a unified approach has some advantages. One advantage is that every analysis applied to one type of **de construction** can be tested with other types of **de constructions**. An analysis of the modification relation in the nominal domain can be extended to the verbal domain in order to test the generality of the analysis. An analysis of the syntactic head in the nominal domain can be extended to the verbal domain in order to test the generality of the proposed head relation. An analysis of nominal modifiers can be extended to the verbal modifiers in order to examine the consequences of modification in nominal and verbal domains. Ultimately, a unified approach tests the possibility of generalizing the modification relation across nominal and verbal heads. Often, tests with other types of **de phrases** reveal weaknesses in the original proposal that are not evident when one type of **de phrases** is considered.

This dissertation adopts a unified approach to **de constructions** in order to examine the degree to which analyses applied to nominal **de phrases** can be extended to verbal **de phrases**. In chapter 2 I review previous accounts of **de phrases** and point out the degree to which they either tacitly or explicitly restrict the focus of their investigation to either nominal or verbal **de constructions**. The literature review is divided by the type of approach taken by the authors. As exponents of the typological approach Li & Thompson (1989) classify *de* in nominal constructions into either an association marker or a nominalizer. They classify *de* in verbal constructions into cases of adverbial modification by whether YP is a stative verb or a clause. Li (1990) divides verbal **de phrases** by whether the YP is an adjective phrase or a clause, while Li (2015) proposes to classify **de phrases** by whether the YP and XP form a predicational relationship.

Syntactic approaches to **de constructions** treat *de* as a functional head, but differ as to its identity, e.g., a complementizer (Cheng, 1986), a determiner (Simpson, 2003), a linker (Den Dikken & Singhapreecha, 2004), and an underspecified classifier (Cheng & Sybesma, 2009). Because the categories assigned to *de* are different, the proposed structures for the **de construction** vary. The center of the debate partly results from the debate on the head



directionality of the NPs/DPs in Mandarin Chinese, i.e. whether they are head-initial as argued by Huang (1982). Simpson (2003) proposes that *de* is a determiner (D) that selects an NP in which the complement of N is a VP formed by the pre-*de* and post-*de* components.

Because all **de constructions** take the same surface form, i.e. X(P) **de** Y(P), if the relation between the XP and the YP in the **de construction** is determined by *de*, it follows that such a relation is uniform in **de constructions**. If the relation between the XP and the YP is determined by the syntactic or semantic nature of their heads, it is reasonable to assume that the type of modification that the XP and the YP form in **de constructions** is not uniform.

There are two main semantic approaches to **de constructions**, which I call the vacancy view and the licensor view. The vacancy view considers that *de* is vacuous in that the morpheme is not necessary or does nothing for the modification to be established between the XP and the YP. The licensor view assumes that *de* licenses the modification between XP and YP but does not contribute any meanings to the whole expression. The vacancy view predicts that modification without *de* is well-formed and that the meaning remains the same as the modification with *de*. The licensor account predicts that if XP and YP are joined together without *de*, a modification reading would not arise or would differ from that of modification with *de*.

Huang (2006) takes a licensor approach by contrasting the distributions of complex adjectives which require *de* to modify a noun and simple adjectives which do not require *de* to modify a noun. The proposal is that the simple adjectives of type *e* and the complex adjectives of type  $\langle e, t \rangle$  are of different semantic types and the function of *de* is to type shift complex adjectives into type *e* in order to compose with a bare noun *e*. In the end, no trace of *de*'s contribution can be recovered from the final meaning of the whole expression.

As seen in these examples, all three approaches make non-unified proposals to account for the different types of **de constructions**. The separate treatment of the nominal **de construction** and the verbal **de construction** makes it difficult to generalize the analyses

of *de* across the two domains. The classical method focuses on the variations within each fixed domain and misses the opportunity to look for generalizations across the two domains. Although nobody disagrees that *de* in both domains is the bridge for building a modification relationship between XP and YP, it is impossible to see whether the bridge remains the same or changes to a different one when only focusing the nominal or verbal **de constructions**. Their proposals provide starting points for testing the extent to which the proposals can be extended to other types of **de constructions**. The following chapters of the dissertation test different types of generalizations.

Chapter 3 investigates the frequencies of different grammatical categories in the XP and YP positions of the **de phrases** found in the **Sinica Treebank**, a parsed corpus of Chinese built by Chinese Knowledge and Information Processing (CKIP). The main goal of the analysis is to test for differences between the types of modifiers for nominal and verbal **de phrases**. Such differences demonstrate the degree to which the head of **de phrases** limits the distribution of its modifiers, and thus the extent to which a unified treatment of **de constructions** is warranted.

Chapter 4 explores the syntactic structure of **de constructions** by employing tests for headedness. Noun classifiers show that the YP noun is the head of nominal **de phrases**. Aspect markers show that the head of verbal **de phrases** can be either the XP or YP depending on the type of verbal **de construction**. Showing that the head of a **de phrase** is either the XP or YP disproves symmetrical accounts of **de constructions** as well as syntactic accounts that make *de* the head of a **de phrase**. Nominal **de phrases** have the distribution of NPs while verbal **de phrases** have the distribution of verbs.

Chapter 5 applies a reflection test in order to probe the structure of nominal and verbal **de phrases**. The reflection test converts an XP **de** YP construction into a YP **de** XP construction. Reflection tests show the constraints that permit this type of change, and thus reveal structural features of **de phrases**. The main contribution of this chapter is that the reflection test shows what syntactic details need to be added to previous syntactic accounts

of the *de* phrase in order to apply a reflection test. The reflections of nominal *de* phrases yield acceptable outputs if the original XP is an NP or capable of becoming an NP through nominalization. The reflections of verbal *de* phrases yield acceptable outputs if one of the phrases is still interpretable as a VP. Which phrase this is depends on which type of verbal *de* phrase is reflected.

In sum, the goal of the dissertation is to examine the premise of proposing a unified analysis for *de* in the XP *de* YP construction. That is whether there is a single *de* that links various categories to establish a modification relation. The research questions approach this question from different angles. Can we find distributional evidence that suggests the nominal *de* constructions and the verbal *de* constructions should be unified? Furthermore, can we find structural similarities between the nominal *de* constructions and the verbal *de* constructions that suggest a unified approach is desired?

## Chapter 2

### Literature Review

In this chapter, I review the previous research on the morpheme *de* first in the nominal domain and then in the verbal domain. This review provides motivation for my research.

#### 2.1 *De* in the nominal domain

The construction under discussion here has the structure of  $XP \text{ de } Y(P)$ , in which  $Y(P)$  can be a bare noun, an NP or a DP. In this section, I first describe the typological approaches to *de* based on its reading, followed by the syntactic proposals for the underlying structures of *de* constructions as well as the semantic analyses that have been provided.

##### 2.1.1 Typological approaches to nominal *de* constructions

Li & Thompson (1989) separate the particle *de* in noun phrases into an associative marker and a nominalizer. Li & Thompson (1989) make their distinction based on the interpretations of the pre-*de* phrase and implicitly assume that the interpretations always align with its categories.

When *de* links two noun phrases, the pre-*de* phrase and *de* form an **associative** phrase, in which *de* is called an **associative** marker, as demonstrated in (3). The association between the two noun phrases can be a possessive relation, as in (3a), or a broader semantic relation, such as a source-outcome relation, as in (3b). According to Li & Thompson (1989), the interpretation of this relation is based on the meanings of the two noun phrases.

- (3) [NP *de*]<sub>ASSOCIATIVE PHRASE</sub> N

- a. 熊猫 的 耳朵  
xiongmao de erduo  
panda DE ear  
'panda('s) ears'
- b. 城市 的 污染  
chengshi de wuran  
city DE pollution  
'urban pollution'

The other way to use *de* in a noun phrase is to form a **modifying phrase** with the pre-*de* phrase, be it a relative clause or an attributive adjective, in which *de* functions as a **nominalizer**.

- (4) [RC *de*]<sub>MODIFYING PHRASE</sub> N
- a. 拥抱 太阳 的 月亮  
[yongbao taiyang]<sub>RC</sub> de yueliang  
hug Sun DE Moon  
'the Moon that hugs the Sun'
  - b. 美丽 的 容颜  
[meili]<sub>ADJ</sub> de rongyan  
beautiful DE face  
'a pretty face'

Unfortunately, Li & Thompson (1989) do not propose a treatment for the other modifiers introduced by the particle *de*. Take (5a) for example, in which the modifier is a prepositional phrase. How this example fits into Li & Thompson (1989)'s classification needs further clarification. Suppose the prepositional phrase can be analyzed as a relative clause. We would expect that the prepositional phrase to be the predicate of the relative clause, contrary to (5b).

- (5) a. 窗外 的 风景  
[chuang.wai]<sub>PP</sub> de feng.jing  
window.out DE scenery  
'the scenery outside the window'

- b. \* 风景 窗外  
 feng.jing [chuang.wai]<sub>PP</sub>  
 scenery window.out  
 Intended: ‘The scenery is from outside the window.’

The way Li & Thompson (1989) classify the usages of *de* in the nominal domain implies that the nominal categories, either NP or DP, have lost the ability of being further nominalized and thus predicts that the association would be licensed when a nominal category is used in a pre-*de* position. This analysis raises the question, though, why a nominalized phrase cannot always be associated further with a N, as suggested by the ungrammaticality of (6a-6b).

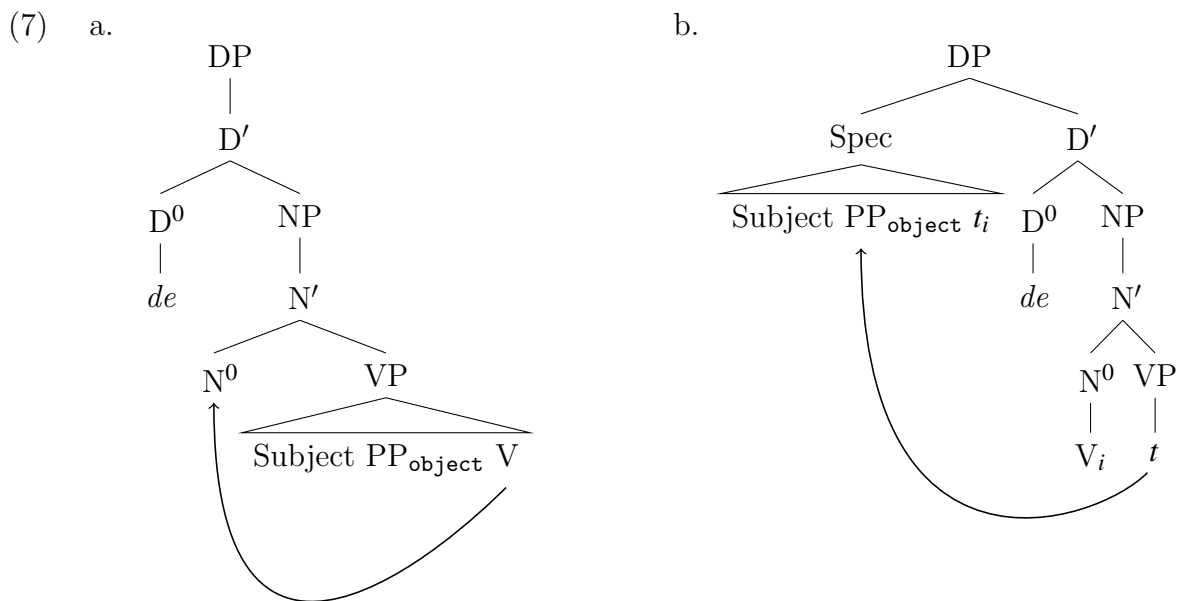
- (6) a. \* 拥抱 太阳 的 的 月亮  
 [yongbao taiyang]<sub>RC</sub> de de yueliang  
 hug Sun NOM ASS Moon  
 Intended: ‘the Moon that associates with those that hug the Sun’
- b. ? 美丽 的 的 容颜  
 [meili]<sub>ADJ</sub> de de rongyan  
 beautiful NOM ASS face  
 Intended: ‘the face that associates with those that are pretty’

## 2.1.2 Syntactic approaches to nominal *de* constructions

There are many syntactic analyses of *de* in the nominal domain. One difficulty in analyzing *de* is that the pre-*de* phrase can take a wide range of categories and yet the function of *de* seems to remain the same – to modify the head N. Many linguists have attempted to offer a unifying analysis for the status of *de* and how the **de construction** is formed. A satisfying analysis should account for the many-to-one mapping between the possible categories of the modifier and their unitary function.

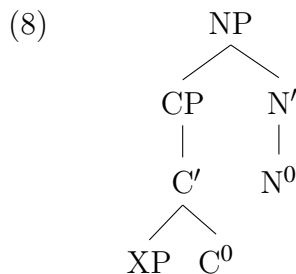
Many of the existing proposals treat *de* as a functional head, e.g., a complementizer (Cheng, 1986), a determiner (Simpson, 2003), a linker (Den Dikken & Singhapreecha, 2004), an underspecified classifier (Cheng & Sybesma, 2009). Because the categories assigned to *de* are different, the proposed structures for the **de construction** vary. The center of the

debate partly results from the debate on the head directionality of the NPs/DPs in Mandarin Chinese, i.e whether they are head-initial if assuming Kayne (1994)'s Linear Correspondence Axiom or head-final as argued by Huang (1982). Following Kayne (1994)'s theory that leads to the NPs/DPs in Chinese being head-initial, Simpson (2003) proposes that *de* is a determiner ( $D^0$ ) that selects a NP in which the complement to  $N^0$  is a VP formed by the pre-*de* and post-*de* components. The post-*de* element first moves to  $N^0$ , as demonstrated in (7a), and then the rest of the VP moves to the specifier position of  $D^0$ , as demonstrated in (7b), generating the correct word order.



Cheng (1986) assumes a head-final structure for the NPs/DPs in Mandarin Chinese and proposes that *de* is a complementizer ( $C^0$ ) which selects any phrasal category to be its complement, explaining the wide range of categories that can function as the modifier in the **de construction**. The complementizer phrase is joined to the specifier position of the NP headed by the modified  $N^0$ . The scheme of the proposal is demonstrated in (8). When the modifier is a relative clause, the position of XP hosts an IP. In the other cases, the category

of XP are identical to the categories of the modifier.



One implication of this debate is whether the pre-*de* phrase and the post-*de* phrase form a predicational relation in the deep structure. According to Simpson (2003), if and only if there is a predicational relation between the modifier and the modified noun, could a modificational construction be formed. This predicational approach runs into problems when the modifiers in a *de* construction cannot be traced back to a predicate position Paul (2012). The examples in (9), taken from Paul (2012), show that temporal adverbs can be used as modifiers in a *de* construction but cannot be used as predicates.

(9) (see Paul, 2012)

- a. 历来 的 习惯  
 lilai de xiguan  
 always DE habit  
 ‘an old habit’
- b. \*习惯 是 历来 的  
 xiguan shi lilai de  
 habit COP always DE  
 Intended: ‘It’s an old habit.’

### 2.1.3 Semantic approaches to nominal *de* constructions

In contrast to many proposals that concern the structure of the *de* construction, Huang (2006) gives a formal analysis for how to compose the meanings of an adjective and a noun in Mandarin. Based on the Property Theory as developed by Chierchia (1984, 1985), Huang (2006) first argues that bare nouns (10) and a class of adjectives (simple adjectives, 11) in Chinese are of type *e* because they appear in argument positions.



(10) Bare nouns appear in argument positions and thus are of type  $e$ .

- a. 新郎 亲吻 了 新娘。  
**xinlang** qinwen le **xinni**ang.  
 groom kiss ASP bride  
 ‘The groom kissed the bride.’
- b. 工人 砸 碎 了 花瓶。  
**gongren** za sui le **huaping**.  
 worker smash broken ASP vase  
 ‘The worker smashed the vase.’

(11) Simple adjectives can occur in argument positions and thus are of type  $e$ .

- a. 幸福 是 灵魂 的 香味。  
**xingfu** shi lingshun de xiangwei.  
 happy COP soul DE fragrance  
 ‘Happiness is the fragrance of the soul.’
- b. 每 个人 都 渴望 得到 幸福。  
 mei ge ren dou kewang dedao **xingfu**.  
 every CL person all want get happy  
 ‘Everyone wants to obtain happiness.’

Having established that bare nouns and simple adjectives are both of type  $e$  in Chinese, Huang (2006) then proposed that the modification of simple adjectives takes place through **nominal modification** (demonstrated in (12)), a version of **predicate modification** customized for Mandarin Chinese, which requires the semantic types of both the modifier and the modified noun to be  $e$ . According to Huang (2006), the particle *de* is not necessary in the case of a simple adjective modifying a bare noun. It raises the question why the particle *de* is present at all if it plays no role in composing the meaning.

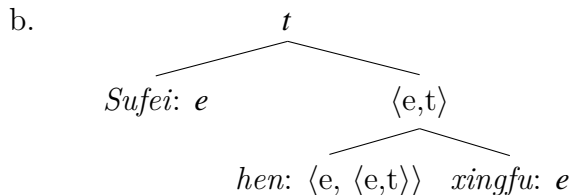
(12) Definition of Nominal Modification (Huang, 2006)

- a.  $x \wedge y = \text{nom}(\lambda z[\text{pred}(x)(z) \wedge \text{pred}(y)(z)])$
- b. **new book:  $e = \text{nom}(\lambda z[\text{pred}(\text{new})(z) \wedge \text{pred}(\text{book})(z)])$**
- ```

      / \
     /   \
    new: e book: e
  
```

The role of the particle *de* becomes indispensable when the modifier is a complex adjective, which can be used as a predicate independently. As shown in (13a), the adverb *hen*, ‘very’, and the adjective *xingfu*, ‘happy’, together form a complex adjective and function as the predicate of the sentence. Huang (2006) argues that the semantic type of complex adjectives in Mandarin is  $\langle e, t \rangle$  because they are truth conditional of type *e* items, as shown in (13b). To apply **nominal modification** on the composition of a complex adjective and a bare noun, Huang (2006) proposes that the particle *de* type shifts the modifier from type  $\langle e, t \rangle$  into type *e*, the same type as a simple adjective and the rest of the composition is the same as combining a simple adjective and a bare noun.

- (13) a. 苏菲 很 幸福。  
 Sufei \*(hen) **xingfu**.  
 Sophie very happy  
 ‘Sophie is very happy.’



Despite its ingenious explanation on the function of *de* and how **modification** works in Chinese, Huang (2006)’s proposal is not satisfactory for several reasons. First of all, the analysis is restricted to the case in which the modifier is an adjective. As I have shown, the modifiers in a nominal **de construction** can belong to various categories. Secondly, it does not clarify the function of *de* when the modifier matches the semantic type of the modified noun, such as in the case of simple adjectives modifying nouns. If *de* is a type-shifter, then it has no purpose when the types of XP and YP are the same. Thirdly, it gives rise to the possibility of any type *e* elements freely associating with each other, which leads to several issues. For example, it predicts that if an adjective and a noun can be connected by the particle *de*, the meaning of their combination would stay the same whether the adjective and the noun switched their positions around *de*. As shown in (14), the post-*de* component in a

*de* construction determines the phrasal head, while in Huang (2006)’s proposal the pre-*de* and the post-*de* components play an equal role in the ultimate meaning if they are both of type *e*.

- (14) a. 美丽 的 少女  
 meili de shaonü  
 beautiful DE maiden  
 ‘a beautiful maiden’
- b. 少女 的 美丽  
 shaonü de meili  
 maiden DE beautiful  
 ‘the beauty of a maiden’

## 2.2 *De* in the verbal domain

The particle *de* also appears in the verbal domain and introduces a modification relation between the pre-*de* and the post-*de* components. The examples in (15-16) demonstrate two usages of *de* in the verbal domain. In (15), the particle *de*, whose written form is ‘地’ as shown, introduces an adverb to modify the matrix verb. The particle *de* in this construction resembles the nominal *de* because it unambiguously introduces the pre-*de* part to modify the post-*de* item. The examples in (16-18) demonstrate the V-DE construction (Huang et al., 2009) in Mandarin Chinese, which is named this way because the pre-*de* component is a verbal element. A straightforward reading of a V-DE construction cannot be that the pre-*de* part modifies the post-*de* part. In (16), the post-*de* part describes the manner of the pre-*de* verb. In (17-18), the post-*de* parts indicate the result of the action in the pre-*de* component. The literature debates on how to classify the V-DE construction and what structure the construction has.

- (15) 乔治 悄悄 地 离开了。  
 Qiaozhi qiaoqiao de likai le.  
 George quiet DE leave ASP  
 ‘George left quietly.’

- (16) 艾米 跑 得 快。  
 Aimi pao de kuai.  
 Amy run DE fast  
 ‘Amy runs fast.’
- (17) 杰瑞 走 得 累 了。  
 Jierui zou de lei le.  
 Jerry walk DE tired ASP  
 ‘Jerry got tired from walking.’
- (18) 依莲 哭 得 眼睛 肿 了。  
 Yilian ku de yanjing zhong le  
 Elaine cry DE eyes swollen ASP  
 ‘Elaine got her eyes swollen from crying.’

### 2.2.1 Typological approaches to the V-DE construction

In this section, I will discuss the typological treatments of the V-DE construction in the literature together, among which the classification by Li & Thompson (1989) is the most influential. The V-DE construction, or the **complex stative construction** in Li & Thompson (1989)’s terms, follows a linear ordering of a **clause**, the particle *de*, and a **stative** which can be either a clause or a verb phrase, as shown in (19). The relationship between the two parts that *de* connects in the construction can be different.

- (19) (Li & Thompson, 1989)

$$\text{clause } \underline{\text{de}} \text{ stative } \left\{ \begin{array}{l} \text{clause} \\ \text{verb phrase} \end{array} \right\}$$

The stative part may be inferred as describing the manner of the pre-*de* clause when the stative is an adjective, considered to be a verb phrase by Li & Thompson (1989). The examples in (20a-20b) demonstrate that the post-*de* phrase, being an adjective phrase, describes *how* the state of action expressed by the pre-*de* clause goes.

- (20) (Li & Thompson, 1989)
- a. 他 走 得 非常 早  
 ta zou de feichang zao  
 3SG leave DE extremely early  
 ‘He left really early.’
- b. 他 站 得 很 稳  
 ta zhan de hen wen  
 3SG stand DE very steady  
 ‘He stands very steady.’

The stative part may also be inferred as describing the extent to which the event indicated by the pre-*de* clause goes. The examples in (21a-21b) demonstrate the extent reading of the stative clause.

- (21) (Li & Thompson, 1989)
- a. 他 教 得 累 了  
 ta jiao de lei le  
 3SG teach DE tired ASP  
 ‘He taught so much that he is tired.’
- b. 我 饿 得 发 慌  
 wo e de fa huang  
 I hungry DE produce panic  
 ‘I’m so hungry that I’m going crazy.’

The reading of the stative clause can be ambiguous between the manner reading and the extent reading. For example, the statives after *de* in (22a-22b) can either be inferred as describing how the event happens or the result of the event. As we see from the two examples, the ambiguous reading happens when the stative is an adjective phrase.

- (22) a. 我们 吃 得 很 开心。  
 women chi de hen kaixin  
 we eat DE very happy  
 ‘We ate very happily./We ate to the point of being very happy.’
- b. 他 哭 得 很 伤心。  
 ta ku de hen shangxin  
 he cry DE very sad

‘He cried very sadly./He cried to the point of being very sad.’

Li (1990) also argues for a classification based on the readings of the post-*de* components. This classification aligns the readings with the categories of the post-*de* part. If the post-*de* part is an adjective phrase, it is descriptive of the pre-*de* event. If the post-*de* part is a clause, it indicates the result of the pre-*de* event, which avoids the issue of ambiguous readings faced by Li & Thompson (1989).

- (23) (Li, 1990)
- a. [S NP X [VP V *de* AP] ] (descriptive)
  - b. [NP1 [X [V1 *de* [(NP2) VP2]]]] (resultative)

Although the reading-based approaches by Li & Thompson (1989) and Li (1990) capture the various readings in the V-DE construction, they do not offer much insight on what role the particle *de* plays. Different readings just arise from the different natures of the post-*de* component while the particle *de* plays no active role.

Li (2015) argues for a new way to classify the V-DE construction by considering whether the post-*de* part can be syntactically used as a predicate. By this criterion, the example in (24a) will be classified as non-predicative V-DE because the post-*de* part *hen* ‘very’ cannot independently be used as a predicate. For non-predicative V-DE case, Li (2015) proposes the structure in (24b). The case of non-predicative V-DE was not addressed by the analyses by Li & Thompson (1989) and Li (1990).

- (24) (Li, 2015)
- a. 张三 的 衣服 多 得 很  
Zhangsan de yifu duo *de* hen  
Zhangsan DE clothes many DE very  
‘Zhangsan has a lot of clothes.’
  - b. [S NP [VP [VP V-*de*] AdvP]]

For the predicative V-DE case, Li (2015) further makes the distinction between an entity-predicative in which the post-*de* part is semantically about a specific entity in the event of

the pre-*de* clause (25a) and an eventuality-predicative in which the post-*de* part semantically concerns the eventuality of the pre-*de* clause (25b).

- (25) a. 张三 吃 得 很 胖。  
 Zhangsan chi de hen pang  
 Zhangsan eat DE very fat  
 ‘Zhangsan ate to the effect of having become overweight.’
- b. 张三 昨晚 睡 得 很 香。  
 Zhangsan zuowan shui de hen xiang  
 Zhangsan last.night sleep de very sound  
 ‘Zhangsan had a sound sleep last night.’

Disappointingly, the structures Li (2015) proposes to account for the entity-predicative V-DE and the eventuality-predicative V-DE are the same, as demonstrated in (26a). If the null category is always present in the clause following *de*, what blocks the entity-predicative reading for 25b is not clear. The schema in (26b) shows the case when the post-*de* part contains an overt NP which blocks the reading of it being entity-predicative. In other words, the presence of an overt NP in the post-*de* part is sufficient for an eventuality-predicative reading.

- (26) a. [<sub>S<sub>1</sub></sub> NP [<sub>VP</sub> V-de [<sub>S<sub>2</sub></sub>  $\emptyset$  PredP]]]
- b. [<sub>S<sub>1</sub></sub> NP1 [<sub>VP</sub> V-de [<sub>S<sub>2</sub></sub> NP2 PredP]]]

Although Li (2015)’s proposal ties the structure and the corresponding meaning together by introducing the notion of predication, the structure for the eventuality-predicative reading is not indicative of a predication relation between the pre-*de* event and the post-*de* event. As in (26b), the pre-*de* event, which consists of both NP<sub>1</sub> and V, do not form a constituent, which makes it difficult for S<sub>2</sub> to be predicative of their composition. Additionally, an event is a complete proposition, which contradicts the idea of being predicative at the same time unless there is additional operation.

## 2.2.2 Syntactic approaches to the V-DE construction

In the last section, I reviewed the main proposals for classifying the V-DE construction. In each proposal, the structure of the V-DE construction is also included. Looking back at the proposals by Li & Thompson (1989), Li (1990), and Li (2015), the structures they offer neither distinguish the function of *de* when the post-*de* part gives rise to different readings nor assign *de* to different positions in the structure. Cheng (1986), on the other hand, argues that when it is followed by a resultative clause, *de* becomes a head-initial complementizer instead of a head-final one, as I have shown in (74). In the nominal domain, the modifier always comes before *de* and being head-final allows *de* to combine with the modifier before joining with the head noun. In the case of *de* preceding a resultative clause, Cheng (1986) argues that joining the whole pre-*de* part including *de* with the post-*de* part makes the prediction that the resultative clause is predicative of the pre-*de* event, which is not always the case.

## 2.2.3 Syntactic approaches to verbal *de* constructions

In section 2.2.1 and 2.2.2, I have reviewed the research on the V-DE constructions and avoided discussion of the adverbial modifiers that can appear preverbally, as demonstrated by the examples in (27a-27b).

- (27) a. 山姆 开心地写着论文。  
Shanmu kaixin de xie zhe lunwen.  
Sam happy DE write ASP paper  
'Sam is writing his paper happily.'
- b. 黛安 飞快地跑来。  
Daian fei.kuai de pao lai.  
Diane fly.fast DE run come  
'Diane is running towards here at a very fast speed.'

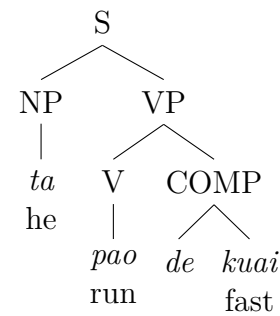
In this section, I will review the proposal by Ross (1984) which compares the pre-verbal modifiers and the post-verbal modifiers and argues that the particle *de* is simply a modi-



fication marker that appears in between a complement and the head of modification. The tree in (28a) demonstrates her analysis of a post-verbal modification and the tree in (28b) demonstrates her analysis of a pre-verbal modification. As shown, the modification is accomplished by joining a complement to the modified head. The presence of *de* signals or licenses the modification to be established. In other words, the position of the particle *de* is dependent on whether the modifier is used preverbally or postverbally.

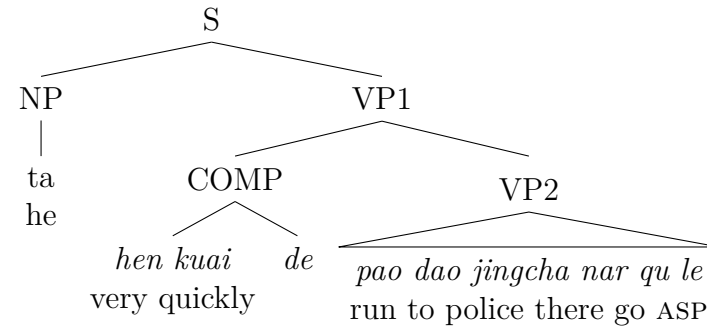
(28) (Ross, 1984)

a.



‘He runs fast.’

b.



‘He very quickly ran to the police.’

## 2.3 Summary

As I have reviewed in section 2.1 and 2.2, the previous literature on *de* constructions fails to come up with a unifying view on the morpheme *de*, including its distribution, its functional status, and its meaning.

The typologists classified *de* into an associative marker and a nominalizer in the nominal

domain. This classification does not account for the distribution of *de* in the verbal domain. The morpheme *de* precedes the `modifier` in the nominal domain while it can either precede the `modifier` or follow the `modifier` in the verbal domain. To unify the typological classification of the nominal `de constructions` and the verbal `de constructions`, it should be investigated whether *de* also functions as an associative marker and a nominalizer in both pre-verbal modification and post-verbal modification.

As for the syntactic treatments of *de* in the nominal domain, Cheng (1986) views *de* as a complementizer. This view has been extended to account for the status of *de* in the verbal domain. However, without flipping the head directions in the CP, this account cannot explain why both pre-verbal modification and post-verbal modification happen in the verbal domain while only pre-nominal modification is observed in the nominal domain. The proposal of flexible head directions fails to be backed up by independent reasons besides aligning with the correct word orders. The other view on the syntax of *de* in the nominal domain considers *de* as a determiner (Simpson, 2003). How this account can be extended to the verbal domain remains unclear at the moment.

Lastly, Huang's (2006) treatment of the meaning of *de* as a type shifter needs further verification for the other types of modifiers than adjectives in the nominal domain and also for the verbal `de constructions`.

## 2.4 Research Questions

The previous research has approached the puzzle of *de* mainly from the typological angle, the syntactic angle, and scarcely from the semantic angle. In this section, I discuss the limitations of the previous research from the three perspectives. To address the limitations in each area, I propose my own research questions.

### 2.4.1 Typological questions

The typological works on the *XP de YP* construction tend not to treat the nominal *de* and the verbal *de* together. The distinction between the nominal **de construction** and the verbal **de construction** is that *YP* is always a nominal category in the nominal domain but is always a verbal category, including verb phrases and clauses, in the verbal domain. This is to say the classical treatment of *XP de YP* makes the first division based on the category of the *YP*. Within each *YP* type, the classification is based on the category of the *XP*. For the nominal **de construction**, depending on whether *XP* is a nominal category or not, Li & Thompson (1989) classify *de* into either an association marker or a nominalizer. For the verbal **de construction**, if *XP* is a verb, then we have the **V-DE construction**; if the *XP* is an adverbial, then we have adverbial modification. The **V-DE construction** is further distinguished based on the category of *YP*, whether *YP* is a stative or a clause (Li & Thompson, 1989), or whether *YP* is an adjective phrase or a clause (Li, 1990), until Li (2015) proposes to classify the construction by examining whether *YP* and *XP* or the participant of *XP* form a predicational relationship.

The separate treatment of the nominal **de construction** and the verbal **de construction** makes it difficult to generalize the function of *de* across the two domains. The classical method focuses on the variations within each fixed domain and misses the opportunity to look for generalizations across the two domains. Although nobody disagrees that *de* in both domains is the bridge for building a modification relationship between *XP* and *YP*, it is impossible to see whether the bridge remains the same or changes to a different one when only focusing on the changes brought up by the variations of *XP* and *YP* without examining whether there are any constant variables in this formula.

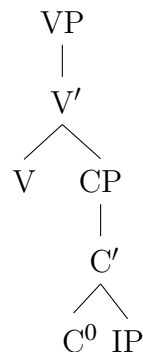
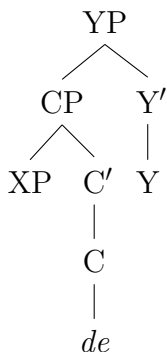
I propose to look at the *XP de YP* construction through examining the relationships built through *de* across the nominal and verbal domains with a focus on whether the relation is predicational or not, as Li (2015) classifies the **V-DE construction** through examining whether *XP* and *YP* form a predicational relationship.

## 2.4.2 Structural questions

The syntactic proposals for the *de* construction are influenced by the typological classification. While Cheng (1986) and Ross (1984) consider the nominal *de* construction and the verbal *de* construction together, the other proposals focus on one or the other. Ross (1984) only argues that structure for *de* in the nominal domain is the same as in the verbal domain but does not show how to extend the structure of *de* from the verbal domain to the nominal domain. Thusly, I only focus on Cheng (1986)'s proposal and its implications.

Cheng (1986) argues that *de* is a complementizer and that there exist two types of them. One is head-final and introduces a modification relation, which is shown in (29a). The other is head-initial and introduces a cause-result relationship, which is shown in (29b). In Cheng (1986), the only exception to a unified analysis is when YP has a resultative reading in the V-DE construction.

- (29) a. *De* introduces a modification relation.      b. *De* introduces a cause-effect relation.



One implication of Cheng (1986) is that the head of a *XP de YP* construction usually appears in a post-*de* position as in (29a). When YP is a clause, the head of a *XP de YP* construction appears in a pre-*de* position as in (29b).

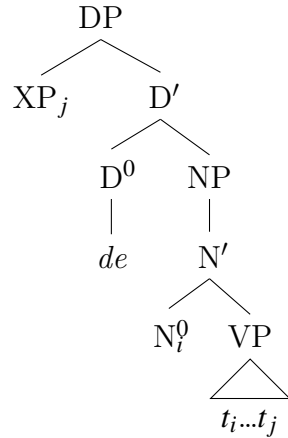
The proposal by Ross (1984) also entertains the idea that either *XP* or *YP* can be the head of the construction. As I have shown in (28a-28b), Ross (1984) considers *YP* to be the head in pre-verbal modification but *XP* to be the head in post-verbal modification. Although Ross

(1984) considers the particle *de* in the two variations to be the same, they underlie different structures.

These proposals account for the correct word order. However, whether the head appears in a pre-*de* position or a post-*de* position seems arbitrary. It follows that XP and YP in a **de construction** do not always have the same structural configuration. For example, in (29a), the supposed modifier XP is embedded as a specifier of the supposed head Y, while in (29b), the supposed head V c-commands the resultative clause. It leads to the implication that modification does not rely on a certain structural configuration. Cheng (1986) avoids the problem by proposing a non-modification relation – a cause-effect relation. Ross (1984) does not address this issue.

Besides XP and YP, *de* has also been considered to be the head of the XP **de** YP construction. This possibility is fully spelled out by Simpson (2003). As I have reviewed in Section 2.1.2, both XP and YP originate in a post-*de* clause. The word order of XP **de** YP is obtained through cyclic movement (30a). One premise of this proposal is that XP and YP form a predicational relation when generated in the deep structure. Paul (2012) rejects Simpson’s (2003) proposal by arguing that XP and YP do not always form a predicational relation. However, this rejection is based on the assumption that there is only one *de* in the language. It is possible that there are two types of **de relations** in the language – predicational and non-predicational. Without examining this possibility, it is too early to accept or reject Simpson’s (2003) proposal. However, this analysis is restricted to the nominal **de constructions**. To claim that *de* is a determiner is to treat the nominal *de* as a different particle than the verbal *de*, which is a question to be examined.

(30) a. (Simpson, 2003) (simplified)



As I have shown so far, one difficulty of unifying the structure of *de* across the nominal domain and the verbal domain appears to be that the position of the head is flexible on the surface. One possibility is that the head or the modifiee is always YP even in the resultative V-DE construction. To address this possibility, I propose to reexamine the question of what serves as the head in the XP *de* YP construction, with a focus on what is a head in the resultative V-DE construction.

Additionally, if XP and YP always form the same modification relation in XP *de* YP, it follows that they form a certain structural configuration designed for modification at least in the deep structure. In Section 2.4.1, I propose to examine whether XP and YP always form a predicational relation. If the answer to this question is positive, it implies that XP and YP in the deep structure follow the structural configuration for predication. If XP and YP do not always form a predicational relation, we need a separate structure to account for the non-predicational relation.

### 2.4.3 Semantic questions

When we look at the accounts for the meaning of *de* in the nominal domain from the implications of the syntactic proposals, there are mainly two schools of opinions on *de*, which I call the vacancy view and the licenser view. The vacancy view considers that *de* is vacuous in that the morpheme is not necessary or does nothing for the modification to be established between the XP and the YP. This line of proposal makes the prediction that the

modification without *de* is well-formed and the meaning stays the same as the modification with *de*. On the contrary, the meanings of modification with *de* and without *de* are different, as shown in (31). Additionally, as shown in (32), the modification relation cannot be formed without *de*. Since my goal is to look for generalizations across different types, the question of whether the vacancy view also holds for the verbal **de construction** arises here.

- (31) a. 橘子 的 香味  
 juzi de xiangwei  
 orange DE fragrance  
 ‘the fragrance of orange’
- b. 橘子 香味  
 juzi xiangwei  
 orange fragrance  
 ‘the orange-like fragrance’
- (32) a. 狡猾 的 狐狸  
 jiaohua de huli  
 sneaky DE fox  
 ‘the sneaky fox’
- b. 狡猾 狐狸  
 jiaohua huli  
 sneaky fox  
 ‘The fox is sneaky.’

On the other hand, the licensor view assumes that *de* licenses the modification between XP and YP but does not contribute any meanings to the whole expression. I have shown evidence against this prediction. The licensor account makes the prediction that if XP and YP are joined together without *de*, a modification reading would not arise. This prediction is partially borne out by (32a), in which dropping *de* cancels the modification reading but partially rejected by (33a), in which dropping *de* does not cause any noticeable difference in meaning. The question of what licenses the modification relation arises here.

- (33) a. 黑色 的 毛衣  
 hei.se de maoyi  
 black.color DE sweater

- ‘a black sweater’
- b.    黑色        毛衣  
       hei.se      maoyi  
       black.color sweater  
       ‘a black sweater’

Huang (2006) addresses this question by comparing the distributions of complex adjectives which require *de* to modify a noun and simple adjectives which do not require *de* to modify a noun. The proposal is that the simple adjectives (*e*) and the complex adjectives ( $\langle e,t \rangle$ ) are of different semantic types and the function of *de* is to type shift complex adjectives into type *e* in order to compose with a bare noun (*e*). In the end, no trace of *de*'s contribution can be recovered from the final meaning of the whole expression. Huang (2006)'s framework best represents the licenser view. One research question I would like to address here is whether all the modifiers in nominal **de constructions** are either type  $\langle e,t \rangle$  or type *e* and whether the semantic types predict the obligatory presence of *de*.

The framework by Huang (2006) also predicts that any type *e* expressions should be able to modify and be modified, including the ones that are type-shifted from  $\langle e,t \rangle$  to *e*. As shown in (34a), the prediction is not borne out. This example raises two questions. One is whether YP can be a nominalized expression. Another issue is why bare nouns and simple adjectives, whose semantic types are both type *e*, have different interpretations. Recall Li & Thompson (1989). When XP is a nominal category, the modification relation is a special kind – association.

- (34)    a.    \* [毛衣]<sub>*e*</sub> 的 [[黑色] <sub>$\langle e,t \rangle$</sub>  的]<sub>*e*</sub>  
               maoyi    de    hei.se            de  
               sweater DE black.color DE  
               Intended: ‘a black sweater’

The semantic framework for the verbal **de construction** is sparse in the literature. I propose to extend the methods that are used to examine the nominal **de constructions** to the verbal domain.



#### 2.4.4 Summary

This section summarizes the research questions I have raised through discussing the previous literature. The goal of the dissertation is to examine the premise for proposing a unified analysis for *de* in the XP *de* YP construction. That is whether there is a single *de* that links various categories to establish a modification relation. The research questions approach this question by examining the distribution, the headedness, and the symmetry of the nominal and the verbal *de* constructions.

## Chapter 3

### Distribution

#### 3.1 Introduction

Two types of *de* constructions (XP *de* YP) are based on the categories of the YP. If the YP of a *de* construction is a nominal category, such as N or NP, the type of the *de* construction is considered to be nominal. If the YP of a *de* construction is a verbal category, such as VP, the type of the *de* construction is verbal. These nominal and verbal *de* constructions are the main two types this chapter will be concerned about.

The *de* construction is the most widely used modification construction in Mandarin Chinese. The nature of modification, i.e. the relation between the modifier (XP) and the modifiee (YP), captured in *de* constructions is extremely difficult to define because of the considerable variations of the XP and the YP in *de* constructions. As mentioned, the modifiee (YP) can be nominal or verbal. The number of possible lexical categories for the modifier (XP) is even higher and builds up another level of complication for the construction, which raises the following questions.

The first question is whether the relation encoded between the XP and the YP is the same as the categories of the two components vary. All the *de* constructions take the same surface form, i.e. X(P) *de* Y(P) in spite of the various categories X and Y can take. If the relation between the XP and the YP in the *de* construction is determined by *de*, it follows that such a relation is uniform in *de* constructions. If the relation between the XP and the YP is determined by the syntactic or semantic nature of themselves, it is reasonable to speculate that the type of modification that XP and the YP form in *de* constructions is not

uniform.

The second question regards the limitation of **de constructions**. Although the **XP** and the **YP** in **de constructions** both vary greatly, not every combination of **X** and **Y** can form a **de construction** via the link *de*. Examining the constraints on **modification** can help understand the nature of the semantic relations that can be encoded in **de constructions**.

The third question is whether there is a difference between **modification** formed with *de* and without *de*. In Mandarin Chinese, there is another strategy to form a **modification construction**, which on the surface only differs from **de constructions** in its absence of *de*. I thereby refer to such constructions as *de*-less constructions. One example is given in (35).

- (35) a. 无限 战争  
wuxian zhanzheng  
infinity war  
'infinity war'

Some previous research has argued that **de constructions** and *de*-less constructions are underlyingly the same and *de*-less constructions are derived from **de constructions** via contraction. This question relates to the first question in that if the type of **modification** is determined by the nature of the **XP** and the **YP**, it follows that *de* is a dummy linker in **de constructions** and therefore **de constructions** and *de*-less constructions are the same. It also relates to the second question. It can help us distinguish **de constructions** and *de*-less constructions or unify them if we can understand the scope of relations encoded in **de constructions** and the scope of relations that can be captured in *de*-less constructions. For example, determining whether their scopes are complementary or overlapping is one way to tackle this piece of the puzzle.

## 3.2 Materials

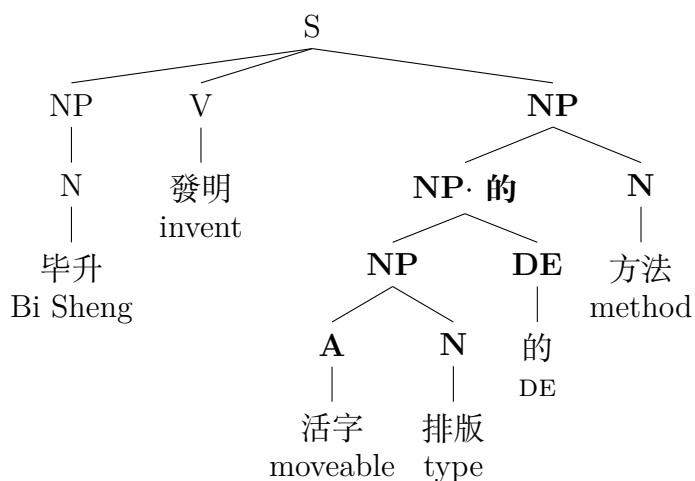
I took the corpus approach to address the research questions laid out in section 2.4. In order to extract the relevant data from the corpus, I wrote a python module based on the

framework provided by Natural Language Toolkit (NLTK), which is platform written in Python dedicated to Natural Language Processing.

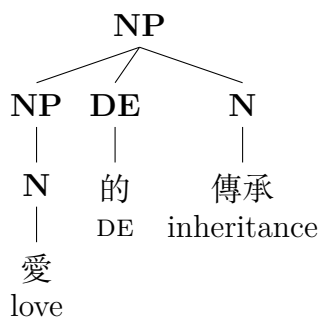
The goal of the python module is to extract the relevant grammatical information for the *de* expressions from the Sinica Treebank, a parsed corpus of Chinese built by Chinese Knowledge and Information Processing (CKIP).

The sentences in the Sinica Treebank are parsed on the basis of Information-based Case Grammar (ICG), which follows the Head-Driven Principle. Some examples of how a **de construction** is parsed in the corpus are shown in (36a-36b). The labels for the nodes are consistent with the documentation on **Sinica Treebank**. Appendix A provides a glossary of all the labels. A generic syntactic category also accompanies each node in the parentheses.

(36) a. ‘Bi Sheng invented the movable type technology.’



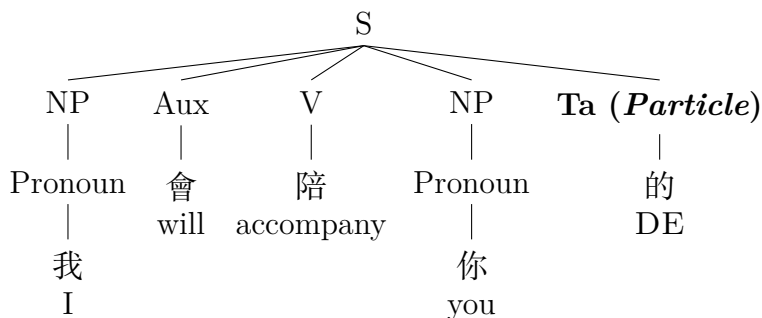
b. ‘the inheritance of love’



As shown in the examples above, the morpheme *de*, ‘的’ is labeled as DE. However, this

character also corresponds to a different usage. As shown in (37), ‘的’ is labeled as **Ta** instead of **DE** and does not help form a **modification** construction. Since this dissertation focuses on the use of *de* as linking a **XP** and a **YP**, we need to extract the **DE** labels that appear in the corpus.

(37) ‘I will accompany you.’



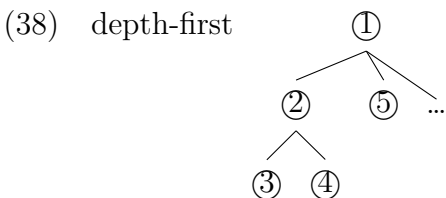
To investigate the frequencies of different grammatical categories in the **XP** position and the **YP** position of a **de construction**, we need to first see how the **XPs** are parsed in the corpus, i.e. where in the tree the **XPs** are located. As shown in (36a), a **XP** can be the left sibling of *de*, a **YP** can be the right sibling of *de*'s dominating node. However, this is not always the case. In (36b), we observe that the **XP** is still the left sibling of *de* but the **YP** is the right sibling of *de*. When comparing (36a) and (36b), we also observe that the dominating node of *de* alters depending on the locality of the **YP**. When the **YP** is c-commanding *de*, *de* and the **XP** form a constituent in the structure, which is labeled as **X-DE**, **X** referring to the category of the **XP**. When the **YP** is a sister to *de*, the dominating node of *de* reflects the category of the whole **de construction**, e.g. the top **NP** in (36b). In order to cover all of the cases in which **XPs** and **YPs** appear, the script should at least extract the dominating node of *de* (shortened as ‘**DN**’), the left sibling of *de* (shortened as ‘**LS**’), the *de* itself, the right sibling of *de* (shortened as ‘**RS**’), and the right sibling of *de*'s dominating node (shortened as ‘**RDN**’), if one exists.

In order to fulfill the aforementioned investigation, the script runs through every node of each sentence of the corpus. For each irrelevant node, the script will pass and continue

traversing the rest of the nodes. If no *de* is found in a tree, a corresponding record will be kept in the results. When a *de* node appears, the script will keep a record of the categories of DN, LS, DE, RS, and RDN, and continue traversing the rest of the tree.

The script was written based on the available corpus from sinica, which utilized the `Tree` class defined in `nlTK`. The script can handle the data type of `[Tree]`, i.e. a list of trees.

When traversing a `Tree` structure, we first need to decide in which order to traverse every node in a tree. The script uses a depth-first search, as shown in (38). It will start from the root, go through every node of a subtree, and move to the adjacent subtree. One example of implementing this search is given (38). The path the script runs through the nodes is marked by integers from 1 to 5 in an increasing order.



After going through every node in every parsed sentence in this corpus, the script will generate the desired results for each sentence together with the index number of the corresponding sentence. For a sentence that does not contain *de*, the desired result would be `none::String`. Together with the index number, the output will look like Table 3.1.

| index | output |
|-------|--------|
| 1     | none   |

Table 3.1: no *de* contained

When a sentence contains one **de construction**, the desired result would be a list of node categories in the order of DN, LS, DE, RS, and RDN. One example is shown in Table 3.2.

| index | DN  | LS      | DE | RS   | RDN         |
|-------|-----|---------|----|------|-------------|
| 49    | N·的 | Pronoun | DE | none | Common Noun |

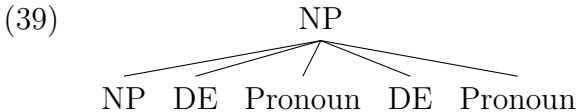
Table 3.2: one *de* contained

When a sentence contains multiple *de* constructions, the desired result would be multiple lists of node categories in the order of DN, LS, DE, RS, and RDN, associated with the same index number. One example is shown in Table 3.3.

| index | DN  | LS      | DE | RS   | RDN |
|-------|-----|---------|----|------|-----|
| 118   | V·地 | V       | DE | none | Ncc |
| 118   | N·的 | Pronoun | DE | none | Ncc |

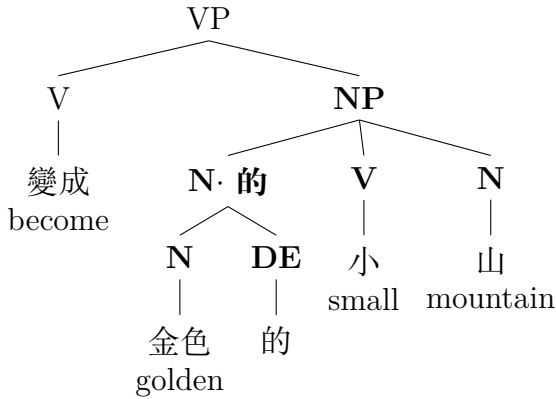
Table 3.3: example with multiple *de*

Some limitations in this procedure were observed. One limitation is due to the way the script is written. At each node, the script will check whether this node contains *de*. If yes, it will report the index number of the *de* node. Then, by subtracting 1 and adding 1 to the index number, the script will locate the left sibling and the right sibling of the *de* node. The drawback of this method is that the `list.index(element)` in Python will only report the index of the first node when there are multiple identical nodes. This limits us from extracting all the *de*-constructions if more than one *de* node is dominated by the same node, as shown in (39).



Some other limitations are partially due to the way the sentences are parsed in the corpus. As illustrated in (40), the right sibling of *de*'s dominating node is VH13, which indicates another attribute of the real YP Common Noun.

(40) ‘(pro) become a golden hill.’



The main goal of the analysis is to distinguish *de* used in NP modification, *de* used in VP modification, *de* used as a nominalizer, and *de* used in other cases. As for NP *de*, VP *de*, and the nominalizer *de*, they are all labeled as DE in the corpus. Therefore, the ones that are not labeled as DE can be taken as the misc *de*.

To distinguish the NP *de* and the VP *de*, we will rely on the category of the dominating node of *de* (DN). When *de* is modifying a noun category, its DN is labeled as ‘X·的’. When *de* is modifying a verb category, its DN is labeled as ‘X·地’. If we assume the right adjacent node to *de* is the YP, either RS or RDN can be the YP. If RS is not null, RS is used as the YP. In other cases, RDN is used. When the right sibling of *de* (RS) and the right sibling of *de*’s DN (RDN) are both null, then *de* was identified as a nominalizer *de*.

The information of the XP can be reflected by both the left sibling of *de* (LS) and *de*’s dominating node (DN). The advantage of using LS as identifier for XP is that it will keep fine-detailed subcategories of nouns and verbs in the analysis. On the other hand, using DN as identifier for XP will avoid the error of counting a partial XP as the whole and improve the accuracy of the analysis. As a compromise, the LS was used as the XP when the XP is not a DN.

Another line of investigation of this chapter is to compare the distribution frequencies of **de constructions** and *de*-less constructions in NPs since *de*-less constructions are only found in NPs. To fulfill this goal, the script will go through every node of a sentence and



check if it is a NP. If yes, the script will store the categories of its daughters. If no, the script will pass to the next node in order. The search method used here is also depth-first. A snapshot of what the output looks like is shown in Table 3.4. As shown, for each NP that appears in a sentence, the script reports the index number of the sentence, and all the daughters of the NP if any.

| index | daughter <sub>1</sub> | daughter <sub>2</sub> | ... | daughter <sub>n</sub> |
|-------|-----------------------|-----------------------|-----|-----------------------|
| 0     | Det                   |                       |     |                       |
| 1     | Abstract Noun         |                       |     |                       |
| 2     | N                     |                       |     |                       |
| 2     | DM                    | Common Noun           |     |                       |
| 3     | Pronoun               |                       |     |                       |
| 3     | Common Noun           |                       |     |                       |
| 4     | Nominalized Verb 3    | Common Noun           |     |                       |
| 5     | Pronoun               |                       |     |                       |
| 6     | none                  |                       |     |                       |
| 7     | DM                    |                       |     |                       |
| 8     | none                  |                       |     |                       |
| 9     | Pronoun               |                       |     |                       |
| 9     | Pronoun               | Noun                  |     |                       |
| 10    | Common Noun           |                       |     |                       |
| 12    | Pronoun               |                       |     |                       |
| 13    | V· 的                  | Abstract Noun         |     |                       |

Table 3.4: components of NP

From the output, we can see that a NP may have two noun categories as its daughters, such as (4) and (9) in table 3.4. The examples are typical *de*-less constructions. In the analysis, the *de*-less constructions will be identified as having at least two consecutive noun categories.

To analyze the components of *de*-less constructions, we need to identify the *de*-less constructions first. The data collected were put into different groups based on the number of daughters a NP has. For each group, if the right-most component is preceded by a noun category, it was considered to be a *de*-less construction. If a DE node or a XP· 的 node is one of a NP's daughters, the construction was considered to be a **de construction**. It is

possible that a construction is counted as a *de*-less construction and a **de construction** at the same time.

For all the *de*-less constructions identified, the right-most component was considered to be the **head**. The component preceding the **head** was considered to be the **XP**. On the other hand, the **YP** would be the **head** in each *de*-less construction, i.e., the right-most component.

### 3.3 Procedures

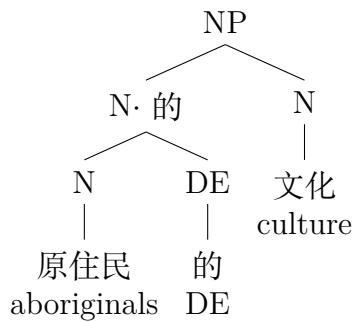
The last section focused on the computational methods that I used. This section discusses the statistical methods that I used. The first research question in this paper is whether the relation between the **XP** and the **YP** remains constant in **de constructions** as their categories vary. Secondly, this paper asks whether there is any dependency between the **XP** and the **YP**. To answer these two questions, the  $\chi^2$  test of independence was chosen due to the type of data collected being categorical. The third research question of the paper is whether **de constructions** and *de*-less constructions derive from the same underlying structure. For this question, the correlations between **de constructions** and *de*-less constructions were tested regarding the categories of the **XPs**, the categories of the **YPs**, and the pairing between the **XPs** and the **YPs**.

The  $\chi^2$  tests of independence were performed on several groups. To test the distribution of the nominal categories when used as the **YP** in **de constructions**, the nominal categories were first divided into four major categories — common nouns, nominalized nouns, **NPs**, and the rest. The possible **XPs** for nominal **YPs** in **de constructions** include nominal categories, verbal categories, prepositional phrases, and relative clauses, as discussed in Chapter 1. Based on the typology, three pairs of **XPs** were used to test the relation between the **XP** and the **YP** in **de constructions**, — **N** and **NP** for nominal **XPs**, **V** and **VP** for verbal **XPs**, and **S** and **VP** for relative clauses. The prepositional **XPs** were not included in the comparison because no syntactic or semantic minimal pairs could be found.

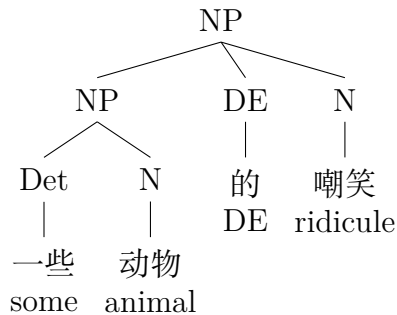
For nominal **de constructions**, **N** and **NP** were both found being used as **XPs** in the

corpus, as shown in examples in (41). The XP in (41a) and the XP in (41b) both consist of the category **Nab** except that in (41b) a quantifier is preceding the head, making a bare N into a NP. As the examples demonstrate, N and NP form a minimal pair that differ in their syntactic categories but share their semantic properties. It will be interesting to see whether the nominal YPs distribute in the same way or differently when modified by this pair of XPs. If the syntactic contrast between the XPs is associated with significantly different distributions of the major nominal categories, it will evidence that there is some dependency between the XPs and the YPs.

(41) a. ‘the aboriginal culture’



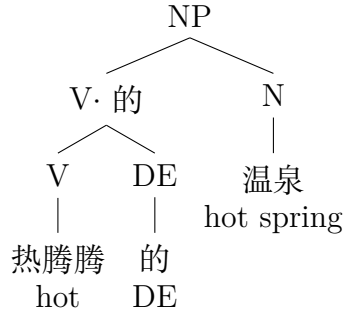
b. ‘the ridicule from some animal’



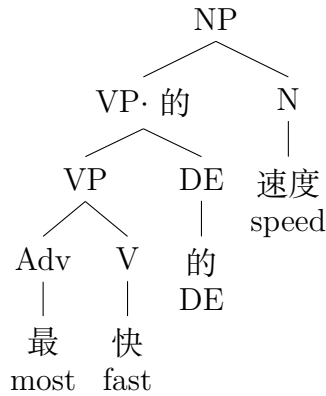
For verbal XPs, both V and VP were found modifying nominal YPs in **de constructions**. The examples in (42a-42b) illustrate a noun being modified by a V as compared to being modified by a VP. The XP in (42a) is a bare stative verb while the XP in (42b) is a VP that consists of a stative verb being modified by a degree adverb. Similar to the pair of

N and NP being used as XPs, V and VP also contrast only in their syntactic categories. Therefore, testing the distributions of the nominal YPs with this pair of XPs will provide evidence whether the YPs are sensitive to the syntactic nature of the XPs.

(42) a. ‘a hot spring that is really hot’

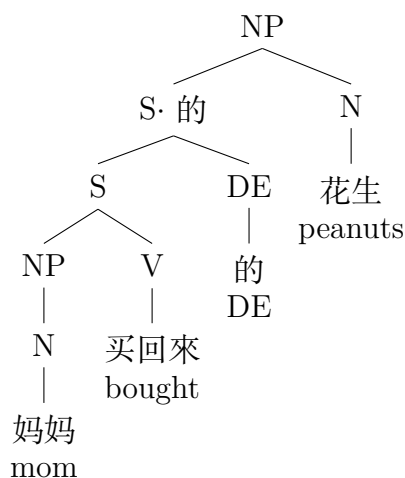


b. ‘the fastest speed’

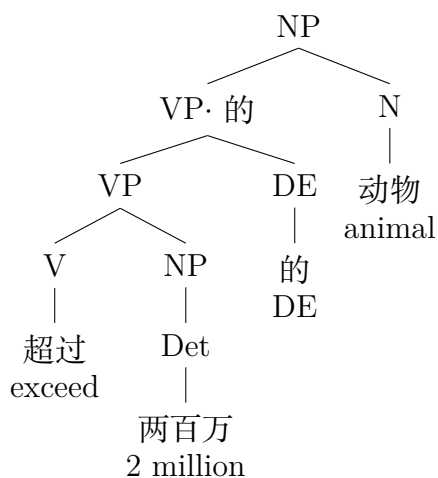


The examples in (43a-43b) compare a noun being modified by a sentence and a noun being modified by a VP. In (43a), the modified head is the object of a relative clause while in (43b), the modified head is the subject of a relative clause. This pair of XPs is associated with different syntactic roles of the YPs. The comparison of the distributions of the YPs will reveal whether there is an asymmetry between subjective relative clauses and objective relative clauses.

(43) a. ‘the peanuts that mom bought’



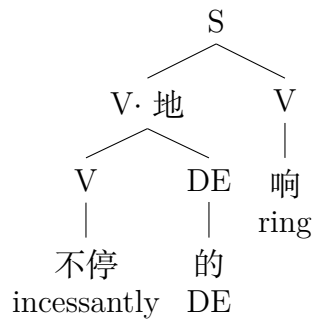
b. ‘the animals of which the number exceeds 2 million’



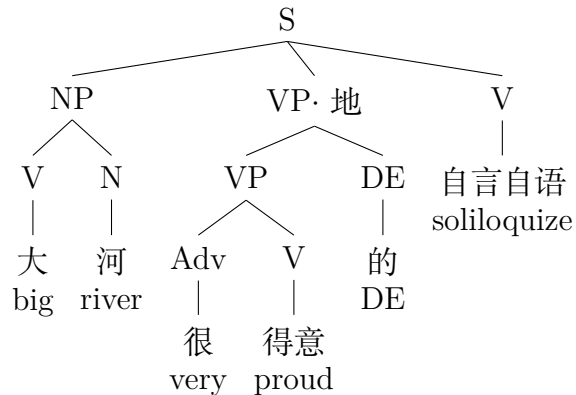
To examine the properties of the verbal **de constructions**, especially whether the semantics or the syntax of the verbal YP is more sensitive to the variation of the XP, the verbal YP were first divided into two semantically distinct classes — active verbs and stative verbs and then divided into two syntactically distinct classes — transitive and intransitive verbs. The case of VP being used as YP were excluded because the head of a VP YP was not examined during data collection and thus the information on its semantic nature or its syntactic nature is lost. Taken together with the discussion on the type of verbal **de constructions** this chapter focuses on, I searched the corpus for the form of X(P) DE V within the VP domain and found several candidates for XP. Firstly, V and VP form a pair of XP that differ

only in their syntactic categories. In (44a), the category modifying the verb head is a bare verb. In (44b), the category modifying the verb head is a VP formed by an adverb modifying the intensity of a verb. This contrast can tell us whether the YP are sensitive to the syntax of the XP in *de* constructions.

- (44) a. ‘(*pro*) is/was ringing incessantly.’

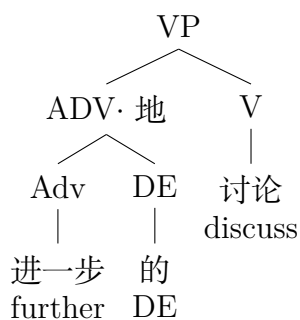


- b. ‘The big river was soliloquizing very proudly.’

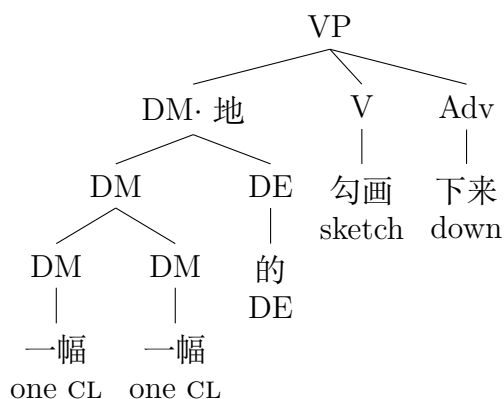


In (45a-45b), I show two other XP available for verbal YP. One is adverb, as in (45a) and the other is demonstrative, as in (45b). Unfortunately, no minimal contrast was found to form a pair with the two categories and therefore we cannot make any meaningful comparison for verbal *de* constructions.

- (45) a. ‘to discuss further’

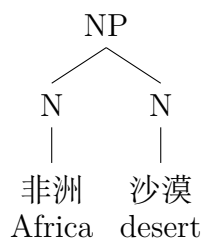


b. 'to make one sketch after another'

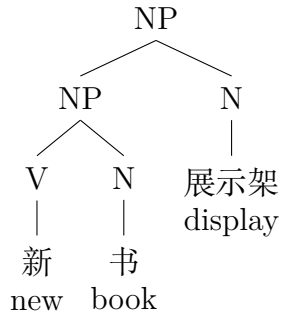


The relation between the XP and the YP was also examined for *de*-less constructions. Following the line of comparison made for **de** constructions, two pairs of XPs were used in the  $\chi^2$  test of independence for *de*-less constructions. The first pair is N and NP, as shown in (46a-46b). Examples for the pair of V and VP are shown in (47a-47b). Since the case of relative clauses being used as XPs in *de*-less constructions are not attested in the corpus, the third pair of comparison made for **de** constructions were skipped for *de*-less constructions.

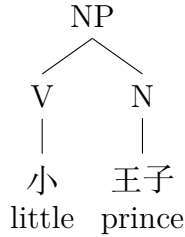
(46) a. 'African deserts'



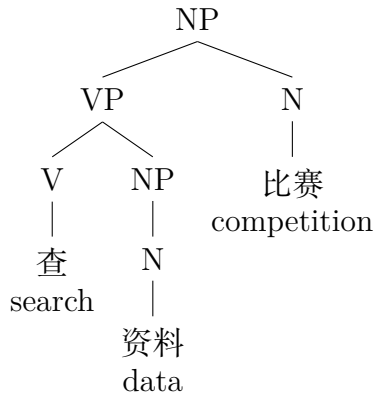
b. 'the shelf displaying new books'



(47) a. 'the little prince'



b. 'a competition of data searching'



Another important question the paper addresses is whether *de* constructions and *de*-less constructions have the same underlying structure. The two constructions were compared with regards to the categories of the XPs, the categories of the YPs, and the relation between the XPs and the YPs. To meet this end, a sequence of correlation tests were performed. Firstly, the correlation between the frequency counts of different categories used as XPs in *de* constructions and *de*-less constructions was tested to see whether the two constructions



share the same distribution of **XP**s. Secondly, the correlation between the frequency counts of different categories used as **YP**s in the two constructions was tested to see whether the two constructions share the same distribution of **YP**s. Thirdly, the correlation was tested between the frequency counts of the **XP**s with a fixed **YP** in the two constructions to see whether the relation between the **XP**s and the **YP**s remains the same in the two constructions.

## 3.4 Results

### 3.4.1 DE constructions

#### 3.4.1.1 Different uses of *de*

In total, the Sinica Treebank in the NLTK corpora has 10,000 sentence tokens available for analysis, of which 4332 tokens do not contain *de* in them. The total number of *de* (的) found using the NLTK's `nltk.FreqDist` is 6776. The total number of 的 constructions extracted from the corpus using the script is 6598. Table 3.5 shows the results divided by the type of *de* categories found in the corpus.

| categories | count |
|------------|-------|
| DE         | 6470  |
| Ta         | 124   |
| Str        | 3     |
| DM         | 1     |

Table 3.5: use of 的

This dissertation focuses on the use of ‘的’ in the modification constructions. Therefore, all the following results are calculated based on the 6470 uses of ‘的’ as ‘DE’.

The data were sliced into 10 sections with the same number of sentences in order to facilitate the program’s operation. Table 3.6 shows the accuracy of the program for each section. The accuracy was calculated by comparing the number of **de constructions** extracted using the program with the number of **de constructions** extracted using NLTK’s

native method `nlk.FreqDist`. As shown, the program successfully extracted between 95.7 and 99.63 percent of the `de` constructions in each section.

| index      | count of the program | count of the nlk | %     |
|------------|----------------------|------------------|-------|
| 1–1000     | 400                  | 402              | 99.50 |
| 1001–2000  | 330                  | 332              | 99.40 |
| 2001–3000  | 269                  | 270              | 99.63 |
| 3001–4000  | 539                  | 546              | 98.72 |
| 4001–5000  | 601                  | 612              | 98.20 |
| 5001–6000  | 804                  | 832              | 96.63 |
| 6001–7000  | 849                  | 877              | 96.81 |
| 7001–8000  | 838                  | 859              | 97.56 |
| 8001–9000  | 980                  | 1024             | 95.70 |
| 9001–10000 | 988                  | 1015             | 97.34 |
| total      | 6598                 | 6776             | 97.37 |

Table 3.6: accuracy of the script

### 3.4.1.2 Categories of the YP

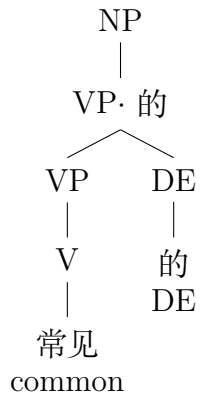
As discussed in section 3.2, the choice of YP is made between `RS` and `RDN`. From table 3.7, we can see the availability of the two nodes.

|                | RDN is not null | RDN is null |
|----------------|-----------------|-------------|
| RS is not null | 124             | 282         |
| RS is null     | 5859            | 205         |

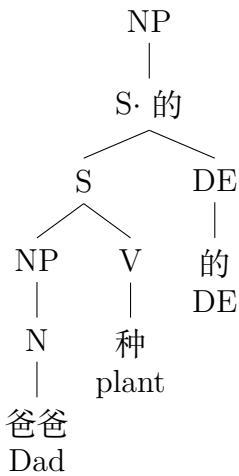
Table 3.7: RS vs. RDN

When both nodes are not empty, the corresponding mother nodes (`DN`) of `DE` are either `NP` or `VP`. In this case, the right sibling of `DE` should be considered to be the `YP` instead of the right sibling of `DE`'s dominating node (`RDN`). In the case of empty `RS` or empty `RDN`, the non-empty node between the two was considered to be the `YP`. In the case of `RS` and `RDN` both being empty, the `YP` was considered to be `null`. For example, in (48a-48b), the rightsibling of `DE` is none and the dominating node of `DE` also has no rightsibling, illustrating a null `YP`.

(48) a. ‘the common ones’



b. ‘(the tree) that Dad planted’



Based on this criterion, the YP in all the **de constructions** are extracted and sorted according to their frequencies. In total, 89 different categories can appear in the YP position in a **de construction**. Table 3.8 shows the frequencies of all the categories, which are above 50. The categories are then grouped into the nominal, the verbal, and other categories. The total counts and their percentages of the nominal group, the verbal group, and the rest are highlighted in the table.

| categories                 | count | percentage(%) |
|----------------------------|-------|---------------|
| Nominal                    | 5464  | 84.45         |
| Common Noun                | 1534  | 23.71         |
| Abstract Noun, Countable   | 1154  | 17.84         |
| Abstract Noun              | 932   | 14.40         |
| Nominalized Verb           | 484   | 7.48          |
| Location Noun 1            | 369   | 5.70          |
| NP                         | 213   | 3.29          |
| null                       | 205   | 3.17          |
| Mass Noun                  | 157   | 2.43          |
| Proper Noun                | 155   | 2.40          |
| Group Noun                 | 133   | 2.06          |
| N                          | 72    | 1.11          |
| Time Noun                  | 56    | 0.87          |
| Verbal                     | 581   | 8.98          |
| Stative Intransitive       | 338   | 5.22          |
| Active Transitive          | 122   | 1.89          |
| Active Intransitive        | 59    | 0.91          |
| Other Verbal Categories    |       |               |
| Other Categories           | 425   | 6.57          |
| DM                         | 185   | 2.86          |
| Det                        | 84    | 1.30          |
| Non-Predicative Adjectives | 60    | 0.93          |
| Others                     | 96    | 1.48          |

Table 3.8: categories of YP

As shown in Table 3.8, the nominal `de` constructions are much more frequent than the verbal `de` constructions. Among the nominal `de` constructions, `Common Noun`, `Abstract Noun, Countable` and `Abstract Noun` are the most frequent categories. Among the verbal `de` constructions, `Stative` are more frequent for intransitive verbs while `Active` are more frequent for transitive verbs. The pattern is better illustrated in Table 3.9.

| categories   | Stative | Active |
|--------------|---------|--------|
| Intransitive | 338     | 59     |
| Transitive   | 13      | 122    |

Table 3.9: categories of YP in verbal `de` constructions

### 3.4.1.3 Categories of the XP

In this section, I will provide the frequency distribution of the categories that appear at the XP position in a *de* construction. The categories of the XP were determined by examining both the dominating node (DN) and the left-sibling node (LS) of DE in a *de* construction.

Table 3.10 shows the categories of the dominating nodes (DN) of DE. The categories of DN reflect the general categories of the XP without looking into the fine differences among the minor categories within each major category, such as N, V, etc.

| rank | categories | count | cumulative percentage (%) |
|------|------------|-------|---------------------------|
| 1    | VP· 的      | 1575  | 23.37                     |
| 2    | N· 的       | 1250  | 41.91                     |
| 3    | V· 的       | 929   | 55.70                     |
| 4    | S· 的       | 868   | 68.58                     |
| 5    | NP· 的      | 826   | 80.83                     |
| 6    | NP         | 404   | 86.82                     |
| 7    | V· 地       | 173   | 89.39                     |
| 8    | GP· 的      | 108   | 90.99                     |
| 9    | PP· 的      | 75    | 92.11                     |
| 10   | A· 的       | 70    | 93.15                     |
| 11   | DM· 的      | 68    | 94.15                     |
| 12   | ADV· 地     | 51    | 94.91                     |
| 13   | VP· 地      | 43    | 95.55                     |
| 14   | DM· 地      | 8     | 95.67                     |
| 15   | ADV· 的     | 7     | 95.77                     |
| 16   | N· 地       | 4     | 95.83                     |
| 17   | VP         | 3     | 95.88                     |
| 18   | A· 地       | 2     | 95.91                     |
| 19   | N          | 1     | 95.92                     |
| 20   | 得 ·VP      | 1     | 95.93                     |
| 21   | S          | 1     | 95.95                     |
| 22   | NP· 地      | 1     | 95.96                     |
| 23   | S· 地       | 1     | 95.98                     |
| 24   | PP· 地      | 1     | 95.99                     |

Table 3.10: mother nodes of *de*

Table 3.11 shows the categories of DE's left siblings (LS). The categories of LS reveal the distributions of the minor categories, such as *Pronoun*, *Common Noun*, etc. By looking at the distributions of LS, we can understand whether the subtle semantic differences could cause any distributional differences.

| rank | categories                   | count | cumulative percentage (%) |
|------|------------------------------|-------|---------------------------|
| 1    | VP                           | 1657  | 24.58                     |
| 2    | NP                           | 1035  | 39.94                     |
| 3    | S                            | 877   | 52.95                     |
| 4    | Stative Intransitive         | 815   | 65.04                     |
| 5    | Pronoun 1                    | 294   | 69.41                     |
| 6    | Common Noun                  | 223   | 72.72                     |
| 7    | Location Noun 1              | 128   | 74.61                     |
| 8    | GP                           | 117   | 76.35                     |
| 9    | PP                           | 114   | 78.04                     |
| 10   | Abstract Noun                | 107   | 79.63                     |
| 11   | Proper Noun                  | 105   | 81.19                     |
| 12   | DM                           | 84    | 82.43                     |
| 13   | Non-Predicative Adjective    | 78    | 83.59                     |
| 14   | Abstract Noun, Countable     | 75    | 84.70                     |
| 15   | Active Intransitive Verb 4   | 60    | 85.59                     |
| 16   | Location Noun 2              | 55    | 86.41                     |
| 17   | Determinative                | 51    | 87.17                     |
| 18   | Pronoun 2                    | 45    | 87.83                     |
| 19   | Stative Intransitive Verb 21 | 43    | 88.47                     |
| 20   | Manner Adverb                | 36    | 89.01                     |
| 21   | Active Transitive 2          | 34    | 89.51                     |
| 22   | Location Noun 5              | 33    | 90.00                     |

Table 3.11: left siblings of *de*

The choice between DN and LS as the XP for the analysis was made based on whether an explicit character for DE is included in the DN node. If the XP category indicated by DN is a phrasal category, such as VP, NP, the DN node was used as the indicator for the XP. If the XP category indicated by DN is at a morpheme level, such as N, V, the LS node was used as the indicator for the XP. When the DN node does not include any character for DE, there is

no way to figure out the category for the XP. In these cases the LS node was used to indicate the category for the XP. After further filtering, Table 3.12 shows a list of categories that can appear in the XP position of a `de` construction and their frequencies.

| rank | categories                   | count | cumulative percentage (%) |
|------|------------------------------|-------|---------------------------|
| 1    | VP                           | 1656  | 24.57                     |
| 2    | NP                           | 1041  | 40.01                     |
| 3    | S                            | 883   | 53.12                     |
| 4    | Stative Intransitive         | 812   | 65.16                     |
| 5    | Pronoun                      | 293   | 69.51                     |
| 6    | Common Noun                  | 220   | 72.77                     |
| 7    | Location Noun 1              | 127   | 74.66                     |
| 8    | GP                           | 118   | 76.41                     |
| 9    | PP                           | 115   | 78.12                     |
| 10   | Abstract Noun                | 106   | 79.69                     |
| 11   | Proper Noun                  | 105   | 81.25                     |
| 12   | DM                           | 81    | 82.45                     |
| 13   | Non-Predicative Adjective    | 78    | 83.61                     |
| 14   | Abstract Noun, Countable     | 75    | 84.72                     |
| 15   | Active Intransitive Verb 4   | 60    | 85.61                     |
| 16   | Location Noun 2              | 55    | 86.42                     |
| 17   | Determinative                | 51    | 87.18                     |
| 18   | Pronoun 2                    | 45    | 87.85                     |
| 19   | Stative Intransitive Verb 21 | 43    | 88.49                     |
| 20   | Manner Adverb                | 36    | 89.02                     |
| 21   | Active Transitive 2          | 34    | 89.53                     |
| 22   | Location Noun 5              | 33    | 90.01                     |

Table 3.12: frequency of the modifier

Table B1 — B17 in the Appendix B illustrate the categories that appear in the XP position as the YP changes.

#### 3.4.1.4 Nominal `de` constructions

In this section, I will focus on the distribution of the nominal YP in `de` constructions. I will attempt to answer the question whether the subcategories of nouns behave in the same

way in `de constructions`.

Table 3.13 shows the distribution of nouns (including Common Noun, Mass Noun, Abstract Noun, Abstract Noun (Countable)), nominalized nouns, and the rest of the nouns (such as proper nouns and location nouns) used as YP for each major XP category. The three major divisions of nouns behave significantly differently ( $\chi^2 = 434.54$ ,  $df = 18$ ,  $p < 0.01$ ). Common nouns are the most frequently used as the YP among nouns in `de constructions`, approximating 78.7%. Nominalized nouns in general are less frequently used as YP. However, when the XP is an NP, the frequency of using nominalized nouns as YP goes up. The category of other nouns consist of 20 unique subcategories of nouns. In total, they appear as YP in 11.5% of `de constructions` that are headed by nouns.

| YP          | XP  |    |     |     |    |     |     |     |      |        |
|-------------|-----|----|-----|-----|----|-----|-----|-----|------|--------|
|             | ADJ | GP | N   | NP  | PP | PRO | S   | V   | VP   | OTHERS |
| Common Noun | 47  | 62 | 575 | 537 | 50 | 269 | 543 | 720 | 1001 | 105    |
| Nom Noun    | 8   | 11 | 53  | 215 | 31 | 6   | 26  | 59  | 64   | 11     |
| Other Noun  | 4   | 11 | 98  | 85  | 3  | 33  | 70  | 71  | 193  | 12     |

Table 3.13: Comparing major divisions of noun YP in `de constructions`

The research question I try to answer here is whether the noun YP distribute differently based on their categories. It would be interesting to see how the noun YP distribute when the XP fall into the same semantic class but carry different syntactic categories. Firstly, the distribution of the noun YP was examined when the XP are N and NP, as illustrated in Table 3.14. A chi-square test of independence was performed to examine whether the distribution of the noun YP was independent from the categories of the XP, i.e. N and NP in this case. The relation between the categories of the YP and the XP was significant,  $\chi^2$  ( $df = 2$ ) = 90.94,  $p < 0.01$ . The results indicate that nominalized nouns are more likely to be modified by an NP than N.



| YP          | XP  |     |
|-------------|-----|-----|
|             | N   | NP  |
| Common Noun | 569 | 537 |
| Nom Noun    | 53  | 215 |
| Other Noun  | 95  | 84  |

Table 3.14: Comparing N and NP as XP for N YP

The relation between the YP and the XP in nominal **de constructions** was also examined when the categories of the XP are V and VP. A chi-square test of independence was performed and the results once again show that the relation between the categories of the YP and the XP was significant ( $\chi^2 = 26.72$ ,  $df = 2$ ,  $p < 0.01$ ). The other nouns are much more likely to be modified by VP than V although in general nouns are more likely to be modified by VP.

| YP          | XP  |      |
|-------------|-----|------|
|             | V   | VP   |
| Common Noun | 720 | 1001 |
| Nom Noun    | 59  | 64   |
| Other Noun  | 68  | 193  |

Table 3.15: Comparing V and VP as XP for N YP

Taking the two results together, it appears that the syntactic categories of the XP make a difference to the distribution of noun YP in **de constructions**.

The relation between the YP and the XP in nominal **de constructions** was further examined when the categories of the XP are S and VP for that both S and VP are candidates for a relative clause structure. The  $\chi^2$  results confirmed a significant difference between the distribution of the YP when the XP are S and VP ( $\chi^2 = 9.75$ ,  $df = 2$ ,  $p < 0.01$ ).

| YP          | XP  |      |
|-------------|-----|------|
|             | S   | VP   |
| Common Noun | 543 | 1001 |
| Nom Noun    | 26  | 64   |
| Other Noun  | 67  | 193  |

Table 3.16: Comparing S and VP as XP for N YP

To get a closer look at the distribution of the common nouns, which head 78.7% of nominal `de` constructions, I break them down into subcategories. The distribution of the subcategories is illustrated in Table 3.17, from which it can be inferred that the distribution of common nouns heavily centralizes around `Common Noun` (39%), `Abstract Noun, Countable` (30%), and `Abstract Noun` (24%), rounding up to a total of 93%.

| YP                       | XP  |     |     |    |     |     |    |     |     |     |     |      |
|--------------------------|-----|-----|-----|----|-----|-----|----|-----|-----|-----|-----|------|
|                          | ADJ | ADV | DET | GP | N   | NP  | PP | PRO | S   | V   | VP  | Misc |
| Mass Noun                | 2   | 1   | 3   | 3  | 31  | 20  | 2  | 4   | 14  | 44  | 27  | 6    |
| Common Noun              | 21  | 1   | 23  | 17 | 236 | 204 | 6  | 141 | 139 | 296 | 430 | 20   |
| Abstract Noun, Countable | 17  | 2   | 8   | 23 | 131 | 162 | 17 | 50  | 231 | 195 | 300 | 17   |
| Abstract Noun            | 7   | 4   | 6   | 18 | 155 | 138 | 24 | 62  | 137 | 160 | 206 | 15   |
| Group Noun 1             | 0   | 0   | 0   | 0  | 1   | 0   | 0  | 2   | 1   | 4   | 6   | 1    |
| Group Noun 2             | 0   | 0   | 3   | 1  | 15  | 13  | 1  | 5   | 21  | 21  | 32  | 6    |

Table 3.17: Comparing major divisions of common noun YP in `de` constructions

According to the annotation of the `Sinica Treebank`, `Common Noun` codes `common noun`; `Abstract Noun, Countable` codes `countable, abstract noun`; `Abstract Noun` codes `abstract noun`.

The distribution of the major subcategories, `Common Noun`, `Abstract Noun, Countable`, and `Abstract Noun` when used as YP is illustrated in Table 3.18. The distribution of the three subcategories differs significantly ( $\chi^2 = 107.84$ ,  $df = 14$ ,  $p < 0.01$ ). The division between the three common noun subcategories is made on semantic grounds. The results

evidence that different semantic types are sensitive to the syntactic categories they associate with.

| YP                       | XP  |     |     |     |     |     |     |       |
|--------------------------|-----|-----|-----|-----|-----|-----|-----|-------|
|                          | ADJ | N   | NP  | PRO | S   | V   | VP  | OTHER |
| Common Noun              | 21  | 236 | 204 | 141 | 139 | 296 | 430 | 67    |
| Abstract Noun, Countable | 17  | 133 | 162 | 54  | 231 | 195 | 300 | 61    |
| Abstract Noun            | 7   | 158 | 138 | 63  | 137 | 160 | 206 | 63    |

Table 3.18: Comparing major divisions of main common noun YP in *de* constructions

To understand where the different distribution comes from, a sequence of closer examination was performed. When the XP are N and NP, the  $\chi^2$  results show that the three subcategories have similar distributions ( $\chi^2 = 6.02$ ,  $df = 2$ ,  $p > 0.01$ ).

| YP                       | XP  |     |
|--------------------------|-----|-----|
|                          | N   | NP  |
| Common Noun              | 236 | 204 |
| Abstract Noun, Countable | 133 | 162 |
| Abstract Noun            | 158 | 138 |

Table 3.19: Comparing N and NP as XP for common noun YP

The distribution of the three subcategories was also compared when the XP are V and VP. The  $\chi^2$  results do not reveal any significant difference among their distributions ( $\chi^2 = 1.66$ ,  $df = 2$ ,  $p > 0.01$ ).

| YP                       | XP  |     |
|--------------------------|-----|-----|
|                          | V   | VP  |
| Common Noun              | 296 | 430 |
| Abstract Noun, Countable | 195 | 300 |
| Abstract Noun            | 160 | 206 |

Table 3.20: Comparing V and VP as XP for common noun YP

However, when the XP are S and VP, the distributions of the three subcategories were significantly different, confirmed by the  $\chi^2$  results ( $\chi^2 = 48.41$ ,  $df = 2$ ,  $p < 0.01$ ).

| YP                       | XP  |     |
|--------------------------|-----|-----|
|                          | S   | VP  |
| Common Noun              | 139 | 430 |
| Abstract Noun, Countable | 231 | 300 |
| Abstract Noun            | 137 | 206 |

Table 3.21: Comparing S and VP as XP for common noun YP

### 3.4.1.5 Verbal **de constructions**

In this section, I will focus on the distribution of YP in verbal **de constructions**. Compared with nominal **de constructions**, the total number of verbal **de constructions** drops by a great extent. To examine whether the YP and the XP are independent in verbal **de constructions**, the YP were first divided into active verbs and stative verbs on a semantic basis and into transitive and intransitive verbs on a syntactic basis. The distribution of the different classes of verbs was then examined and compared when the XP vary. If the variation of the XP sees significantly different distributions of the semantically distinct verb classes, it will suggest that the YP and the XP are not independent semantically. On a similar logic, if the variation of the XP cooccurs with the variation of the distribution of syntactically distinct verb classes, it will suggest that the YP and the XP are not totally independent syntactically.

In Table 3.22, I compare the distribution of active verbs and stative verbs for all available XP. Their behaviors in **de constructions** do not differ significantly, as evidenced by the  $\chi^2$  results ( $\chi^2 = 2.80$ ,  $df = 4$ ,  $p > 0.01$ ).

| YP      | XP  |    |     |    |        |
|---------|-----|----|-----|----|--------|
|         | ADV | DM | V   | VP | OTHERS |
| Active  | 28  | 5  | 100 | 14 | 5      |
| Stative | 5   | 0  | 15  | 4  | 0      |

Table 3.22: Comparing *active* and *stative* verb YP in *de* constructions

To better interpret the relation between the XP and the YP, finer comparisons were made between the distributions of active verbs and stative verbs. Table 3.23 only shows the frequency of the active verbs and the stative verbs being used as YP when the XP are V and VP. Due to the limit number of tokens, no statistically meaningful conclusions could be drawn here.

| YP      | XP  |    |
|---------|-----|----|
|         | V   | VP |
| Active  | 100 | 14 |
| Stative | 15  | 4  |

Table 3.23: Comparing V and VP as XP for *active* and *stative* verb YP

For verbal *de* constructions, the comparison was also made between ADV XP and DM XP. Table 3.24 shows the distribution of active verbs and stative verbs when the XP are ADV and DM. Due to the limited number of tokens, no statistically meaningful conclusions could be drawn here.

| YP      | XP  |    |
|---------|-----|----|
|         | ADV | DM |
| Active  | 28  | 5  |
| Stative | 5   | 0  |

Table 3.24: Comparing Adv and DM as XP for *active* and *stative* verb YP

In the following, I will examine whether the two syntactically distinct verb classes behave

the same way in **de constructions**. Table 3.25 shows the frequencies of the two classes of verbs modified by different syntactic categories. No inferences could be made here due to limited tokens available.

| YP           | XP  |    |    |    |        |
|--------------|-----|----|----|----|--------|
|              | ADV | DM | V  | VP | OTHERS |
| Intransitive | 16  | 0  | 47 | 4  | 0      |
| Transitive   | 17  | 5  | 68 | 14 | 5      |

Table 3.25: Comparing *intransitive* and *transitive* verb YP in **de constructions**

What type of variation associated with the XP that the YP are sensitive to was further investigated. Table 3.26 shows the frequency of the YP when the XP are V and VP. According to the results from the  $\chi^2$  independency test, transitive verbs and intransitive verbs do not distribute significantly differently ( $\chi^2 = 1.57$ ,  $df = 1$ ,  $p > 0.01$ ).

| YP           | XP |    |
|--------------|----|----|
|              | V  | VP |
| Intransitive | 47 | 4  |
| Transitive   | 68 | 14 |

Table 3.26: Comparing V and VP as XP for *intransitive* and *transitive* verb YP

When the XP are ADV and DM, the distribution of transitive verbs and intransitive verbs was also compared. As shown in Table 3.27, transitive verbs are never modified by PP in **de constructions**, which differs from intransitive verbs by 5 counts. Unfortunately, the number of occurrences is so limited that no statistically meaningful inferences can be drawn here.

| YP           | XP  |    |
|--------------|-----|----|
|              | ADV | DM |
| Intransitive | 16  | 0  |
| Transitive   | 17  | 5  |

Table 3.27: Comparing Adv and DM as XP for *intransitive* and *transitive* verb YP

### 3.4.1.6 Compare the nominal and the verbal *de* constructions

As shown in Table 3.8, the nominal *de* constructions are much more frequent than the verbal *de* constructions. Table 3.28 shows the distribution of the XP for the nominal and the verbal *de* constructions. As shown, only V and VP are found in the XP position in both the nominal and the verbal *de* constructions. V and VP are both the most frequent categories found in the XP position of the nominal and verbal *de* constructions. The distributional evidence shows that the nominal and the verbal features of the YP determine the distribution of their modifiers.

| YP      | XP   |     |     |     |     |     |     |     |
|---------|------|-----|-----|-----|-----|-----|-----|-----|
|         | VP   | V   | NP  | N   | S   | PRO | ADJ | ADV |
| Nominal | 1258 | 850 | 837 | 673 | 639 | 308 | 59  | 0   |
| Verbal  | 18   | 115 | 0   | 0   | 0   | 0   | 0   | 33  |

Table 3.28: Comparing the XP distributions in nominal and verbal *de* constructions

In the next section, I will follow a similar structure as this section and show the findings for the *de*-less constructions so that we can make a comparison between *de* constructions and *de*-less constructions later.

### 3.4.2 *de*-less construction

For all the tokens in the corpus, 405 of them do not contain an NP. After excluding these tokens, 27147 noun phrases were collected in total. The number of daughters an NP can

have varies from 1 to 9. The frequency of the number of daughters an NP has is shown in table 3.29.

| # of daughters a NP has | # of NPs |
|-------------------------|----------|
| 1                       | 9828     |
| 2                       | 11651    |
| 3                       | 4481     |
| 4                       | 906      |
| 5                       | 224      |
| 6                       | 39       |
| 7                       | 15       |
| 8                       | 2        |
| 9                       | 1        |

Table 3.29: the frequency of different number of daughters

For all the NPs that have only one daughter, the frequency of different syntactic categories is partly shown in table 3.30.

| categories               | count |
|--------------------------|-------|
| Common Noun              | 2457  |
| Pronoun                  | 2130  |
| Proper Noun              | 745   |
| Abstract Noun            | 734   |
| Location Noun 1          | 651   |
| Abstract Noun, Countable | 594   |
| Location Noun 2          | 350   |
| Mass Noun                | 242   |
| Determinative            | 235   |
| Group Noun 2             | 204   |
| Pronoun 2                | 169   |
| N                        | 121   |
| Nominalized Verb 4       | 116   |
| VP· 的                    | 110   |
| ...                      | ...   |

Table 3.30: different categories that make a NP



### 3.4.2.1 Categories of YP in *de*-less constructions

The table in 3.31 shows the frequency of the categories that can be the **head** of a NP. The right most daughter of an NP was chosen to be its **head**. In total, 70 different categories can function as the **head** of an NP when they are preceded by at least one other node. This paper considers these **heads** to be candidates of YP.

| rank | categories               | count | cumulative percentage (%) |
|------|--------------------------|-------|---------------------------|
| 1    | Common Noun              | 4839  | 27.940412                 |
| 2    | Abstract Noun, Countable | 3167  | 46.226687                 |
| 3    | Abstract Noun            | 1871  | 57.029852                 |
| 4    | NP                       | 1707  | 66.886079                 |
| 5    | Location Noun 2          | 1267  | 74.201744                 |
| 6    | Location Noun 4          | 1143  | 80.801432                 |
| 7    | Proper Noun              | 507   | 83.728853                 |
| 8    | Mass Noun                | 348   | 85.738207                 |
| 9    | Nominalized Verb 1       | 341   | 87.707142                 |
| 10   | Nominalized Verb 4       | 332   | 89.624112                 |
| 11   | Group Noun 2             | 332   | 91.541082                 |

Table 3.31: Categories of YP in **noun phrases**

### 3.4.2.2 Categories of XP in *de*-less constructions

For each **head** in an NP, its left sibling was chosen to be the XP. Table 3.32 shows the frequency of the categories of the XP. As shown in Table 3.32, not all XP candidates are XP, such as demonstratives and conjunctions. Furthermore, this list of XP also includes *de modifiers*, as in row 5, 6, 7, 11, 12. A list of true XP in a *de*-less construction should exclude these categories.

| rank | categories              | count | cumulative percentage (%) |
|------|-------------------------|-------|---------------------------|
| 1    | NP                      | 1550  | 8.949708                  |
| 2    | Common Noun             | 1337  | 16.669554                 |
| 3    | Conjunction             | 1139  | 23.246146                 |
| 4    | DM                      | 1072  | 29.435880                 |
| 5    | VP· 的                   | 1037  | 35.423523                 |
| 6    | N· 的                    | 1026  | 41.347653                 |
| 7    | V· 的                    | 773   | 45.810959                 |
| 8    | Abstract Noun           | 744   | 50.106819                 |
| 9    | Location Noun 1         | 734   | 54.344939                 |
| 10   | Stative Intransitive    | 693   | 58.346325                 |
| 11   | NP· 的                   | 635   | 62.012818                 |
| 12   | S· 的                    | 579   | 65.355967                 |
| 13   | Stative Intransitive 13 | 434   | 67.861886                 |
| 14   | Proper Noun             | 405   | 70.200358                 |

Table 3.32: Categories of XP in **noun phrases**

Table 3.33 shows the frequency of the XP categories in *de*-less constructions.

| rank | categories               | count | cumulative percentage (%) |
|------|--------------------------|-------|---------------------------|
| 1    | NP                       | 1550  | 14.809861                 |
| 2    | Common Noun              | 1337  | 27.584560                 |
| 3    | Abstract Noun            | 744   | 34.693293                 |
| 4    | Location Noun 1          | 734   | 41.706478                 |
| 5    | Stative Intransitive     | 693   | 48.327919                 |
| 6    | Stative Intransitive 13  | 434   | 52.474680                 |
| 7    | Proper Noun              | 405   | 56.344353                 |
| 8    | Abstract Noun, Countable | 396   | 60.128034                 |
| 9    | Location Noun 2          | 392   | 63.873495                 |

Table 3.33: Categories of XP in ***de*-less constructions**

### 3.4.2.3 The relation between YP and their XP

As discussed in 3.4.2.1, the data from *de*-less constructions were collected restrictively from NPs because *de*-less modification outside NPs is ill-defined. Therefore, when looking at the relation between the YP and the XP in *de*-less constructions, the YP will always be nominal categories.

Table 3.34 shows the frequency of the three major divisions among nouns, i.e. common nouns, nominalized nouns, and other nouns, being used as the YP when the XP vary. A  $\chi^2$  independency test was performed and the results reveal a significant difference for the three groups of nouns ( $\chi^2 = 920.55$ ,  $df = 10$ ,  $p < 0.01$ ).

| YP          | XP  |    |      |     |    |     |    |      |     |        |
|-------------|-----|----|------|-----|----|-----|----|------|-----|--------|
|             | ADJ | GP | N    | NP  | PP | PRO | S  | V    | VP  | OTHERS |
| Common Noun | 212 | 10 | 3342 | 386 | 13 | 118 | 53 | 1081 | 136 | 4      |
| Nom Noun    | 9   | 3  | 171  | 80  | 3  | 3   | 0  | 49   | 5   | 24     |
| Other Noun  | 45  | 3  | 1929 | 668 | 0  | 61  | 6  | 71   | 9   | 3      |

Table 3.34: Comparing major divisions of noun YP in *de*-less constructions

To investigate which property of the XP is responsible for the different distribution of the YP in *de*-less constructions, several pairs of XP that differ by one and only one property were analyzed. Table 3.35 shows the frequency of the common nouns, nominalized nouns, and other nouns when the XP are N and NP, which is a pair that differs only by their syntactic category.  $\chi^2$  results reveal that the distribution of common nouns, nominalized nouns and other nouns are significantly different when being modified by N and NP ( $\chi^2 = 292.45$ ,  $df = 2$ ,  $p < 0.01$ ).

| YP          | XP   |     |
|-------------|------|-----|
|             | N    | NP  |
| Common Noun | 3342 | 386 |
| Nom Noun    | 171  | 80  |
| Other Noun  | 1929 | 668 |

Table 3.35: Comparing N and NP as XP for N YP in *de*-less constructions

Table 3.36 shows the distribution of common nouns, nominalized nouns, and other nouns when the XP are V and VP, a pair that also differ only by that syntactic category. The  $\chi^2$  results show that the distribution of common nouns, nominalized nouns and other nouns is similar when they are modified by V and VP ( $\chi^2 = 0.19$ ,  $df = 2$ ,  $p > 0.01$ ).

| YP          | XP   |     |
|-------------|------|-----|
|             | V    | VP  |
| Common Noun | 1081 | 136 |
| Nom Noun    | 49   | 5   |
| Other Noun  | 71   | 9   |

Table 3.36: Comparing V and VP as XP for N YP in *de*-less constructions

The distribution of the subcategories of common nouns is further examined. Similar to the observation from examining *de* constructions, the distribution of common nouns centers around three major subcategories, **Common Noun**, **Abstract Noun**, **Countable**, and **Abstract Noun**, as demonstrated in Table 3.37. Thus, the following discussion on the distribution of common nouns will focus on **Common Noun**, **Abstract Noun**, **Countable**, and **Abstract Noun**.

| YP                       | XP  |      |     |     |     |    |        |
|--------------------------|-----|------|-----|-----|-----|----|--------|
|                          | ADJ | N    | NP  | PRO | V   | VP | OTHERS |
| Mass Noun                | 7   | 76   | 18  | 0   | 52  | 1  | 1      |
| Common Noun              | 88  | 1410 | 193 | 67  | 618 | 40 | 25     |
| Abstract Noun, Countable | 66  | 1070 | 105 | 7   | 234 | 63 | 37     |
| Abstract Noun            | 37  | 599  | 56  | 29  | 141 | 29 | 17     |
| Group Noun 1             | 2   | 61   | 3   | 12  | 3   | 0  | 0      |
| Group Noun 2             | 12  | 126  | 11  | 3   | 33  | 3  | 0      |

Table 3.37: Comparing major divisions of common noun YP in *de*-less constructions

The distribution of **Common Noun**, **Abstract Noun**, **Countable**, and **Abstract Noun** was first examined and compared when the XP are N and NP, as illustrated in Table 3.38. The  $\chi^2$  results suggest that **Common Noun**, **Abstract Noun**, **Countable**, and **Abstract Noun** behave significantly differently when the XP are N and NP ( $\chi^2 = 9.78$ ,  $df = 2$ ,  $p < 0.01$ ).

| YP                       | XP   |     |
|--------------------------|------|-----|
|                          | N    | NP  |
| Common Noun              | 1410 | 193 |
| Abstract Noun, Countable | 1070 | 105 |
| Abstract Noun            | 599  | 56  |

Table 3.38: Comparing N and NP as XP for major common noun YP

Table 3.39 shows the frequency of **Common Noun**, **Abstract Noun**, **Countable**, and **Abstract Noun** when the XP are V and VP. According to the  $\chi^2$  results ( $\chi^2 = 50.73$ ,  $df = 2$ ,  $p < 0.01$ ), the common nouns distribute significantly differently when being modified by V and VP.

| YP                       | XP  |    |
|--------------------------|-----|----|
|                          | V   | VP |
| Common Noun              | 618 | 40 |
| Abstract Noun, Countable | 234 | 63 |
| Abstract Noun            | 141 | 29 |

Table 3.39: Comparing V and VP as XP for major common noun YP

### 3.4.3 DE constructions vs. *de*-less constructions

One of the research questions of this project is whether **de constructions** and *de*-less constructions derive from the same underlying structure. Now we can address this question by first comparing the distribution of the XP and the YP in both constructions. Since the data for **de**-less constructions were drawn from NPs, I will restrict the comparison to YP that can head a NP, thus excluding the verb YP. The comparison will be made regarding three aspects – the categories of the YP, the categories of the XP, and distribution of the noun YP.

#### 3.4.3.1 Categories of YP

Table 3.40 shows the frequency of the most frequently modified heads in **de constructions** in contrast with their occurrences in *de*-less constructions. As shown, the head of a **de construction** has the option of being null while in *de*-less constructions, it must be filled. After restricting the comparison to the categories that can head both **de constructions** and *de*-less constructions, a positive correlation was found between the frequency of YP in **de constructions** and that in *de*-less constructions,  $r = 0.94$ ,  $p < 0.01$ . This correlation evidences that the nature of the heads in *de constructions* and *de*-less constructions is similar.

|                          | de   |          | de-less |          |
|--------------------------|------|----------|---------|----------|
| Common Noun              | 1534 | (23.70%) | 4839    | (27.94%) |
| Abstract Noun, Countable | 1153 | (17.82%) | 3167    | (18.28%) |
| Abstract Noun            | 932  | (14.40%) | 1871    | (10.80%) |
| Stative Intransitive     | 222  | (3.43%)  | 3       | (0.02%)  |
| Nominalized Verb1        | 221  | (3.42%)  | 341     | (1.97%)  |
| Nominalized Verb 4       | 214  | (3.31%)  | 332     | (1.92%)  |
| NP                       | 213  | (3.29%)  | 1707    | (9.86%)  |
| none                     | 205  | (3.17%)  | 0       | (0%)     |
| DM                       | 185  | (2.86%)  | 144     | (0.83%)  |
| Location Noun 2          | 180  | (2.78%)  | 1267    | (7.32%)  |
| Mass Noun                | 157  | (2.43%)  | 348     | (2.01%)  |
| Proper Noun              | 150  | (2.32%)  | 507     | (2.93%)  |
| Location Noun 1          | 139  | (2.15%)  | 170     | (0.98%)  |
| Group Noun 2             | 118  | (1.82%)  | 332     | (1.92%)  |
| Stative Intransitive 13  | 91   | (1.41%)  | 1       | (0.01%)  |
| N                        | 72   | (1.11%)  | 104     | (0.60%)  |
| A                        | 60   | (0.93%)  | 0       | (0%)     |

Table 3.40: The frequency of YP in **de constructions** and *de*-less constructions

### 3.4.3.2 Categories of XP

Table 3.41 shows the frequency of part of the XP that appear in **de constructions** and *de*-less constructions following their frequency ranking in *de constructions*. There was a positive correlation between the frequency of the XP in **de constructions** and that in *de*-less constructions,  $r = 0.36$ ,  $p < 0.01$ . The correlation indicates that the XP in both constructions have a similar distribution and further suggests that the XP in **de constructions** and *de*-less constructions do not differ by nature.

|                              | de   |          | de-less |         |
|------------------------------|------|----------|---------|---------|
| VP                           | 1656 | (25.60%) | 167     | (0.96%) |
| NP                           | 1041 | (16.09%) | 1550    | (8.95%) |
| S                            | 883  | (13.65%) | 80      | (0.46%) |
| Stative Intransitive         | 812  | (12.55%) | 693     | (4.00%) |
| Pronoun                      | 293  | (4.53%)  | 194     | (1.12%) |
| Common Noun                  | 220  | (3.40%)  | 1337    | (7.72%) |
| Location Noun 1              | 127  | (1.96%)  | 734     | (4.24%) |
| GP                           | 118  | (1.82%)  | 21      | (0.12%) |
| PP                           | 115  | (1.78%)  | 19      | (0.11%) |
| Abstract Noun                | 106  | (1.64%)  | 744     | (4.30%) |
| Proper Noun                  | 105  | (1.62%)  | 405     | (2.34%) |
| DM                           | 81   | (1.25%)  | 1072    | (6.19%) |
| A                            | 78   | (1.21%)  | 268     | (1.55%) |
| Abstract Noun, Countable     | 75   | (1.16%)  | 396     | (2.29%) |
| Active Intransitive Verb 4   | 60   | (0.93%)  | 13      | (0.08%) |
| Location Noun 2              | 55   | (0.85%)  | 392     | (2.26%) |
| Determinative                | 51   | (0.79%)  | 378     | (2.18%) |
| Pronoun 2                    | 45   | (0.70%)  | 25      | (0.14%) |
| Stative Intransitive Verb 21 | 43   | (0.66%)  | 20      | (0.12%) |
| Manner Adverb                | 36   | (0.56%)  | 12      | (0.07%) |
| Active Transitive 2          | 34   | (0.53%)  | 17      | (0.10%) |
| Location Noun 5              | 33   | (0.51%)  | 40      | (0.23%) |

Table 3.41: The frequency of XP in *de* constructions and *de*-less constructions

### 3.4.3.3 Distribution of noun YP

In this section, I will compare the relation between the XP and the YP in *de* constructions and in *de*-less constructions. Table 3.42 summarizes the results on whether nouns in general distribute in the same way or differently when the XP differ by one property for *de* constructions and *de*-less constructions.



|        | Pairs of XP |           |           |
|--------|-------------|-----------|-----------|
|        | N vs NP     | V vs VP   | S vs VP   |
| de     | different   | different | different |
| deless | different   | same      |           |

Table 3.42: Comparing the interactions between the XP and the noun YP in **de constructions** and *de*-less constructions

When the XP are S and VP, the data for *de*-less construction are so limited that we cannot make a fair comparison between **de constructions** and *de*-less constructions. With the available comparisons we can make, we can see that the change of the XP from N to NP will trigger a shift in the distribution of nouns in both **de constructions** and *de*-less constructions. In contrast, only the nouns in **de constructions** are sensitive to the XP changing from V to VP not in *de*-less constructions.

When we compare the relation between common nouns and their XP in **de constructions** and *de*-less constructions, we once more observe some differences between the two constructions. Table 3.43 shows whether common nouns distribute in the same way or differently when the XP vary in **de constructions** and *de*-less constructions. We see that in **de constructions**, common nouns are not sensitive to the XP changing from a word level to a phrasal level, such as N to NP or V to VP while in *de*-less constructions, such a shift in XP will result in a difference in the distribution of the common nouns.

|        | Pairs of XP |           |           |
|--------|-------------|-----------|-----------|
|        | N vs NP     | V vs VP   | S vs VP   |
| de     | same        | same      | different |
| deless | different   | different |           |

Table 3.43: Comparing the interactions between the XP and the common noun YP in **de constructions** and *de*-less constructions

To further investigate whether the relation between the XP and the YP are the same or

not in **de constructions** and *de*-less constructions, several correlation tests were performed between the categories of the XP in **de constructions** and in *de*-less constructions when the YP is fixed. **Common Noun**, **Abstract Noun**, **Countable**, **Abstract Noun** were chosen to be the anchor YP to make such a comparison. When the XP is **Common Noun**, no correlation was found between XP in **de constructions** and XP in *de*-less constructions,  $r = 0.17$ ,  $p > 0.01$ . When the XP is **Abstract Noun**, **Countable**, no correlation was found between XP in **de constructions** and XP in *de*-less constructions,  $r = 0.22$ ,  $p > 0.01$ . When the XP is **Abstract Noun**, no correlation was found between the XP in **de constructions** and the XP in *de*-less constructions,  $r = 0.24$ ,  $p > 0.01$ . The correlation results suggest that the relation between the XP and the YP are different when in **de constructions** and in *de*-less constructions.

To summarize, similarities between **de constructions** and *de*-less constructions were supported when we compare a broad range of categories of the XP and the YP in each type of modification construction. However, when the relation between the XP and the YP in **de constructions** and *de*-less constructions was examined in more detail, differences between the two types of modification strategies start to emerge.

### 3.5 Discussion

This chapter asks two main questions, i.e. what are the selectional properties of **de** in **de constructions** and whether **de constructions** and *de*-less constructions underlie the same structure. The investigation into the selectional properties of **de** in **de constructions** has two parts. One is whether there is a preference of using certain categories as YP than others. The other is whether the choice of XP depends on the YP. In this section, I will use the results from Section 3.4 to address these three questions.

### **3.5.1 Are certain categories preferred to be modified in de constructions than others?**

When we compare the frequency of the categories that appear in the YP position in de constructions, we observed that the three types of nouns – Common Noun, Abstract Noun, Countable, and Abstract Noun, make up a majority (55.8%) of the YP, as demonstrated in Table 3.8.

However, the fact that certain categories are more frequently used as a YP in de constructions could be attributed to the fact they are overall more frequently used in the language. Therefore, without knowing how much weight the categories take in the language outside de constructions, no conclusions could be drawn on whether certain categories are more preferred as a YP in de constructions.

### **3.5.2 Does the choice of the XP depend on the YP?**

Since we have made the distinction between nominal de constructions and verbal de constructions, we will look into this question in two pieces.

Firstly, in nominal de constructions, as discussed in Section 3.4.1.4, the distribution of three classes of nouns (common nouns, nominalized nouns, and the rest of nouns combined) were compared when they are modified by three near minimal pairs. Similarly, the distribution of three most frequently modified common nouns were compared when they are modified by the same three near minimal pairs. The results of two comparison were summarized in Table 3.44 below. As the results show, when the XP differ in their syntactic categories, the different classes of nouns distribute differently with the exception of common nouns being modified N and NP, in which case the three common noun categories distribute evenly.

|                                                                       | Pairs of XP |           |           |
|-----------------------------------------------------------------------|-------------|-----------|-----------|
|                                                                       | N vs. NP    | V vs. VP  | S vs. VP  |
| noun YP (common nouns, nominalized nouns, other nouns)                | different   | different | different |
| common noun YP (Common Noun, Abstract Noun, Countable, Abstract Noun) | same        | different | different |

Table 3.44: Comparisons among noun YP and among common noun YP when the XP only differ in syntactic categories

In most cases, the change in the XP is associated with a different distribution of the YP. This observation supports that the choice of the XP does depend on the YP. Otherwise, different XP should have the YP distributed in the same way. The strange case is when N and NP are the XP, the distribution of the common noun YP remain the same.

When it comes to verbal **de-constructions**, the distribution of stative verbs and active verbs were compared when they are modified by two near minimal pairs. So were transitive verbs and intransitive verbs. The results were summarized in Table 3.45. Due to the limited number of tokens available in the corpus, no statistically meaningful inferences can be made.

|                             | Pairs of XP |            |
|-----------------------------|-------------|------------|
|                             | V vs. VP    | Adv vs. DM |
| stative vs. active          | N/A         | N/A        |
| transitive vs. intransitive | N/A         | N/A        |

Table 3.45: Comparisons of verb YP basing on a semantic classification and a syntactic classification

Taking the evidence from both the nominal **de constructions** and verbal **de constructions** together, the answer seems to lean towards that the choice of the XP depends on the YP.

### 3.5.3 Are **de** constructions and *de*-less constructions the same or different?

The comparison between **de** constructions and *de*-less constructions was made with respect to the categories of the YP, the categories of the XP and the relation between the YP and the XP. Table 3.46 summarizes the comparison on the categories of the YP and the categories of the XP in the two constructions. As shown, both the categories of the YP and the categories of the XP are significantly correlated, suggesting a similarity between **de** constructions and *de*-less constructions. This similarity supports that **de** constructions and *de*-less constructions are underlyingly the same but is not convincing enough. The core of **de** constructions should be the relations between the XP and the YP. Showing that the nature of the XP and the YP in the two constructions is similar is only the first step so than comparing the relations encoded in the two constructions is meaningful.

---

| correlation between in <b>de</b> constructions and in <i>de</i> -less constructions |                      |
|-------------------------------------------------------------------------------------|----------------------|
| categories of YP                                                                    | $r = 0.94, p < 0.01$ |
| categories of XP                                                                    | $r = 0.36, p < 0.01$ |

---

Table 3.46: Correlations between the frequency of categories in **de** constructions and in *de*-less constructions

To compare the relations between the XP and the YP encoded in the two constructions, several correlation tests were done on the frequency of different XP when the YP stay the same. Table 3.47 summarizes the results of comparing the XP for the three major categories of common noun and shows that no correlation was found between the XP used in **de** constructions and the ones used in *de*-less constructions when modifying the same noun category, suggesting that the relation between the XP and the YP are different between **de** constructions and *de*-less constructions.

|                                                 | correlation between in <b>de constructions</b> and in <i>de</i> |
|-------------------------------------------------|-----------------------------------------------------------------|
| categories that modify Common Noun              | $r = 0.17, p > 0.01$                                            |
| categories that modify Abstract Noun, Countable | $r = 0.22, p > 0.01$                                            |
| categories that modify Abstract Noun            | $r = 0.24, p > 0.01$                                            |

Table 3.47: Correlations between the frequency of XP in **de constructions** and *de*-less constructions when the YP are common nouns

### 3.6 Conclusion

Previous research on the **de construction** has focused on its syntactic aspect and its semantic aspect. This chapter on the other hand focused on the frequency distribution of the categories that appear in the pre- and post-*de* positions. This new approach allowed us to see how different types of **de constructions** are weighted in the use of language. Native speakers' intuitions can tell us about what are the possible **de constructions** in the language but not the distribution of the possibilities. Understanding the quantitative properties of the possible constructions is key to revealing the distributional patterns of any natural language.

This chapter used the programming language `Python` to traverse and extract the **de constructions** in the parsed corpus of Sinica Treebank that is available in NLTK. The number of **de constructions** extracted by the script of this chapter and the number of *de* at the word level counted by NLTK's native method `nlk.FreqDist` from the unparsed corpus were compared and gave us an overall accuracy rate of 97.37% of the script. The methodology developed in this chapter can be used in other projects that need to extract a phrasal constituent in question rather than just a word from a parsed corpus. Methods for answering general questions in regards to parsing the relations of certain nodes in a **Tree** structure are also provided by this methodology.

Using the corpus-based approach, I found the percentages of different categories used in the **de constructions** do differ. For the categories that can appear in the YP position, they

are not equally distributed. Some categories appear more frequently in the post-*de* position than the others. Based on the categories of the YP, the categories of the XP are also not equally distributed. For each YP, some categories of the XP are more preferred than others. When we compare **de constructions** and *de*-less constructions, the categories that appear in the YP are qualitatively and quantitatively different. The XP in **de constructions** also qualitatively differ from the XP in *de*-less constructions.

In the meantime, some limitations of this research are worth noting. First of all, the results of this chapter heavily rely on how the sentences are parsed in the corpus. If a different set of grammar is used, the results may differ. Secondly, the extraction rate and the efficiency of the script can be improved in the future. One thing noticeable is that when the number of *de* increases, the extraction rate drops slightly. If the method is to be used on a larger corpus, improving the accuracy of the extraction is important. Thirdly, the corpus used in this research is not large enough. It will be interesting to see if the distribution of the internal categories of **de constructions** will stay the same as the corpus size gets larger.

## Chapter 4

### Headedness

#### 4.1 The symmetric and asymmetric theory of de phrases

In this chapter I use modifier phrases to test the headedness of *de* phrases. If *xp* and *yp* in a *de* phrase are in a symmetric syntactic relation, then neither *xp* nor *yp* will be the head of the *de* phrase. It follows that the modifier preceding a *de* phrase can logically be associated with either *xp* or *yp*, resulting in ambiguous interpretations. On the other hand, if *xp* and *yp* are in an asymmetric syntactic relation, then the modifier preceding the *de* phrase will only target the features of the head of the entire *de* phrase. Thus, modifier phrases provide crucial evidence about the structure of a *de* phrase. In Section 4.5, I use noun classifiers to probe headedness in nominal *de* phrases, and in Section 4.6, I use aspect markers to probe headedness in verbal *de* phrases. Before we dive in, I will provide an introduction how the classifier structure works in other context in Section 4.2 – 4.4. A discussion of the classifiers is to help assess the features of the following NP.

#### 4.2 The basic structure of a noun phrase with a classifier

This section discusses the structure of classifier phrases in Mandarin Chinese. In a classifier phrase, the classifier appears after a numeral or a determiner and before a nominal category. The examples in (49) and (50) show the linear structures of classifiers following a numeral and a determiner respectively.

- num cl n

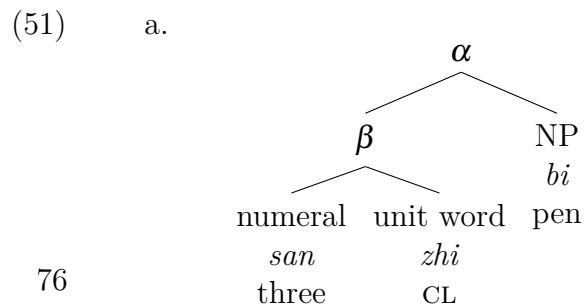


- (49) a. 一 本 书  
 yi ben shu  
 one CL book  
 ‘one book’
- b. 一 朵 花  
 yi duo hua  
 one CL flower  
 ‘one flower’

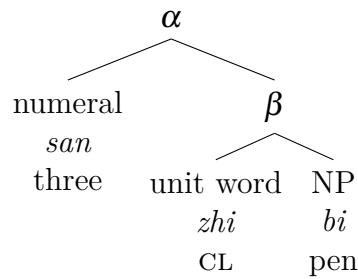
• det cl n

- (50) a. 这 本 书  
 zhe ben shu  
 DEM CL book  
 ‘this book’
- b. 那 朵 花  
 na duo hua  
 DEM CL flower  
 ‘that flower’

Two possible structures have been proposed for classifier phrases in Mandarin, as shown in (51a-51b) (Zhang, 2013). The main difference between (51a) and (51b) lies in whether the classifier forms a constituent with the preceding numeral or with the following *np*. Because I am only interested in the underlying structure of the following *np*, which is where the *de phrase* resides, I will not discuss further the attachment of the classifier phrase. Following Kayne (1994), I will assume a right-branching structure for the classifier phrase in Mandarin Chinese, as demonstrated in (51b).  $\alpha$  indicates the overall constituency and  $\beta$  indicates the intermediate constituency. The syntactic categories of  $\alpha$  and  $\beta$  are not provided in (Zhang, 2013).



b.



### 4.3 How the classifier applies to simple nouns

This section shows the interaction between classifiers and simple nouns. There are many types of classifiers, including individual classifiers, individuating classifiers, kind classifiers, partitive classifiers, and collective classifiers (Zhang, 2013). Among all these kinds, the choice of an individual classifier is usually based on the properties of the following nouns. For example, the classifier *gen* is used with long and slender objects while the classifier *mian* is used with objects that have a flat surface, as shown in (52a-52b) respectively. Combining classifiers with incompatible nouns yields ungrammaticality. For example, if the classifier *mian* is used with the object cigarette or *gen* with the object mirror, we get ungrammatical expressions.

- (52) a. 一 根/面 烟  
 yi gen/\*mian yan  
 one CL cigarette  
 ‘one cigarette’
- b. 三 面/根 镜子  
 san mian/\*gen jingzi  
 three CL mirror  
 ‘three mirrors’

The reason for including a discussion of the classifiers is to assess the features of the following NP. Therefore, the following discussions will mainly focus on the individual classifiers. In addition, the generic classifier *ge* is also an individual classifier. However, it does not

reflect the properties of the following *np*, as shown in (53). For this reason, the use of *ge* as an individual classifier will also be avoided when possible.

- (53) a. 一个烟  
yi ge yan  
one CL cigarette  
'one cigarette'
- b. 三个镜子  
san ge jingzi  
three CL mirror  
'three mirrors'

#### 4.4 How the classifier applies to compound nouns

This section shows the interaction between classifiers and compound nouns in Mandarin Chinese. The purpose of this section is to demonstrate the behavior of the classifiers when the following NP has more than one component that can associate with a classifier. For this purpose, the compounds of choice should have two nouns that require different classifiers and can be used with a classifier as a whole. Following this logic, the discussion will mainly focus on verb-noun compounds in which the verb does not require a classifier but the noun does and noun-noun compounds in which the two nouns require different individual classifiers.

In (54), I show the examples of using classifiers with verb-noun compounds. As shown, the classifiers always go with the noun parts even when the verbs are omitted. The meanings of the two compounds are mainly determined by the noun parts in that a jumprope is a kind of rope instead of a kind of jumping action and a wok is a kind of wok instead of a stir-fry activity.

- (54) a. 一根跳绳  
yi gen (tiao).sheng  
one CL jump.rope  
'one jumprope'

- b. 一口炒锅  
 yi kou (chao).guo  
 one CL stir.wok  
 ‘one stir-fry wok’

Additionally, the classifiers *gen* and *kou* as used in (54a-54b) are specific individual classifiers. When the classifiers and their following objects in (54a-54b) are mismatched, the results are ungrammatical, as demonstrated by the examples in (55). For this reason, I consider the heads of the two compounds to be their noun components.

- (55) a. \*一口跳绳  
 yi kou tiao.sheng  
 one CL jump.rope  
 Intended: ‘one jumprope’
- b. \*一根炒锅  
 yi gen chao.guo  
 one CL stir.wok  
 Intended: ‘one stir-fry wok’

In (56) and (57), I explore the behavior of the classifiers when followed by noun-noun compounds. As shown in (56a-59a), *taiyang* ‘sun’ cannot associate with the specific individual classifier for *hua* ‘flower’. Additionally, *taiyanghua* ‘sunflower’ must be headed by *hua* ‘flower’ since the object is a kind of flower instead of a kind of sun. The classifier used for *taiyanghua* ‘sunflower’ is the same for *hua* ‘flower’, as shown in (56c) although the classifier immediately precede the noun *taiyang* ‘sun’. Taken together, the classifier before the noun-noun compound associates with the head of the compound, which follows its modifier.

- (56) a. 一个/朵 太阳  
 yi ge/\*duo taiyang  
 one CL sun  
 Intended: ‘one sun’
- b. 一朵花  
 yi duo hua  
 one CL flower  
 ‘one flower’

- c. 一 朵 太阳花  
 yi duo taiyang.hua  
 one CL sun.flower  
 ‘one sunflower’

The examples in (57a-57b) show that the classifier for *zhi* ‘paper’ cannot associate with *qiang* ‘wall’, which requires a different classifier. Moreover, the classifier for the compound *qiang-zhi* ‘wall-paper’ is the same as the one for *zhi* ‘paper’ though the classifier immediately precedes *qiang* ‘wall’. Considering that wallpaper is a kind of paper instead of a kind of wall, we know that the head of the compound is paper instead of wall. These facts together show that the classifier for the noun-noun compound associates with the right-most noun, which is the head of the compound.

- (57) a. 一 面/张 墙  
 yi mian/\*zhang qiang  
 one CL wall  
 ‘one wall’
- b. 一 张 纸  
 yi zhang zhi  
 one CL paper  
 ‘one piece of paper’
- c. 一 张 墙纸  
 yi zhang qiang.zhi  
 one CL wall.paper  
 ‘one piece of wallpaper’

With the examples in (56-57), I have argued that when the two nouns in a compound require different classifiers, the compound requires the classifier that agrees with the head. The examples with verb-noun compounds and noun-noun compounds show that the final noun in the compound is the head.

## 4.5 How the classifier applies to *de* phrases

In this section, I will use the test that I applied to the compounds to look at how the classifiers behave in a *de* phrase in order to establish what is the head of a *de* phrase. I assume that the classifier associates with the head of a *de* phrase, in the same way that it associates with the head of a compound noun. I will look at the *de* phrases whose pre-*de* elements are nouns, verbs, and VPs. The three types of *de* phrases differ in the categories of the pre-*de* elements but are all compatible with the classifiers that go with the post-*de* elements. When a noun modifies a noun in a *de* phrase, the two nouns may go with different classifiers.

When the classifier preceding a *de* phrase can only be used with the post-*de* noun, the classifier is interpreted as specifying the entire *de* phrase. For example, the individual classifier *ba* can associate with the object chair as in (58a) but not the material plastic as in (58b). When the classifier *ba* is used with the *de* phrase in which *plastic* modifies *chair*, the combination is still grammatical and interprets as the chair being specified, as demonstrated in (58c).

- (58)
- a. 一 把 椅子  
yi ba yi.zi  
one IND.CL chair  
'one chair'
  
  - b. \*一 把 塑料  
yi ba su.liao  
one IND.CL plastic  
Intended: 'one piece of plastic'
  
  - c. 一 把 塑料 的 椅子  
yi ba su.liao de yizi  
one IND.CL plastic DE chair  
'one plastic chair'

When the classifier preceding a *de* phrase can only be used with the pre-*de* noun, the classifier is interpreted as specifying only the pre-*de* noun. As shown in (59a), the individual

classifier *duo* goes with the noun for flower. On the other hand, this classifier does not go with the noun for color, as shown in (59b). When the classifier *duo* is used with the **de phrase** in which its compatible noun *flower* occurs before *de* and its incompatible noun *color* occurs after *de*, the classifier is only interpreted as specifying the noun for *flower*, and not the entire **de phrase**, as shown in (59c).

- (59) a. 一 朵 花  
 yi duo hua  
 one IND.CL flower  
 ‘one flower’
- b. \*一 朵 颜色  
 yi duo yanse  
 one IND.CL color  
 ‘one color’
- c. 一 朵 花 的 颜色  
 yi duo hua de yanse  
 one IND.CL flower DE color  
 ‘the color of one flower’

It is then predicted that when the classifier can be used with both the pre-*de* noun and the post-*de* noun, two possible readings will arise. For example, the kind classifier *zhong* can be used with both the noun for black color, as shown in (60a), and the noun for mushroom, as shown in (60b). When the classifier is used with the **de phrase** composed of the noun for black color modifying the noun for mushroom, it can be interpreted as specifying the mushroom that is black or as specifying the black color of a mushroom, as shown in (60c).

- (60) a. 一 种 黑色  
 yi zhong hei.se  
 one KIND.CL black.color  
 ‘a kind of black color’
- b. 一 种 蘑菇  
 yi zhong mogu  
 one KIND.CL mushroom  
 ‘a kind of mushroom’

- c. 一 种        黑 色        的 磨 菇  
 yi zhong    hei.se        de mogu  
 one KIND.CL black.color DE mushroom  
 ‘a black kind of mushroom’/  
 ‘the mushrooms that have one black color’

It is not surprising that the classifier would associate with the pre-*de* noun and form a constituent in a **de phrase** since the two elements are linearly adjacent to each other and their combination accords with both the structure of a classifier phrase, which results in a noun phrase as expected of the pre-*de* element in a **de phrase**. What is interesting here is that when both the pre-*de* noun and the post-*de* noun are available for the classifier to associate, as in (60c), the classifier would also associate with the post-*de* noun, giving rise to an ambiguous reading. If the **de construction** is headed towards the pre-*de* element, association with the post-*de* component would not have been possible. Nevertheless, when the pre-*de* noun cannot associate with the classifier while the post-*de* noun can, as in (58c), the entire expression is still grammatical and the classifier specifies the entire **de phrase**. This evidence shows that the structure of the **de construction** is not symmetrical. If the **de construction** had a symmetrical structure, the features of the **de phrase** should reflect the features of both the pre-*de* part and the post-*de* part and the **de phrase** should not be able to go with the classifier because its pre-*de* part does not go with it.

In addition, the classifier test shows that the noun in the pre-*de* position is phrasal in that it can take its own modifiers. The phrasal nature of the pre-*de* modifiers distinguishes them from the lexical nature of noun modifiers in noun-noun compounds.

The case becomes more straightforward when the pre-*de* part is a verb for verbs never associate with classifiers. When a verb modifies a noun in a **de phrase**, the classifier can only be interpreted as specifying the post-*de* noun. As shown in (61a), if the post-*de* noun were to be omitted together with *de*, the remaining expression is hardly natural without any context and the intended meaning is definitely not available anymore. If an appropriate context were provided, such as many melodies were being played, then as a comment, it is acceptable to



say (61b), which is just a classifier phrase followed by the pre-*de* verb. Obviously, the two form a predicational relation which is very different from the specifying relation between a classifier and a noun.

- (61) a. 一段悦耳的旋律  
 yi duan yue.er \*(de xuanlü)  
 one IND.CL pleasant.ear DE melody  
 ‘a pleasant melody’
- b. 一段悦耳  
 yi duan yue.er  
 one IND.CL pleasant.ear  
 ‘One (of the melodies) is pleasant.’

Similar observations can be made with a different verb. In (62a), dropping the post-*de* noun and *de* together will destroy the original meaning and result in a predicational relation between the classifier phrase and the pre-*de* verb, as shown in (62b).

- (62) a. 一条上升的曲线  
 yi tiao shang.sheng \*(de qu.xian)  
 on IND.CL up.increase DE curve.line  
 ‘an increasing curve’
- b. 一条上升  
 yi tiao shang.sheng  
 one IND.CL up.increase  
 ‘One (of the curves) increases.’

These observations are similar to the case in which both components of a **de phrase** are nouns and only the post-*de* noun is compatible with the given classifier. It supports the hypothesis that the post-*de* noun is the head of the entire **de phrase** because the pre-*de* verb cannot combine with the classifier independently. In (63a - 64a), another two examples of using classifiers with a **de phrase** are provided, in which the pre-*de* parts are both verb phrases. As shown, the classifiers only specify the post-*de* phrases as indicated by the non-optional parentheses. If the contents in the parentheses are omitted in (63a), we get a predicational reading between the classifier phrase and the pre-*de* phrase, as shown in (63b).

- (63) a. 一 种 贴 墙 \*(的 纸)  
 yi zhong tie qiang \*(de zhi)  
 one KIND.CL paste wall DE paper  
 ‘the kind of paper that is used to attach on the wall’
- b. 一 种 贴 墙。  
 yi zhong tie qiang  
 one KIND.CL paste wall  
 ‘One kind will be attached on the wall.’

Similarly, the same parallel is observed between (64a) and (64b). In (64a), without the material in the parentheses, the classifier cannot specify the pre-*de* component but forms a predicational relation with the pre-*de* part in which the noun phrase being specified by the classifier is null and needs to be recovered from the context.

- (64) a. 一 种 有 毒 \*(的 蛇)  
 yi zhong you du \*(de she)  
 one KIND.CL have poison DE snake  
 ‘a kind of poisonous snakes’
- b. 一 种 有 毒。  
 yi zhong you du  
 one KIND.CL have poison  
 ‘One kind is poisonous.’

As we have observed earlier, the classifiers can associate with the post-*de* phrase even though they immediately precede the pre-*de* phrase. The phenomenon supports the position that the post-*de* phrase is the head of the whole **de phrase** and its features percolate to the whole phrase so that it can be specified by the classifier.

What is more striking with the case of using verb phrases as modifiers is that the classifier does not associate with the nouns that are the objects in the verb phrases even though they are compatible, as shown in (65a - 65b). It shows that with the presence of an intervening head, the verb in this case, a classifier cannot associate with the object noun. In contrast, when a classifier and a noun is intervened by a pre-*de* element, their association is still possible. This observation adds another piece of evidence to show that the pre-*de* part cannot be the

head of a *de* phrase.

- (65) a. 一 种 墙  
yi zhong qiang  
one KIND.CL wall  
'one kind of wall'
- b. 一 种 毒  
yi zhong du  
one KIND.CL poison  
'one kind of poison'

At this point, we have observed that the classifiers associate with the head noun in a compound and the post-*de* phrase in a *de* phrase. Compounds and nominal *de* phrases are both right-headed. One main similarity between the observations is that the structures of the compounds and the post-*de* phrase must be hierarchical. If not, the classifiers will immediately associate with the elements adjacent to them, contrary to fact. Another conclusion we can draw from the observations is that the structures of the compounds and the post-*de* phrase must be asymmetrical. If not, omitting the pre-*de* component or the post-*de* component will lead to similar readings, contrary to fact. Omitting the pre-*de* component will not break the structure of the classifier phrase while omitting the post-*de* component will turn the classifier phrase into a predicational structure. For an asymmetrical structure, we need to consider which is the head. The results show that the head of a *de* phrase is the post-*de* component. If the head of a *de* phrase is *de*, it needs further proof as to how the features of the post-*de* phrase can percolate to the whole phrase and then associate with the preceding classifier.

## 4.6 Classifiers in the Verbal Context

In a verbal *de* construction, *de* connects two verbal elements. Nominal classifiers in the conventional sense do not associate with verbal elements. Thus, using classifiers above a verbal *de* construction would create ungrammatical expressions and not inform us of the

symmetrical properties, let alone headedness, about verbal *de* constructions. For verbal *de* constructions, we can test which component has a selectional restriction on the subject. Only the head of a *de* construction should have a selectional restriction on the subject. Using the method, we could find out which part of a *de* construction is the real head.

In a pre-verbal *de* construction, the post-*de* part selects the subject as its external argument. As shown in (66), the post-*de* part functions as the main predicate of the whole sentence without changing the meaning of (66a). Thus, we conclude that the head of the pre-verbal *de* constructions must be the post-*de* part.

- (66) a. 闵闵 快速 地 逃跑 了。  
 Minmin kuaisu **de** taopao le  
 Minmin fast DE escape ASP  
 ‘Minmin has quickly escaped.’
- b. \* 闵闵 快速。  
 Minmin kuaisu  
 Minmin fast  
 Intended: ‘Minmin was fast (in escaping).’
- c. 闵闵 逃跑 了。  
 Minmin taopao le  
 Minmin escape ASP  
 ‘Minmin has escaped.’

In a post-verbal *de* construction, it is the pre-*de* part that selects the subject as the external argument. As shown in (67), only the pre-*de* part selects the subject as its external argument and preserves the original meaning. Thus, we conclude that the pre-*de* part is the head of the post-verbal *de* constructions.

- (67) a. 闵闵 逃跑 得 很 轻松。  
 Minmin taopao de hen qingsong  
 Minmin escape DE very relax  
 ‘Minmin escaped quite easily.’
- b. 闵闵 逃跑。  
 Minmin taopao  
 Minmin escape

- c. 闵闵 很 轻松。  
 Minmin hen qingsong  
 Minmin very relax  
 ‘Minmin is very relaxed.’

Additionally, if we could find an alternative for using classifiers with the nominal *de* constructions, we could apply the same logic to the verbal *de* constructions and test whether *de* constructions in the verbal context are symmetrical or asymmetrical. An ideal alternative would be one that shows different preferences for the pre-*de* part and the post-*de* part. One operation that shows such preference is the verb copying process in Mandarin Chinese. In a verb copying process, the head of a verb phrase would be copied and the copy would form a *de* construction with another phrase following the original verb phrase. For example, in (68a), the verb *qi* ‘ride’, the head of the verb phrase *qi che* ‘ride bike’, is copied to form a *de* construction with an adverbial that describes the speed of the bike-riding activity. Similarly, in (68b), the verb head *sha* ‘kill’ is copied to form a *de* construction with a resultative that evaluates the result of the people-killing activity.

- (68) a. 他 骑 车 骑 得 太 快 了。  
 ta qi che qi de tai kuai le  
 3rd.sing ride vehicle ride DE very fast ASP  
 ‘He rode the bike too fast.’
- b. 他 杀 人 杀 得 太 多 了。  
 ta sha ren sha de tai duo le  
 3rd.sing kill people kill DE too many ASP  
 ‘He killed too many people.’

With the help of the verb copying operation, we can start to assess the symmetrical properties of the verbal *de* constructions. First of all, the verb head has to be copied into the pre-*de* position of a *de* construction. As illustrated in (69a-69b), the heads of the two verb phrases are copied into the post-*de* position and the constructions are not grammatical.

- (69) a. \*他 骑 车 太 快 了 的 骑。  
 ta qi che tai kuai le de qi  
 3rd.sing ride vehicle too fast ASP DE ride

Intended: ‘He rode the bike too fast.’

- b. \*他 杀 人 太 多 了 的 杀。  
ta sha ren tai duo le de sha  
3rd.sing kill people too many ASP DE kill  
Intended: ‘He killed too many people.’

The contrasts between (68a-68b) and (69a-69b) demonstrate that the verb in a verb phrase can only be copied into the pre-*de* position not the post-*de* position which supports the hypothesis that the pre-*de* and the post-*de* are in an asymmetrical structure. It is worth noting that the V-*de* constructions that result from a verb copying process are only one subcategory of all the verbal *de* constructions.

Based on the protocol of head movements that a head of a phrase can only be copied to another head position, we deduce that the pre-*de* part serves as the head of the V-*de* construction. One remaining question is whether the verb copying rule applies to a V-*de* construction.

When we apply the verb copying operation to a common verb phrase and a V-*de* construction, the results yield different interpretations. Take (70a) and (70b) for instance. In (70a), when we copy the verb head *pao* ‘run’ when it takes an object indicating the distance, the post-*de* part in the V-*de* construction headed by the copy evaluates the manner of the running activity, i.e. running a five hundred meter race as opposed to running a hundred meter race. In (70b), it is a V-*de* construction that is undergoing the verb copying operation. The result of the verb copying process is interpreted as a conjunction between the original verb phrase and its copy heading a second V-*de* construction.

- (70) a. 他 跑 五 百 米 跑 得 很 快。  
ta pao wu bai mi pao de hen kuai  
3rd.sing run five hundred meter run DE very fast  
‘He runs very fast in 500 meter race.’
- b. 他 跑 得 很 快 跑 得 很 远。  
ta pao de hen kuai pao de hen yuan  
3rd.sing run DE very fast run DE very far  
‘He runs very fast and very far.’

We know that the (70b) has a conjunctive structure because when the positions of the two V-de constructions are reversed, as in (71b), the meaning remains the same. However, when the positions of the original verb phrase and its V-de copy are reversed, as in (71a), the expression is ungrammatical. The contrast in the results of the verb copying process provides us with evidence that the V-de construction has a different underlying structure than a common verb phrase.

- (71) a. \*他 跑 得 很 快 跑 五 百 米。  
 ta pao de hen kuai pao wu bai mi  
 3rd.sing run DE very fast run five hundred meter  
 Intended: ‘He runs very fast in 500 meter race.’
- b. 他 跑 得 很 远 跑 得 很 快。  
 ta pao de hen yuan pao de hen kuai  
 3rd.sing run DE very far run DE very fast  
 ‘He runs very far and very fast.’

In parallel with the nominal case, the verbal compounds also lend us support for that the head of a V-de construction is the pre-*de* verb. In a V-V compound such as *xiu fu* ‘repair’ in which *xiu* means fix and *fu* means recover, the first verb indicates an action and the second verb indicates the extent or the result of the action. When verb compounds undergo the verb copying process, either the whole compound or the first verb in the compound can be copied, as shown in (72a) and (72b). If the second verb in the compound is copied, as demonstrated in (72c), the result is ungrammatical.

- (72) a. 蓝蓝 修复 花瓶 修复 得 很 认真。  
 Lanlan **xiu.fu**. huaping **xiu.fu** de hen renzhen  
 Lanlan repair vase repair DE very careful  
 ‘Lanlan repaired the vase carefully.’
- b. 蓝蓝 修复 花瓶 修 得 很 认真。  
 Lanlan **xiu.fu** huaping **xiu** de hen renzhen  
 Lanlan repair vase fix DE very careful  
 ‘Lanlan repaired the vase carefully.’

- c. \* 蓝蓝 修复 花瓶 复 得很 认真。  
 Lanlan xiu.fu huaping fu de hen renzhen  
 Lanlan repair vase recover DE very careful  
 Intended: ‘Lanlan repaired the vase carefully.’

For a V-V compound in which the first verb indicates an action while the second verb indicates its extent or result, only the first verb can undergo the verb copying operation. This difference between the first verb and the second verb reveals an asymmetrical relation between the first verb and the second verb. Furthermore, since the verb copying operation targets the verb head, we know that the first verb derives from a head position in the compound. On top of this, the verb copy occupies the pre-*de* position in the V-*de* construction that result from the verb copying process, as demonstrated by (72b). Following the head movement constraint, a head can be only copied into a head position. The V-V compounds provide evidence that the pre-*de* verb in a V-*de* construction is the head of the construction.

When we apply the verb copying operation to the V-V compounds and the V-*de* constructions, the patterns are different despite the meaningful similarities between the two verbal components in a V-V compound and in a V-*de* constructions. When a V-V compound undergoes the verb copying process, the first verb will be copied into a V-*de* construction. When a V-*de* construction undergoes the verb copying process, the operation results in a conjunction with the original V-*de* construction. In a V-V compound, the second verb can indicate the extent or the result of the first verb. In a V-*de* construction, the post-*de* part also indicates the extent or the result of the pre-*de* verb. The different behaviors of the V-V compound and the V-*de* construction in a verb copying operation suggest a difference between a regular verb phrase and a V-*de* construction, which supposedly is also a verb phrase. The difference also reveals a limit on the recursivity of a V-*de* construction.



## 4.7 Conclusion

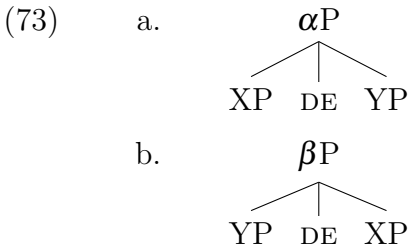
In this chapter, I examined the structural properties of the nominal *de* constructions, the pre-verbal *de* constructions and the post-verbal *de* constructions by turning to the properties of the classifier phrase, selectional restrictions, and the verb copying operation respectively. The classifier test shows that the nominal *de* construction is asymmetrical. The verb copying operation shows that the verbal *de* construction is also asymmetrical. However, the head of a nominal *de* construction and a pre-verbal *de* construction is the post-*de* phrase while the head of a post-verbal *de* construction is the pre-*de* verb phrase. A unified account of *de* phrases needs to explain their asymmetrical structure as well as the different positions of the heads in nominal and verbal *de* phrases. Assuming that *de* phrases are basically modifiers of the head predicts their asymmetry. Differences between nominal and verbal *de* phrases could be due to differences in the modification of nouns and verbs as seen in the structure of the noun and verb compounds.

# Chapter 5

## The *De*-Reflection Test

### 5.1 What is the test and why use it?

If XP and YP are in symmetrical positions in a XP *de* YP phrase, it then follows that XP *de* YP is the same as YP *de* XP. Symmetry could refer to structural symmetry or semantic symmetry. They have different implications. If XP *de* YP is structurally symmetrical, as demonstrated in (73a), then YP *de* XP, as demonstrated in (73b), should be grammatically well-formed as the two positions around *de* should be equally constrained by the structure. In other words, switching the syntactic categories of the pre-*de* part or the post-*de* part of a well-formed *de* phrase should only result in another well-formed *de* phrase under the symmetry assumption. It should also follow that a *de* phrase in the form of XP *de* YP and one in the form of YP *de* XP are of the same syntactic category. If not, it suggests that either XP or YP has a heavier role in determining the syntactic category of a *de* phrase, which contradicts that XP and YP are in symmetrical positions structurally. This implication means that XP *de* YP and YP *de* XP can be used in the same grammatical context.



Semantic symmetry has to do with the meaning composition. If XP and YP contribute evenly in the process of meaning composition, then on the condition that XP *de* YP passes

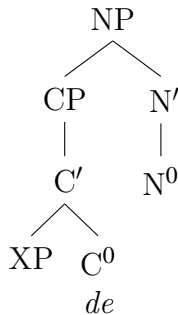
the *de*-reflection test on the syntactic level, it should follow that the meanings of *XP de YP* and *YP de XP* are the same. If *XP de YP* does not pass the test on the syntactic level, there is no point of checking whether its meaning has changed or not after the test.

## 5.2 What implications does this test have for the existing analyses?

### 5.2.1 Cheng (1986)

Cheng (1986) proposes that *de* is a complementizer and the pre-*de* component is the specifier of the complementizer phrase and can be of any category, as demonstrated in (74). The post-*de* component is a *n* in a nominal *de* construction. This proposal predicts that if the pre-*de* component can be used as a bare *n*, the *de* reflection test should pass. There is no restriction on the pre-*de* part under this proposal so any failure in the *de*-reflection test should be attributed to the process of converting the pre-*de* part to the post-*de* part instead of the reverse.

(74)



When applying the test, I will examine whether the original pre-*de* part can be used as a nominal category in a different context than a *de* phrase and check whether the pre-*de* part being able to be nominalized in a differ context aligns with a success in the *de*-reflection test.

The contexts where we see the use of nominal categories are various. In (75), I demonstrate how the noun *dongtian* ‘winter’ is used as the subject in a sentence (75a), the direct

object of a verb (75b), and the complement in a classifier phrase (75c).

(75) a. SENTENTIAL SUBJECT

冬天 很 冷。  
**dongtian** hen leng.  
winter very cold  
'Winter is very cold.'

b. OBJECT OF A VERB

闵闵 喜欢 冬天。  
Minmin xihuan **dongtian**  
Minmin like winter  
'Minmin likes winter.'

c. COMPLEMENT IN A CLASSIFIER PHRASE

一个 冬天  
yi ge **dongtian**  
one CL winter  
'one winter'

However, the contexts have different terms for what kind of nominal category is allowed to be used. As demonstrated, in (76), the nominal category, *he cha* 'drink tea', which is originally a verb phrase, can be used as a subject in a sentence (76a), an object of a verb (76b), but not as a complement to a classifier (76c).

(76) a. SENTENTIAL SUBJECT

[喝 茶] 促进 消化。  
[**he cha**] cujin xiaohua  
drink tea promote digest  
'Drinking tea promotes digestion.'

b. OBJECT OF A VERB

闵闵 喜欢 [喝 茶]。  
Minmin xihuan [**he cha**]  
Minmin like drink tea  
'Minmin likes drinking tea.'

c. \* COMPLEMENT IN A CLASSIFIER PHRASE

一个 [喝 茶]  
 yi ge [he cha]  
 one CL drink tea

Intended: ‘one occasion of drinking tea’

If we call the process of turning any category into a DP or an NP as nominalization, the products of nominalization still differ from the authentic noun phrases or determiner phrases but also differ from each other. For example, the products of nominalizing a verb phrase with and without an auxiliary behave differently. The examples in (77) show when a verb phrase that includes an auxiliary is being nominalized, its product differs from a verb phrase without an auxiliary when it comes to being used as the object of a verb, compare (76b) and (77b).

(77) a. SENTENTIAL SUBJECT

[会 飞] 靠 天分。  
 [hui fei] kao tianfen  
 can fly depend gift

‘Being able to fly depends on the gift.’

b. \* OBJECT OF A VERB

闵闵 喜欢 [会 飞]。  
 Minmin xihuan [hui fei].  
 Minmin like can fly

Intended: ‘Minmin likes being able to fly.’

c. \* COMPLEMENT IN A CLASSIFIER PHRASE

一个 [会 飞]  
 yi ge [hui fei]  
 one CL can fly

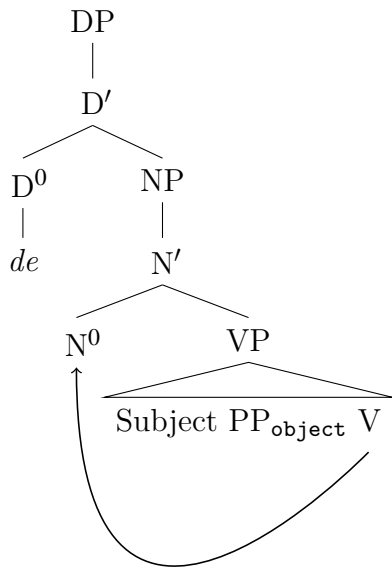
Intended: ‘an ability of flying’

## 5.2.2 Simpson (2003)

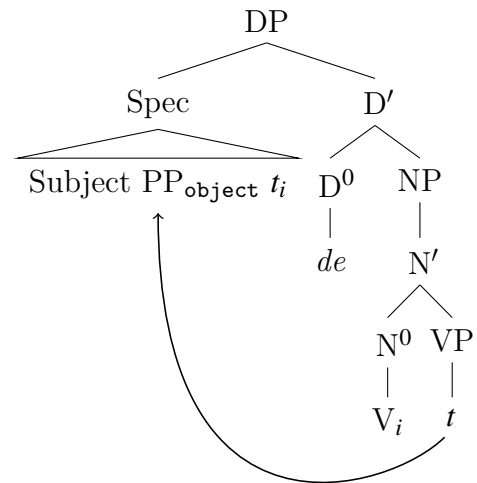
Simpson (2003) proposes that the modifier and the modifiee form a predicational relation

underlyingly. As demonstrated in (7a), such predicational relations refer to the relations between an external subject and a bare verb in a verb phrase. This analysis predicts that all *de* constructions entail a predicational structure. The *de* reflection test reverses the modifier and the modifiee in a *de* construction. According to Simpson (2003), a *de* phrase should pass the *de* reflection test if and only if the pre-*de* part and the post-*de* part can still form a predicational relation when their positions are switched.

(7a)



(7b)



To rephrase the results of the *de*-reflection test predicted by Simpson (2003), if *XP de YP* is well-formed, for *YP de XP* to be well-formed, then *XP* could form a predicate to which *YP* can be the external subject.

### 5.2.3 Huang (2006)

Huang (2006) proposes that the meaning of *XP de YP* is the intersection of the property indicated by *XP* and by *YP*. The function of *de* is to type-shift so that *XP* and *YP* can combine. This proposal implicates that the meaning of *XP de YP* is only affected by the property of

XP and that of YP and the positions XP and YP do not have an effect on the outcome. Simply put, XP de YP and YP de XP should have the same meaning under this proposal.

### 5.3 Applying the test

In this section, I will apply the *de*-reflection test to various combinations of XP and YP in XP de YP phrases.

#### 5.3.1 n de n

Since in an n de n phrase, the pre-*de* part and the post-*de* part are of the same syntactic category, its *de*-reflection will still be n de n. Therefore, we can predict that the n de n case passes the *de*-reflection test without exceptions on the syntactic level. One example is provided in (78). One complication of the test result is that the output sounds more natural if the pre-*de* noun becomes a dp, as in (78c) than a bare noun form. This complication raises the question of what are the semantic constraints on the pre-*de* part. Nonetheless, the result does not refute the proposal by Cheng (1986).

- (78)
- a. 木头 的 桌子  
mutou de zhuozi  
wood DE table  
'a wooden table'
  - b. ?桌子 的 木头  
zhuozi de mutou  
table DE wood  
'the wood of a table'
  - c. 这/一 张 桌子 的 木头  
zhe/yi zhang zhuozi de mutou  
DEM/one CL table DE wood  
'the wood of the/one table'

As for the semantic level of the test result, the interpretation of the output is different from the interpretation of the original phrase. Thusly, we have reasons to believe that the

meaning of the pre-*de* part and that of the post-*de* part do not contribute to the overall meaning equally.

### 5.3.2 dp de n

When a *dp* is used in a pre-*de* position, the results of the *de*-reflection test vary. One acceptable example is provided in (79). The pre-*de* part in (79a) is a proper noun, which is usually analyzed as a *dp*. (79b) shows that a *dp* is compatible with the post-*de* position.

- (79) a. 北京 的 夜晚  
beijing de yewan  
Beijing DE night  
'the night in Beijing'
- b. 夜晚 的 北京  
yewan de beijing  
night DE Beijing  
'Beijing at night'

Although (79a) passes the *de*-reflection test on the syntactic level, it still fails the test on the semantic level. The meaning of (79a) is about a period of time while the meaning of (79b) is about a city. The change of meaning indicates that the meaning of the pre-*de* part and the meaning of the post-*de* part are not in symmetrical positions when the overall meaning is composed. The change in meaning is due to the difference in the heads of the two *de* phrases as shown in the previous chapter.

One unacceptable example is provided in (80) in which the pre-*de* part in the original phrase is Beijing, the same as in (79a). However, switching the positions of the pre-*de* part and the post-*de* part in (80a) creates an ill-formed expression as shown in (80b). Although why two similar structures produce different results after the same test is a question to be examined, the example in (79b) is enough to show that using *dp* in post-*de* position is not the cause of the failure. It is likely that certain features or the lack of certain features in the noun *luoye* 'falling leaves' have caused (80b) to fail.



- (80) a. 北京 的 落叶  
 beijing de luo.ye  
 Beijing DE fall.leaf  
 ‘the falling leaves of Beijing’
- b. \*落叶 的 北京  
 luo.ye de beijing  
 fall.leaf DE Beijing  
 Intended: ‘Beijing at the time of falling leaves’

### 5.3.3 pp de n

Prepositional phrases include a NP or a DP and a functional category. When a prepositional phrase is the pre-*de* part in a *de* phrase, as shown in (81a), switching the pre-*de* part and the post-*de* part results in an ungrammatical expression, as shown in (81b).

- (81) a. 对 玩具 的 喜爱  
 dui wanju de xiai  
 to toy DE love  
 ‘love for toys’
- b. \*喜爱的 对 玩具  
 xiai de dui wanju  
 love DE to toy  
 Intended: ‘love for toys’

It is not surprising that a *de* phrase with a PP modifier fails the *de*-reflection test. Since *pp* is not a nominal constituent, it is predicted that a *pp de n* construction would fail the *de*-reflection test as the test results in a *n de pp* phrase and the proposal by Cheng (1986) directly predicts that the post-*de* part has to be a noun. However, it is unclear whether it fails the test because *pp* is not a nominal or because it cannot be turned into a nominal. The examples in (82) examine how a PP fails to fit in other nominal-only contexts and suggest that a PP cannot be converted into a nominal.

- (82) a. \*SENTENTIAL SUBJECT

对 玩具 培养 兴趣  
dui wanju peiyang xingqu.  
to toy cultivate hobby

Intended: ‘Anything for toys cultivates a hobby.’

b. \* OBJECT OF A VERB

闵闵 喜欢 对 玩具。  
Minmin xihuan dui wanju  
Minmin like to toy

Intended: ‘Minmin likes anything for toys.’

c. \* COMPLEMENT IN A CLASSIFIER PHRASE

一 个 对 玩具  
yi ge dui wanju  
one CL to toy

Intended: ‘one for toys’

The PP *de n* phrase fails the *de*-reflection test and in the meanwhile PP fails to be converted into nominal categories in other independent contexts. The result from the PP *de n* case supports Cheng (1986) because it shows a non-nominal category cannot appear after *de* if it cannot be nominalized.

### 5.3.4 *adj de n*

When an adjective modifies a noun in a *de* phrase, as shown in (83a), the phrase can be used as a direct object of *xihuan*, ‘like’. When the adjective and the noun switch their positions, as shown in (83b), the phrase can still be used as a direct object of *xihuan* ‘like’. In other words, the combination of an adjective and a noun passes the *de*-reflection test on a syntactic level.

- (83) a. 闵闵 喜欢 红 的花。  
Minmin xihuan [hong de hua]  
Minmin like red DE flower  
‘Minmin likes red flowers.’

- b. 闵闵 喜欢 花 的 红。  
 Minmin xihuan [hua de hong]  
 Minmin like flower DE red  
 ‘Minmin likes the redness of flowers.’

The reversed **de construction** can be used as a direct object of a verb, suggesting the category of the phrase remains a noun phrase. Thusly, the adjective *red* has been nominalized in the test. The examples in (84) also show that *hong* ‘red’ can be used as a subject of a sentence, a direct object of a verb, and a complement of a classifier, signifying that the word can be nominalized in these other contexts than a **de construction**. This process supports the proposal by Cheng (1986) because of the syntactic constraint on the post-*de* part. In the proposal by Simpson (2003), there is no such constraint.

- (84) a. 红 象征 着 热情。  
 hong xiangzheng zhe reqing  
 red symbolize ASP passion  
 ‘The color red symbolizes passion.’
- b. 闵闵 喜欢 红。  
 Minmin xihuan hong  
 Minmin like red  
 ‘Minmin like the color red.’
- c. 一 种 红  
 yi zhong hong  
 one kind red  
 ‘one kind of red color’

The meaning of *red* in the two sentences are quite different. In (83a), *red* is a property describing all the red things while in (83b) *red* refers to a property abstracted from all the red colors. The change in the meaning corresponds to the change of the category.

### 5.3.5 v(p) de n

When a verb or a verb phrase modifies a noun in a **de phrase**, it can be predicted that the pre-*de* part and the post-*de* part cannot be switched because **n de v(p)** is ill-formed unless

the verbal constituent has been nominalized. In a *de* phrase, the pre-*de* part has to be a verb or an adverb when the post-*de* part is a verbal category.

The example in (85a) has a verb phrase as its pre-*de* part. As has been shown in (77), the pre-*de* part *hui fei* ‘can fly’ can be used as a sentential subject but not as a direct object of a verb nor as a complement to a classifier. The pattern suggests that the verb phrase does not fully nominalize and the *de* phrase should fail the *de*-reflection test.

As shown in (85b), the prediction is born out. The output of the *de*-reflection test on (85a) is an ungrammatical expression as shown in (85b). At this point, it seems that the *vp de n* case has provided evidence for the proposal made by Cheng (1986).

- (85) a. 会 飞 的 鱼  
hui fei de yu  
can fly DE fish  
‘the fish that can fly’
- b. \*鱼 的 会 飞  
yu de hui fei  
fish DE can fly  
Intended: ‘the fish’s ability of flying’

Nevertheless, there exist *vp de n* cases that pass the *de*-reflection test. As shown in (86), the pre-*de* part and the post-*de* part in (86a) can be switched as shown in (86b) although the pre-*de* part is a verb.

- (86) a. 消失 的 光芒  
xiaoshi de guangmang  
disappear DE light  
‘the dying light’
- b. 光芒 的 消失  
guangmang de xiaoshi  
light DE disappear  
‘the disappearance of the light’

We already know that the pre-*de* part in (85a) cannot be fully nominalized in other nominal-friendly contexts and (85a) fails the *de*-reflection test. To see whether the success of

(86a) in the *de*-reflection test is due to that its pre-*de* part can be nominalized, I examined the acceptability of using the pre-*de* part in the proposed nominal-friendly contexts in (87). The results show that the verb *xiaoshi* ‘disappear’ can be nominalized in other independent contexts, which aligns with the success of (86a) in the *de*-reflection test.

- (87) a. SENTENTIAL SUBJECT
- 消失 预示 着 灭亡。  
 xiaoshi yushi zhe miewang  
 disappear predict ASP perish  
 ‘Disappearance signals perishment.’
- b. OBJECT OF A VERB
- 闵闵 喜欢 消失。  
 Minmin xihuan xiaoshi  
 Minmin like disappear  
 ‘Minmin likes to disappear.’
- c. COMPLEMENT IN A CLASSIFIER PHRASE
- 一 次 消失  
 yi ci xiaoshi  
 one CL disappear  
 ‘one occasion of disappearance’

### 5.3.6 cp de n

A CP can also be used as a pre-*de* part in a *de* phrase. The pre-*de* part of the *de* phrase in (88b) is a sentence, as shown in (88a). When (88b) goes through the *de*-reflection test, the output is ill-formed as shown in (88c). This result suggests that the *de* constructon is asymmetrical.

- (88) a. 闵闵 回来 过。  
 Minmin huilai guo  
 Minmin return ASP  
 ‘Minmin had returned.’

- b. [闵闵 回来 过]<sub>CP</sub> 的事实  
 [Minmin huilai guo]<sub>CP</sub> de shishi  
 Minmin return ASP DE fact  
 ‘the fact that Minmin had returned’
- c. \*事实 的 [闵闵 回来 过]<sub>CP</sub>  
 shishi de [Minmin huilai guo]<sub>CP</sub>  
 fact DE Minmin return ASP  
 Intended: ‘that Minmin had returned as stated in the fact’

If the case of *cp de n* fails the *de*-reflection test because CP cannot be nominalized, we should examine whether a CP can be nominalized in other contexts. If we could find independent evidence that a CP cannot be nominalized, we can attribute the failure of *cp de n* in the *de*-reflection test to the failure of nominalizing the pre-*de* CP.

As shown in (89), the same CP as in (88a) is used in the contexts for nominals. The examples show that a CP can be used as a subject of a sentence but not as a direct object of a verb or a complement of a classifier.

(89) a. SENTENTIAL SUBJECT

[闵闵 回来 过]<sub>CP</sub> 推翻 了 很多 推测。  
 [Minmin huilai guo]<sub>CP</sub> tuifan le henduo tuice  
 Minmin return ASP refute ASP many speculation  
 ‘That Minmin had returned refutes many speculations.’

b. \*OBJECT OF A VERB

蛮蛮 喜欢 [闵闵 回来 过]<sub>CP</sub>。  
 Manman xihuan [Minmin huilai guo]<sub>CP</sub>  
 Manman like Minmin return ASP  
 Intended: ‘Manman likes the fact that Minmin had returned.’

c. \*COMPLEMENT IN A CLASSIFIER PHRASE

一 个 [闵闵 回来 过]<sub>CP</sub>  
 yi ge [Minmin huilai guo]<sub>CP</sub>  
 one CL Minmin return ASP  
 Intended: ‘one occasion that Minmin had returned’

That a CP cannot be used as a nominal in certain contexts aligns with the result of the *de*-reflection test for CP *de* N phrases. It lends support to the speculation that the failure of transforming CP *de* N into N *de* CP is due to the failure of converting a CP into a nominal.

### 5.3.7 Relative clause *de* n

In the last section, I discussed the *cp de n* case, in which a *cp* can be regarded as non-restrictive relative clauses. In this section, I will discuss the case of restrictive relative clauses modifying a noun. When the pre-*de* part is a relative clause, the *de* phrase fails the *de*-reflection test. For example, the pre-*de* part in (90b) is a relative clause derived from (90a) and it is modifying the post-*de* part which is coindexed with the implicit object of the verb *xihuan* ‘like’ in the pre-*de* part. When (90b) undergoes the *de*-reflection test, it generates an ill-formed expression, as shown in (90c).

- (90) a. 闵闵 喜欢 宠物。  
 Minmin xihuan chongwu  
 Minmin like pet  
 ‘Minmin likes pets.’
- b. [闵闵 喜欢  $t_i$ ] 的 宠物;  
 [Minmin xihuan  $t_i$ ] de chongwu;  
 Minmin like DE pet  
 ‘the pets that Minmin likes’
- c. \* 宠物 <sub>$i$</sub>  的 [闵闵 喜欢  $t_i$ ]  
 chongwu <sub>$i$</sub>  de [Minmin xihuan  $t_i$ ]  
 pet DE Minmin like  
 Intended: ‘Minmin’s liking of pets’

If the pre-*de* part fails being nominalized in other independent contexts, we will have supporting evidence for the proposal by Cheng (1986) that the post-*de* part has to be a noun. As shown in (91), the headless relative clause cannot be used as a nominal in the chosen contexts.

- (91) a. \* SENTENTIAL SUBJECT

[闵闵 喜欢  $t_i$ ] 引起了 关注。  
 [Minmin xihuan  $t_i$ ] yinqi le guanzhu  
 Minmin like raise ASP attention

Intended: ‘What Minmin likes has caught some attention.’

b. \* OBJECT OF A VERB

蛮蛮 喜欢 [闵闵 喜欢  $t_i$ ].  
 Manman xihuan [Minmin xihuan  $t_i$ ]  
 Manman like Minmin like

Intended: ‘Manman likes that what Minmin likes.’

c. \* COMPLEMENT IN A CLASSIFIER PHRASE

一 个 [闵闵 喜欢  $t_i$ ]  
 yi ge [Minmin xihuan  $t_i$ ]  
 one CL Minmin like

Intended: ‘one thing that Minmin likes’

## 5.4 Theoretical implications of the results

According to the pairing patterns of the syntactic categories that appear in the pre-*de* and the post-*de* positions in the **de construction**, we could make certain predictions about the whether a certain combination of syntactic categories would pass or fail the *de*-reflection test. That is to say, if a certain category never appears in a post-*de* position, such as adjectives, then it is reasonable to predict that the **adj de n** case would fail the *de*-reflection test. However, some predictions are not born out in the test, as shown in the previous section.

The cases that are contradictory to our prediction include **adj de n**, **v(p) de n**. As shown in (83b) and (86b), the post-*de* parts are adjectival and verbal before the *de*-reflection test. The surprising results need an explanation. One speculation is if the pre-*de* part can undergo nominalization then the pre-*de* part and the post-*de* part can be switched successfully on the syntactic level. Further investigation into the speculation will be saved for another chapter.

A simple premise of arguing that the **xp** undergoes nominalization when successfully



passing the *de*-reflection test is that the post-*de* part determines the category of the entire **de phrase**. Because the product of a successful *de*-reflection test can be used as a nominal, we can deduce that the post-*de* part in the post-test **de phrase** must be of a nominal category. If its original category is not of a nominal category, then it must have undergone nominalization.

The results from the section support the results of the previous chapter that the pre-*de* part and the post-*de* part are in asymmetrical positions syntactically speaking. Cheng (1986) does not have any assumption that relates to the reversability of a **de phrase**. As long as the post-*de* categories can be used as nominals, the **de construction** should be well-formed. That is to say, it cannot go beyond explaining why some conventionally non-nominal categories can be used in post-*de* positions while others cannot be used. Especially, when the pre-*de* part is a verbal category, it is unclear what the constraints are as to when the verbal elements can be used as a nominal in a post-*de* position. As shown in (85) and (86), when the pre-*de* part contains modals, the **de phrase** fails the *de*-reflection test. When the pre-*de* part is a bare verb, the results of the *de*-reflection test is not predictable. The **de phrase** in (85a) and (86a) are both bare verbs. However, the **de phrase** in (86a) passes the *de*-reflection test while the **de phrase** in (85a) fails the *de*-reflection test.

Simpson (2003) assumes that the pre-*de* part and the post-*de* part form a predicate relation underlyingly. This assumption does not help to explain the behaviors of various **de phrases** in the *de*-reflection tests.

The results also show that the pre-*de* part and the post-*de* part make uneven contributions to the meaning composition because the meaning of **xp de yp** and that of **yp de xp** always differ supposing both sequences are well-formed syntactically.

## 5.5 Verbal **de phrases**

There are two types of **de phrases** that belong to the verbal category. The first type has an adverb as the pre-*de* part modifying the post-*de* verb or verb phrase, which I will refer

to as pre-verbal modification. One example of such a type is given in (92). The second type has a verb as the pre-*de* part which is modified by the post-*de* part. One example is given in (93). I will refer to the second type of verbal **de phrases** as post-verbal modification.

(92) 闵闵 悄悄 地 离开 了。  
 Minmin qiaoqiao de likai le.  
 Minmin quiet DE leave ASP  
 ‘Minmin left quietly.’

(93) 闵闵 跑 得 快。  
 Minmin pao de kuai.  
 Minmin run DE fast  
 ‘Minmin runs fast.’

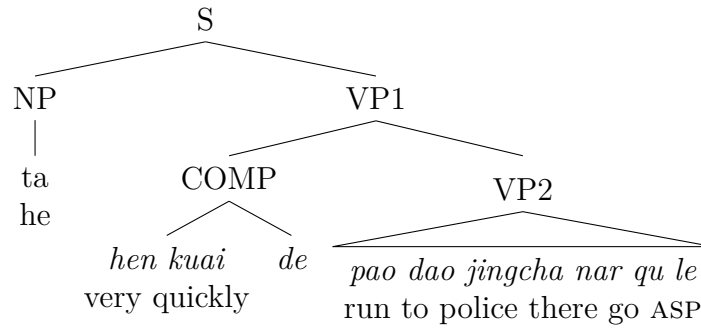
In the nominal domain, modification with *de* has the configuration that the pre-*de* part modifies the post-*de* part. The proposed structures for the nominal **de constructions** certainly cannot account for the post-verbal modification. Therefore, I will discuss the structures specifically proposed to account for the verbal **de constructions**.

### 5.5.1 Ross (1984)

Ross (1984) proposes that *de* serves to connect the modifier and the modifiee and always appears in between the two. Whether the modifier appears pre-verbally or post-verbally depends on whether the modifiee is a verb or a **vp**. The structure in (94a) demonstrates a case of pre-verbal modification in which the modifiee is always a **verb phrase**. The structure in (94b) demonstrates a case of post-verbal modification in which the modifiee is always a bare verb.

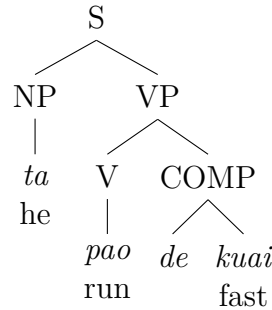
(94) (Ross, 1984)

a. PRE-VERBAL MODIFICATION  
 ‘He very quickly ran to the police.’



b. POST-VERBAL MODIFICATION

‘He runs fast.’



### 5.5.2 Cheng (1986)

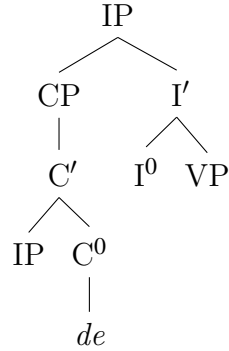
Cheng (1986) holds that *de* is complementizer in the verbal **de phrases** just as in the nominal **de phrases**. Cheng (1986) does not mention the case of pre-verbal modification but proposes two structures for post-verbal modification. The difference in the two structures accounts for the different readings of the post-verbal modification.

When the pre-*de* part is a non-relative IP, *de* heads a CP which locates in the **specifier** position of an IP, as demonstrated in (95a). The CP becomes the subject of the sentence and the post-*de* part serves as the predicate of the sentence. The relation between the *de*-headed CP and the post-*de* part becomes predication instead of modification.

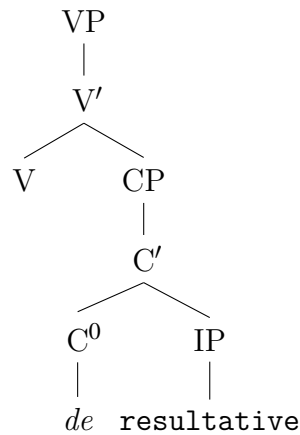
On the other hand, when the post-*de* part has a resultative interpretation, the **complementizer phrase** that *de* heads becomes the complement of the verb that is being modified, as demonstrated in (95b). Cheng (1986) proposes that the complementizer *de* has an optionality of being head-initial or head-final in Mandarin and thus the variation from (95a) to (95b).

(95) POST-VERBAL MODIFICATION

a. THE POST-DE IS PREDICATIVE OF THE PRE-DE.



b. POST-DE IS RESULTATIVE.



In the *de*-reflection test that follows, I will only evaluate the structure proposed by Ross (1984) for the pre-verbal modification and only the structure proposed by Cheng (1986) for the post-verbal modification for the following reasons. In the case of pre-verbal modification, only Ross (1984) proposes an analysis. In the case of post-verbal modification, the structure Ross (1984) proposes is almost identical to the structure Cheng (1986) proposes for the resultative case, except that Cheng (1986) offers a structure that is more detailed. Ross (1984) does not categorize *de* or the post-*de* part. Compare (94b) and (95b).

## 5.6 Predictions and implications

### 5.6.1 Pre-verbal modification

In the case of pre-verbal modification, we can only evaluate the structure Ross (1984) proposes. However, the structure lacks many details, which makes predicting how such constructions behave in the *de*-reflection test difficult if not impossible. To make the structure evaluable, I will discuss three remedies in the following.

The first problem with the structure in (94a) is that it does not categorize the pre-*de* part. In a *de*-reflection test, if the pre-*de* part cannot be converted into a VP, then we can predict all pre-verbal modification structures would fail according to Ross (1984). If the pre-*de* part can be converted into a VP, then the prediction relies on whether the pre-*de* position can host a VP. Not knowing the category of the pre-*de* part makes making predictions extremely complicated. Not being able to make predictions using the proposal makes it impossible to evaluate the proposal using the results from the test.

Without the help of morphology, we can only rely on some distribution facts to determine the category of the pre-*de* part. If the pre-*de* part can only appear in the context of *de*, then we have reasons to treat them as a special category. If we can find the pre-*de* part in other independent contexts, we will use its category determined by the context it appears in.

I propose to treat the pre-*de* part as VP. In the example of (96a), we have a pre-verbal modification in which the pre-*de* part modifies the manner of the post-*de* part. In the example of (96b), we can see that the pre-*de* part in (96a) is the predicate of the sentence. Since predicates are considered to be VP or IP, we will categorize the pre-*de* part as VP or IP now.

- (96) a. 闵闵 [很 慢] 地 离开了。  
Minmin [hen man] de likai le  
Minmin very slow DE leave ASP  
'Minmin left very slowly.'
- b. 闵闵 [很 慢]。  
Minmin [hen man]  
Minmin very slow

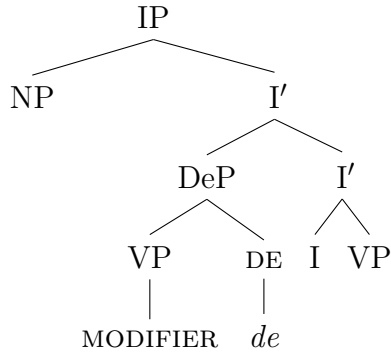
‘Minmin is very slow.’

To rule out the possibility that the pre-*de* part is an IP, we have the examples in (97). The predicate in (97a) contains an overt aspect marker *guo* indicating a perfective structure. However, the aspect-containing predicate cannot be used as a pre-*de* modifier in pre-verbal modification, as shown in (97b). It is important to contrast (97b) with (96a) in which a predicate without overt aspect marking serves as a pre-verbal modifier. Therefore, I will categorize the pre-verbal modifier as VP instead of IP.

- (97) a. 闵闵 [很 慢 过]。  
Minmin [hen man guo]  
Minmin very slow ASP  
‘Minmin used to be very slow.’
- b. \* 闵闵 [很 慢 过] 地 离开了。  
Minmin [hen man guo] de likai le  
Minmin very slow ASP DE leave ASP  
Intended: ‘Minmin left in a previously very slow manner.’

The second problem with the structure in (94a) is its lack of a bar-level projection of the head. Not having a bar-level structure eliminates the specifier position and thus restricts the way constituents can combine. I propose to follow the **x-bar** scheme and revise the structure in (94a) into the structure in (98). A crucial change is that a sentence now is an IP instead of a VP. This change is more coherent with the contemporary and allows us to mark tense and aspect in the structure. I renamed the COMP phrase as DeP since it is a phrase headed by *de*. The VP modifier is the complement of *de*. I left out the specifier layer of DeP because no known content sits in that position. The entire DeP is attached to the adjunct position of the IP. The subject of the sentence is placed in the specifier position of the structure.

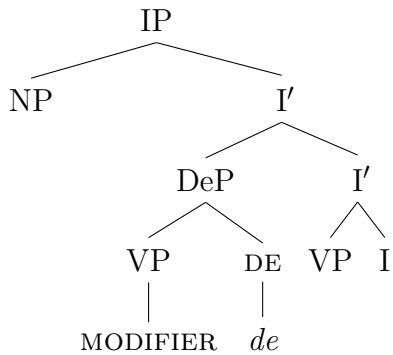
(98)



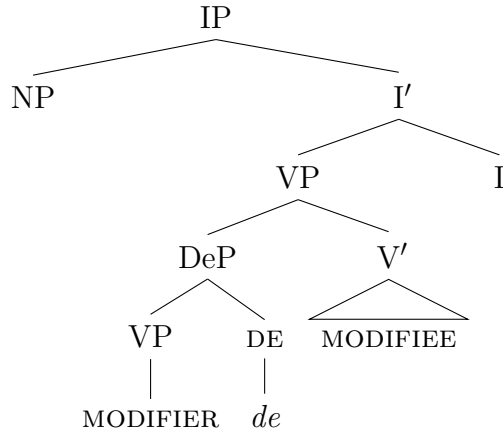
The third problem with the structure Ross (1984) proposes is that it treats the aspect marker *le* as part of the post-*de* VP without any examination. To examine whether the aspect marker resides above or below DeP, I propose two analyses to compare what consequences each analysis will give rise to. I call the analysis where the aspect marker is projected below DeP as **low-ip** analysis. I call the analysis where the aspect marker is projected above DeP as **high-ip** analysis. There exist both head-initial and head-final aspects in Mandarin. The perfective aspect *le* as we have seen is head-final. Let's consider this case first. As shown in (99a), the tree depicts a low-ip analysis with a head-final aspect, which attaches DeP as an adjunct of the IP. As shown in (99b), the tree depicts a high-ip analysis with a head-final aspect, which attaches DeP as an adjunct of the VP. Under both analyses, the two structures will yield the same word order, which makes it impossible to distinguish the two analyses.

(99) HEAD-FINAL

a. LOW-IP



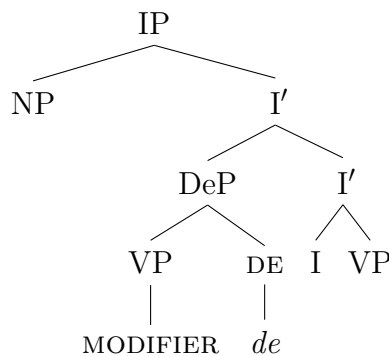
b. HIGH-IP



However, if we turn to the head-initial aspects, the two structures yield different word orders, which will tell us which analysis is more accurate. The structure in (100a) depicts the low-ip analysis with a head-initial aspect while the structure in (100b) depicts the high-ip analysis with a head-initial aspect. The location where DeP is attached in the two structures in (100) remains the same as those in (99). The only difference is that the head direction of the IP has changed from head-final to head-initial. With a head-initial I, the low-ip analysis generates a word order that the aspect marker sits in between *de* and the modified VP while the high-ip analysis generates a word order that the aspect marker precedes the pre-verbal modifier.

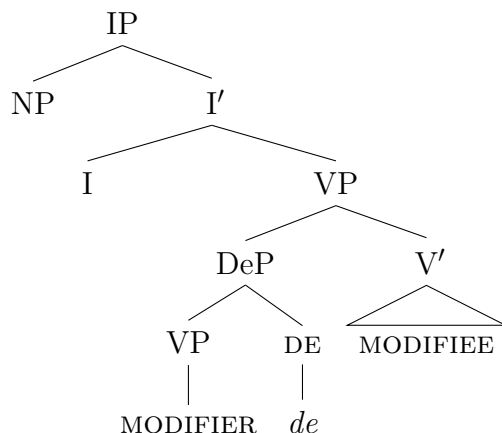
(100) HEAD-INITIAL

a. Low-IP



b. High-IP





The progressive aspect marker *zai* happens to be a head-initial one, meaning that it comes before a verb phrase. Using the aspect marker *zai* with the low-ip analysis will give us a sentence in (101a). Using the same marker with the high-ip analysis will give a sentence in (101b). The sentence corresponding to the prediction of the low-ip analysis is not well-formed while the sentence corresponding to the prediction of the high-ip analysis is. Thus, this word order fact lends support to the high-ip analysis.

(101) a. \* LOW-IP

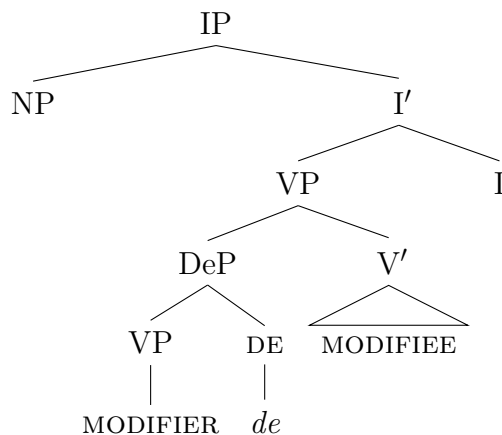
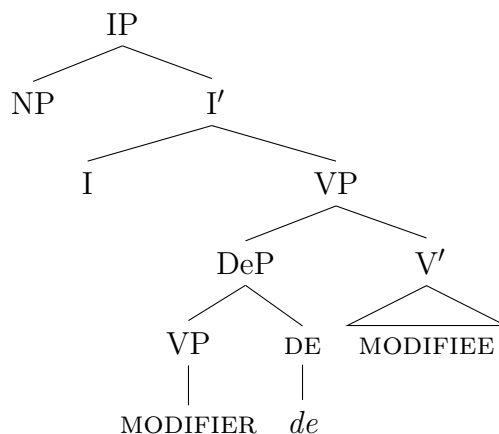
闵 闵 很 慢 地 在 离 开。  
 Minmin hen man de **zai** likai.  
 Minmin very slow DE ASP leave  
 Intended: ‘Minmin is leaving slowly.’

b. HIGH-IP

闵 闵 在 很 慢 地 离 开。  
 Minmin **zai** hen man de likai.  
 Minmin ASP very slow DE leave  
 ‘Minmin is leaving slowly.’

Finally, we have an analysis that derives from Ross (1984) that is detailed enough so that we can use to predict how the pre-verbal modification structures behave in the *de*-reflection test. Depending on the head-directionality, the structures are schematized in (102).

(102)

a. HEAD-FINALb. HEAD-INITIAL

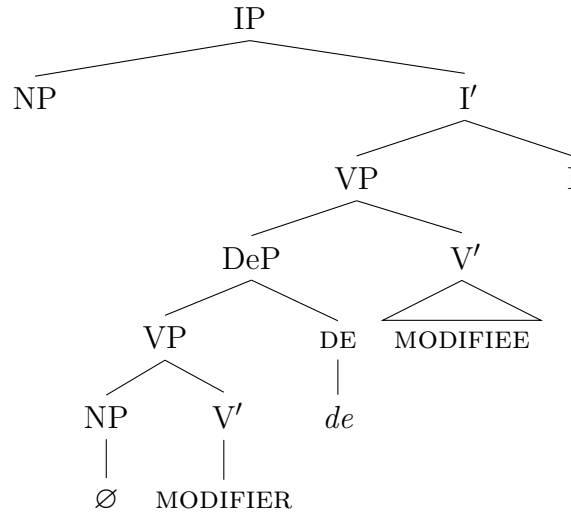
According to the newly revised structures in (102), we can predict that the pre-verbal modification structures will always pass the *de*-reflection test. The pre-verbal modifier in this revised structures is considered a VP at the moment. However, this VP does not allow any external arguments in it. As shown in (103a), when the pre-verbal modifier includes an external argument, the sentence becomes ungrammatical.

- (103) a. \* 闵闵 [彬彬 很 慢]<sub>VP</sub> 地 离开了。  
 Minmin [Binbin hen man]<sub>VP</sub> de likai le.  
 Minmin Binbin very slow DE leave ASP  
 Intended: 'Minmin left in a way that Binbin is very slow.'

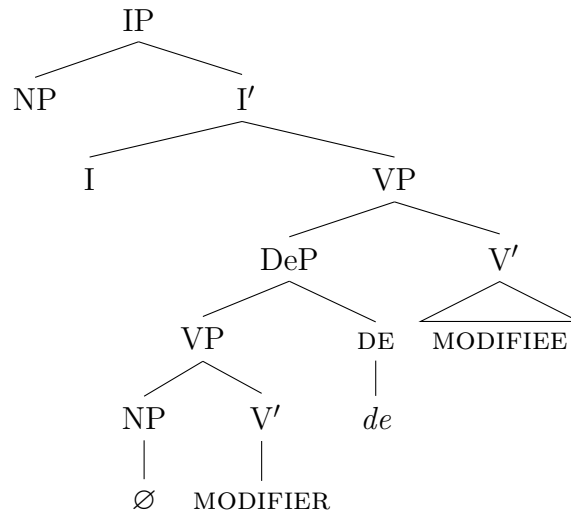
We may have to revise the category of the pre-verbal category to one that does not project arguments later but for now I will stick to using a VP whose external subject is always null. The new structures are now shown in (104). In a *de*-reflection test, we switch the positions of the modifier and the modifiee. Now that the modifier VP does not project external arguments,

its actual content is the same as that of a  $V'$ . Because the pre-*de* content and the post-*de* content are the same, we predict that all pre-verbal modification structures will pass the *de*-reflection test. If any failure arises, it tells us that this proposed structure has its limitations, probably in capturing the additional requirements of the pre-verbal modification.

(104) a. HEAD-FINAL



b. HEAD-INITIAL

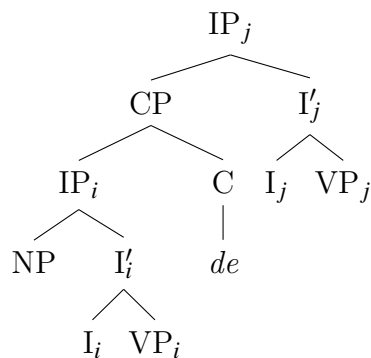


### 5.6.2 Post-verbal modification

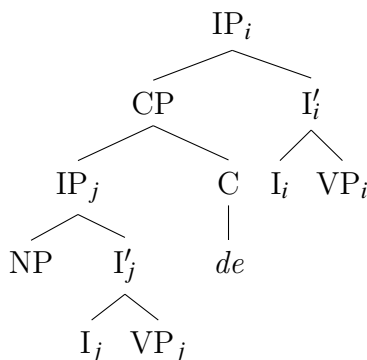
For post-verbal modification, we will use the structures Cheng (1986) proposes to predict how such construction behave in the *de*-reflection test. According to Cheng (1986), when the post-*de* is not a resultative, the CP that *de* heads is the external argument of the main verb and thus the subject of the sentence. A structure that follows Cheng (1986) is shown in

(105a). In the structure, projections of the same head are co-indexed. As shown in (105a), the pre-*de* content has an NP more than the post-*de* content. I propose to switch only the bar-level projections in the *de*-reflection test. Therefore, the *de*-reflection of (105a) should be the structure in (105b). The reason to switch the material excluding the external argument is that the external argument of VP<sub>j</sub> in (105a) contains the pre-*de* part. Switching the pre-*de* part and the post-*de* part will create a loop, which is doomed to be ungrammatical.

(105) a. before reflection

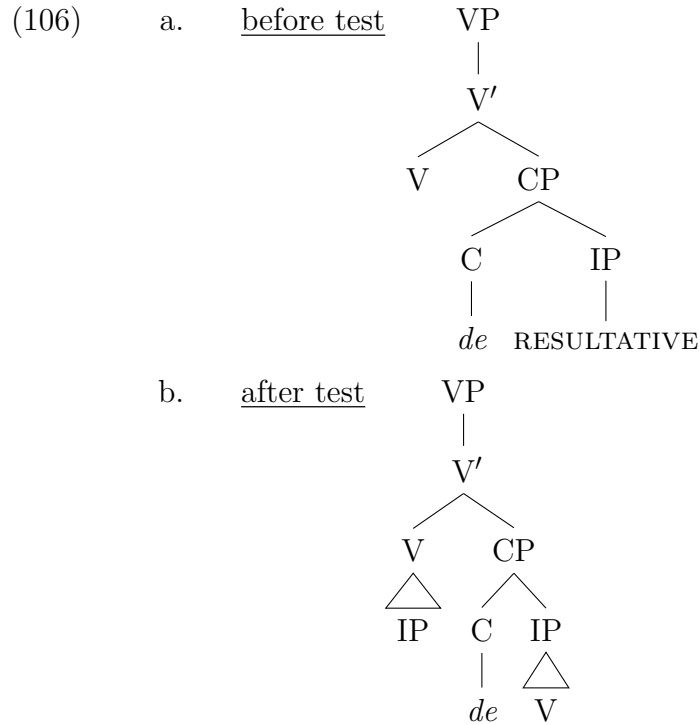


b. after reflection



Based on the predicted structure in (105b), the grammaticality of it depends on whether NP can be the external argument of VP<sub>j</sub> and whether a CP can be the external argument of VP<sub>i</sub>.

When the post-*de* part is a resultative, we have a structure as in (106a) according to Cheng (1986). In the *de*-reflection test, the content in V and the content in IP will switch positions. Thus, we will get a structure like that in (106b). Whether the result is grammatical depends on whether the content in the resultative IP can fit under a head verb. If the resultative IP originally is a bare verb, then we predict the structure will pass the *de*-reflection test according to Cheng (1986).



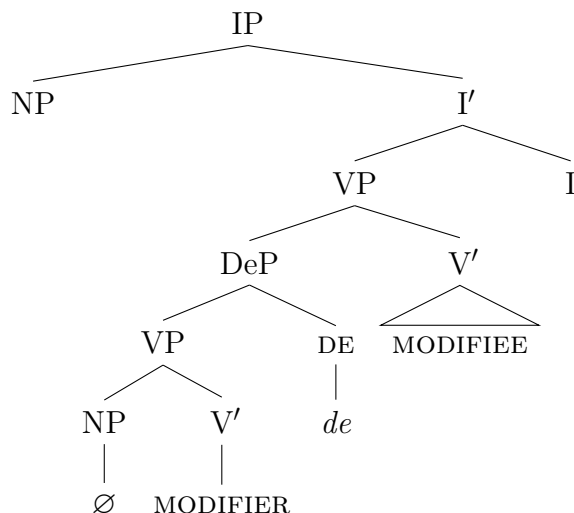
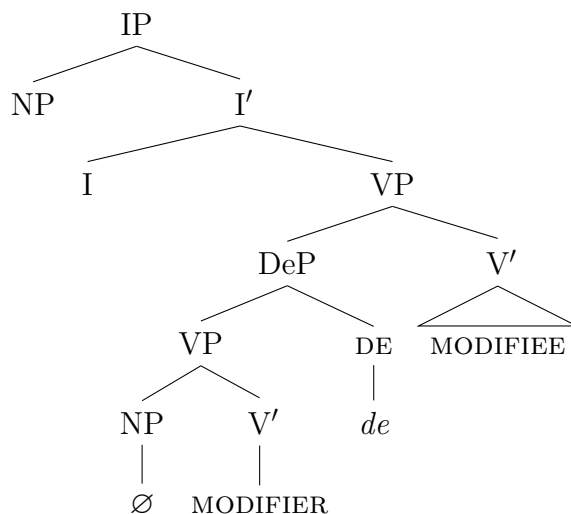
## 5.7 Applying the test

In this section, I will apply the *de*-reflection test to pre-verbal modification and post-verbal modification and compare the results with our predictions. If the results are consistent with the predictions, then the *de*-reflection test has provided supporting evidence for the proposals that implicate those predictions. If the results are not consistent with the predictions, then we have found contradictions to the relevant proposals through the *de*-reflection test.

### 5.7.1 pre-verbal modification

According to Ross (1984) (diagramed in (104), repeated in (107)), all the pre-verbal modification structures should pass the *de*-reflection test because the pre-*de* modifier and the post-*de* modifiee have the same overtly spelled-out content, categorically.

(107)

a. HEAD-FINALb. HEAD-INITIAL

However, when we put the *de* phrase in (108a) (the part in square brackets) through the *de*-reflection test, we end up with (108b), which is an ungrammatical expression.

(108) a. 闪闪 [快速 地 逃跑 了]。  
 Minmin [kuaisu **de** taopao le]  
 Minmin fast DE escape ASP  
 ‘Minmin has quickly escaped.’

b. \* 闪闪 [逃跑 了 地 快速]。  
 Minmin [taopao le **de** kuaisu]  
 Minmin escape ASP DE fast  
 ‘Minmin was fast in terms of escaping.’

One speculation of why (108a) failed the *de*-reflection test is that the lexical item *kuaisu* ‘fast’ cannot be used as a predicate by its self. As shown in (109a), the true predicate in

(108a) *taopao le* ‘escape’ can be used as a predicate by itself. As shown in (109b), the pre-verbal modifier in (108a) *kuaisu* ‘fast’ cannot be used as a predicate independently. Therefore, the failure of (108b) could be attributed to the failure of (109b), suggesting that the post-*de* part is predicate of the subject but the pre-*de* part is not. Due to this implication, predicate modification is not suitable for the composition of the pre-*de* part and the post-*de* part in the pre-verbal modification.

- (109) a. 闵闵 逃跑 了。  
 Minmin taopao le.  
 Minmin escape ASP  
 ‘Minmin has escaped.’
- b. \* 闵闵 快速。  
 Minmin kuaisu.  
 Minmin fast  
 Intended: ‘Minmin is fast.’

This speculation makes sense in that after the *de*-reflection test the original pre-verbal modifier will become the predicate of the new sentence. It has to be able to be used as an independent predicate for the test output to be grammatical. However, the condition that the pre-*de* part must be able to be used as a predicate independently is not sufficient for a pre-verbal modification to pass the *de*-reflection test. As shown in (110), the **de** phrase in (110a) is a pre-verbal modification and its outcome through the *de*-reflection test is still ungrammatical, as shown in (110b).

- (110) a. 闵闵 [很 认真 的 做 了 作业]。  
 Minmin [hen renzhen **de** zuo le zuoye]  
 Minmin very careful DE do ASP homework  
 ‘Minmin did the homework very carefully.’
- b. \* 闵闵 [做 了 作业 的 很 认真]。  
 Minmin [zuo le zuoye **de** hen renzhen]  
 Minmin do ASP homework DE very careful  
 Intended: ‘Minmin was very careful when he did the homework.’

Different from the case in (108a), both the pre-*de* part and the post-*de* part in (110a) can be used as a predicate of the subject, as shown in (111a) and (111b) respectively.

- (111) a. 闵闵 很 认真。  
 Minmin hen renzhen  
 Minmin very careful  
 ‘Minmin is very careful.’
- b. 闵闵 做 了 作业。  
 Minmin zuo le zuoye  
 Minmin do ASP homework  
 ‘Minmin did the homework.’

The pre-verbal modification structures failed the *de*-reflection test despite whether the modifier is a predicate of the subject or not. The results suggest that the structures of Ross (1984) still need repair.

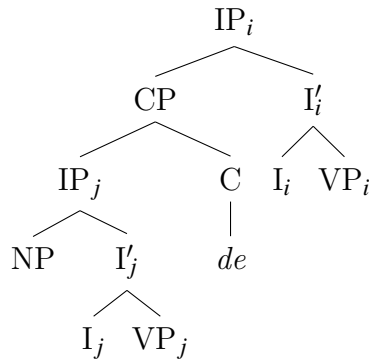
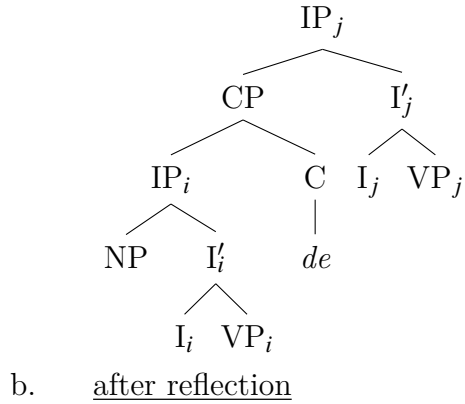
## 5.7.2 post-verbal modification

In the case of the post-verbal modification, we have to divide them into two subcases. The first subcase is when the post-*de* content describes or evaluates the pre-*de* content instead of being the result of the pre-*de* content. The second subcase is when the post-*de* content is the result of the pre-*de* content.

The structure for the first subcase in which the post-*de* is non-resultative is repeated in (112a) and the structure of its *de*-reflection is repeated in (112b). It shows that a structure can pass the *de*-reflection test if the pre-*de* predicate ( $VP_i$ ) can select a **CP** as its subject and the post-*de* predicate ( $VP_j$ ) can select an **NP** as its subject.

- (112) a. before reflection





In the example of (113a), the pre-*de* part describes an event that Minmin dies and the post-*de* part describes the duration of the event. The post-*de* part here cannot be the resultative of the pre-*de* part because the event of dying does not lead to a consequence that is very fast but the event itself happens very fast. The example in (113b) shows the *de*-reflection of (113a) and it is not natural under the intended interpretation that the post-*de* part serves as a description for the pre-*de* part. It has to sound natural under the intended interpretation to be counted as passing the test because the purpose of the test is to test whether the structure is symmetrical. If we only evaluate the results by checking whether the new sentence is grammatical and meaningful and ignore whether the meaning of the new sentence is built up using the same structure, it does not tell us anything about the structure of interest.

- (113) a. 闵闵 [死]<sub>VP<sub>i</sub></sub> 得 [很 快]<sub>VP<sub>j</sub></sub>。  
 Minmin [si]<sub>VP<sub>i</sub></sub> de [hen kuai]<sub>VP<sub>j</sub></sub>  
 Minmin die DE very quick  
 ‘Minmin died very quickly.’

- b. ? 闵闵 [很 快]<sub>VP<sub>j</sub></sub> 得 [死]<sub>VP<sub>i</sub></sub>。  
 Minmin [hen kuai]<sub>VP<sub>j</sub></sub> de [si]<sub>VP<sub>i</sub></sub>  
 Minmin very quick DE die  
 Intended: ‘Minmin is dyingly fast.’

The example of (113a) has failed the *de*-reflection test. To see whether the prediction is born out, we need to check whether the pre-*de* verb phrase VP<sub>i</sub> can take a CP as an argument and whether the post-*de* verb phrase VP<sub>j</sub> can take a NP as an argument. As shown in (114a), VP<sub>j</sub> can take the same NP as in (113a). The second condition is met.

- (114) a. 闵闵 [很 快]<sub>VP<sub>j</sub></sub>。  
 Minmin [hen kuai]<sub>VP<sub>j</sub></sub>  
 Minmin very fast  
 ‘Minmin is very fast.’

Now we need to check whether VP<sub>i</sub> can select a regular CP as an argument. In (115a), we have a yes-no question, which is analyzed as CP conventionally. However, when we use combine this question-type CP with VP<sub>i</sub>, we get an ungrammatical sentence, as shown in (115b).

- (115) a. 闵闵 经常 借 书 吗?  
 Minmin jingchang jie shu ma?  
 Minmin often borrow book Q  
 ‘Does Minmin often borrow books?’
- b. \* [闵闵 经常 借 书 吗]<sub>CP</sub> [死]<sub>VP<sub>i</sub></sub>。  
 [Minmin jingchang jie shu ma]<sub>CP</sub> [si]<sub>VP<sub>i</sub></sub>。  
 Minmin often borrow book Q die  
 Intended: ‘Whether Minmin often borrows books dies.’

The condition that VP<sub>i</sub> in (113a) can subcategorize a CP is not met, which correctly predicts that the sentence in (113a) fails the *de*-reflection test. At this point, it seems that our prediction is born out.

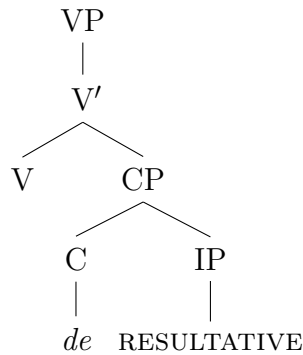
However, VP<sub>j</sub> in (113a), which originally subcategorizes a *de*-headed CP in the sentence does not take the question-type CP either. As shown in (116a), the same CP as in (115b)

cannot be used as an argument of VP<sub>j</sub> which has been proposed to subcategorize a *de*-headed CP by Cheng (1986). Therefore, we have reasons to believe that *de* is a different kind of complementizer. However, Cheng (1986) does not specify any constraints for using *de* as a complementizer and how it is different from the other complementizers.

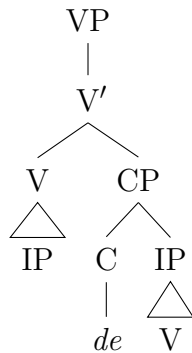
- (116) a. \* [闵闵 经常 借 书 吗]<sub>CP</sub> [很快]<sub>VP<sub>j</sub></sub>.  
 [Mimin jingchang jie shu ma]<sub>CP</sub> [hen kuai]<sub>VP<sub>j</sub></sub>.  
 Minmin often borrow book Q very fast  
 Intended: ‘Whether Minmin often borrows books is very fast.’

The second subcase of post-verbal modification is when the post-*de* part is a resultative of the pre-*de* part. The structure of the resultative construction and the predicted structure after the *de*-reflection test are repeated in (117a) and (117b) respectively.

- (117) a. before test



- b. after test



As shown in (118a), the post-*de* phrase contains an aspect marker which it impossible to fit under a verb head. As predicted, the sentence fails the *de*-reflection test. As shown

in (118b), when the pre-*de* verb and the post-*de* IP switch positions, the sentence becomes ungrammatical. Therefore, Cheng (1986) makes correct predictions about the behavior of the resultative case in a *de*-reflection test. However, since resultatives all include aspect marking in them, we cannot test the case when a resultative contains a bare verb. If the case when a bare-verb resultative passes the *de*-reflection test, we can fully accept the proposal by Cheng (1986).

- (118) a. 闵闵 高兴 得 疯 了。  
 Minmin gaoxing de feng le  
 Minmin happy DE crazy ASP  
 ‘Minmin was so happy that he went crazy.’
- b. \* 闵闵 疯 了 得 高兴。  
 Minmin feng le de gaoxing  
 Minmin crazy ASP DE happy  
 Intended: ‘Minmin was so crazy that he is happy.’

## 5.8 Theoretical implications of the results

To summarize, the structures of pre-verbal modification have failed the *de*-reflection test. However, according to the structure proposed by Ross (1984), all the pre-verbal modification structures should pass the *de*-reflection test.

The structures of post-verbal modification have also failed the *de*-reflection test. In the case of non-relative IP, the structure that Cheng (1986) proposes treats the pre-*de* part and the post-*de* part as equal categories. Thus, we predict that such a structure will pass the test as long as the requirement of subcategorization is not violated after the test. However, all cases have failed the test despite whether the subcategorization requirement is met or not. In the case of a post-*de* resultative, we predict that no such structures will pass the test because we are switching the content of a head and the content of a phrase. It turns out that the prediction is born out.

All the verbal **de-constructions** have failed the *de*-reflection test despite what the

proposed structures implicate. The unpredictable behavior of the verbal **de constructions** suggest that the proposed structures for the verbal **de constructions** are not sufficient enough to account for their behaviors in the *de*-reflection test. If we accept the structures as they are, then the result suggests that satisfying the structural configuration is a necessary condition for forming a modification relation but not a sufficient one.

On the other hand, the nominal **de constructions** are more predictable in how they turn out in a *de*-reflection test. It suggests that the structures for nominal **de constructions** have captured the properties of the nominal **de constructions** that will affect the results of the *de*-reflection test, such as the asymmetrical positions and categories of the pre-*de* and the post-*de* part. The results from the nominal **de constructions** also suggest that the meaning recomposition is much easier for the nominal **de constructions** because satisfying the structural configuration is not sufficient for forming a meaningful expression. When a nominal **de construction** passes a *de*-reflection test, the pre-*de* and the post-*de* part can modify each other and using the same structure. This is not simple to conceptualize in the verbal context. The meaning of ‘slow’ and the meaning of ‘run’ may be able to modify each other. ‘Slow’ describes the manner of the activity indicated by ‘run’ and ‘run’ specifies the context from which we pick out the appropriate scale to measure the speed and then conclude ‘slow’ as the right description. The first kind of modification is realized by the pre-verbal modification while the second kind of modification is realized by the post-verbal modification. The difference between the results of the nominal **de constructions** and the verbal **de constructions** in the *de*-reflections suggest a big difference between nominal modification and verbal modification in general.

The post-*de* resultative constructions pose a different challenge. They exhibit that aspect marking prohibits a verb phrase from modifying another verb. To explain this pattern, we will need more investigations on this.

The *de*-reflection test provides us with a new perspective of looking at the underlying structure of a **de construction**. The proposed structures for the nominal **de constructions**

and the verbal **de constructions** would have to make the right predictions about the **de constructions** in a *de*-reflection test.

## Chapter 6

### Conclusion

The **de constructions** in Mandarin Chinese are used to mark a modification relation between two phrases in both the nominal and the verbal domain. A basic question is whether the nominal **de construction** and the verbal **de construction** derive from the same underlying structure because they share the same form and have similar functions. This dissertation looked at the premise of unifying the structures of nominal **de constructions** and verbal **de constructions**. It compared the nominal **de constructions** and verbal **de constructions** in their distribution, headedness, and symmetrical properties. To compare their distribution, I used a corpus-based approach. To probe the head of the nominal **de constructions**, I use the classifier structure. To probe the head of the verbal **de constructions**, I used verb reduplication. To compare the symmetrical property of the nominal **de constructions** and the verbal **de constructions**, I devised a test that switches the positions of the pre-*de* component and the post-*de* component, i.e. the *de*-reflection test.

Through the corpus study on how the categories distribute in the pre-*de* position and the post-*de* position, we concluded that the nominal **de constructions** greatly outnumber the verbal **de constructions**. The features of the head determine the distribution of their modifiers. Only V and VP are found in the XP position in both the nominal and the verbal **de constructions** and they are the most frequent categories found in the XP position. The categories that are acceptable in the pre-*de* and the post-*de* positions do not distribute equally. Common nouns appear more heavily in pre-*de* positions than other categories. When we compare the modifiers of **de constructions** with the modifiers of *de*-less constructions, we observe that the two categories qualitatively differ from each other. The difference between

the **de constructions** and the *de*-less constructions reveals that the two types of modification have different selectional properties. For example, phrasal modifiers are acceptable in a **de construction** but are unacceptable in *de*-less constructions.

By looking at the interactions between the **de constructions** and the structures they embed in, we also can conclude that both the nominal **de constructions** and the verbal **de constructions** are asymmetrical. Their difference lies in that the nominal **de constructions** and the pre-verbal **de constructions** are headed by the post-*de* component while the post-verbal **de constructions** are headed by the pre-*de* component. This finding disputes Simpson (2003)'s proposal that nominal *de* is the head of the **de construction**. In addition, there is no evidence to support that *de* can be the head of any verbal **de construction**.

Through the *de*-reflection test, we conclude that both the nominal **de constructions** and the verbal **de constructions** are asymmetrical. When the pre-*de* component of a nominal **de construction** can be nominalized, the *de*-reflection test succeeds as expected. However, when the pre-*de* component of a pre-verbal **de construction** can be used as a predicate, the *de*-reflection test fails unexpectedly. This finding reveals that the current proposals for verbal **de constructions** are incomplete. There are two explanations for the unexpected failures of the verbal **de constructions**. One is that the structural configuration is necessary but insufficient for verbal **de constructions** to form. The second is that converting a lexical entry into a verb is not as easy as converting one into a noun. The second reason may also explain why nominal **de constructions** are more frequent than verbal **de constructions**.

|             | asymmetry | head = XP | head = YP |
|-------------|-----------|-----------|-----------|
| nominal     | ✓         |           | ✓         |
| pre-verbal  | ✓         |           | ✓         |
| post-verbal | ✓         | ✓         |           |

One similarity between the nominal **de constructions** and the verbal **de constructions**



is that they are both asymmetrical and require a head. However, they differ in the directionality of the head. For nominal **de constructions**, the head is always the post-*de* phrase. For the verbal **de constructions**, the head can be the pre-*de* phrase or the post-*de* phrase and the different positions of the head correspond to different interpretations. When the post-*de* phrase contains the head in a verbal **de construction**, the pre-*de* phrase describes the manner of the action or the event defined by the post-*de* phrase. When the pre-*de* phrase contains the head in a verbal **de construction**, the post-*de* describes the extent of action marked by the pre-*de* component.

As shown in the Table 6.1, when the nominal **de constructions** pass the *de*-reflection test, the pre-*de* part can be nominalized. The pre-verbal **de constructions** can pass the *de*-reflection test if we allow a post-verbal reading for the test result. The resultative post-verbal **de constructions** cannot pass the *de*-reflection test while the non-resultative post-verbal **de constructions** can pass if we allow a pre-verbal reading for the test result.

|                 | <i>De</i> -Reflection | Constraints                                 |
|-----------------|-----------------------|---------------------------------------------|
| nominal         | ✓                     | The pre- <i>de</i> part can be nominalized. |
| pre-verbal      | ?                     | pre-verbal becomes post-verbal              |
| post-verbal     |                       |                                             |
| resultative     | ×                     |                                             |
| non-resultative | ?                     | post-verbal becomes pre-verbal              |

Table 6.1: *De*-reflection Test Results

In the *de*-reflection test, we have seen that the success rate of nominal **de constructions** is higher than that of verbal **de constructions** on the syntactic level. One successful scenario for the nominal **de construction** is when the modifier is an adjective. Passing the syntactic aspect of the *de*-reflection test implicates the successful nominalization of the adjectives. On the other hand, the failures of the verbal **de constructions** have two implications. One is that pre-*de* components cannot be successfully converted into verbs. The second is that the conversion of these pre-*de* components cannot be modified in the **de**

constructions.

## 6.1 Future Directions

There are still many features to compare between the nominal *de* constructions and the verbal *de* constructions. Their similarities and differences will not only reveal what the nature of *de* is but also the nature of modification. For the future, I propose to look into the recursivity of the *de* constructions and further compare the *de* constructions and the *de*-less constructions.

### 6.1.1 Recursivity of *de* constructions

A nominal *de* construction is a nominal category. The YP in nominal *de* constructions is also a nominal category. Therefore, we can say that the nominal *de* construction has a recursive structure. It predicts that we can embed a *de* construction inside another *de* construction. Additionally, the modifier of a nominal *de* construction can be a noun phrase in which a *de* phrase can fit.

- (119) a. [平价 的 [耐用 的 工具]<sub>np</sub>]<sub>np</sub>  
pingjia de naiyong de gongju  
inexpensive DE durable de tool  
'tools that are inexpensive and durable'
- b. [[聪明 的 和尚]<sub>np</sub> 的 主意]<sub>np</sub>  
congming de heshang de zhuyi  
smart DE monk DE idea  
'the idea from a/the smart monk'

For a verbal *de* construction, the recursive use of *de* is ambiguous. As demonstrated in (120), the two examples have the same phonetic representations. However, their meanings are different, which can only be distinguished by using different written forms of *de*. I consider them to be two interpretations of the same sentence that contains a recursive *de*

construction. In (120a), both *sad* and *quiet* are descriptions of the event of leaving. In (120b), leaving quietly is the result of being sad.

- (120) a. 闵闵 伤心 地 悄悄 地 离开了。  
Minmin shangxin de qiaoqiao de likai le  
Minmin sad DE quiet DE leave ASP  
'Minmin left sadly and quietly.'
- b. 闵闵 伤心 得 悄悄 地 离开了。  
Minmin shangxin de qiaoqiao de likai le  
Minmin sad DE quiet DE leave ASP  
'Minmin was so sad that he left quietly.'

### 6.1.2 The necessity of *de* in *de* constructions

For some nominal *de* phrases, *de* can be dropped without causing noticeable changes in meaning. As shown in (121), *de* in (121a) is dropped in (121b) but the meaning of (121b) is not different from (121a).

- (121) a. 白色 的 毛衣  
bai.se de maoyi  
white.color DE sweater  
'white sweaters'
- b. 白色 毛衣  
bai.se maoyi  
white.color sweater  
'white sweaters'

However, for some nominal *de* phrases, dropping *de* will cause a change in meaning. As shown (122), when taking out *de* from (122a), the meaning becomes slightly different (122b). The taste of a lemon depends on a particular lemon but a lemon flavor is a citrus flavor that is typical of lemons. A lemon may taste bitter if gone bad but a lemon flavor tastes like lemons regardless of any context.

- (122) a. 柠檬 的 味道  
ningmeng de weidao  
lemon DE taste

‘the taste of a lemon’

- b. 柠檬 味道  
ningmeng weidao  
lemon taste  
‘lemon flavor’

Some other nominal *de* phrases cannot drop the particle *de*. As shown in (123), dropping *de* in (123a) will lead to an ill-formed expression (123b).

- (123) a. 狡猾 的 狐狸  
jiaohua de huli  
sneaky DE fox  
‘a sneaky fox’
- b. \*狡猾 狐狸  
jiaohua huli  
sneaky fox  
Intended: ‘a sneaky fox’

Although *de* seems versatile when introducing a modification relation between two properties, the presence of *de* may also break a pre-nominal modification relation. (122) is an example of *de* breaking a type of pre-nominal modification because the meaning is changed with the addition of it. (124) shows the addition of *de* can cause the phrase to become ill-formed.

- (124) a. 独立 音乐  
duli yinyue  
independent music  
‘indie music’
- b. \*独立 的 音乐  
duli de yinyue  
independent DE music  
Intended: ‘indie music’

For a pre-verbal *de* construction, *de* can be dropped without causing a meaningful change when the post-*de* part contains aspect marking.

- (125) a. 闵闵 缓缓 地 离开了。  
 Minmin huanhuan de likai le  
 Minmin slow DE leave ASP  
 ‘Minmin slowly left.’
- b. 闵闵 缓缓 离开了。  
 Minmin huanhuan likai le  
 Minmin slow leave ASP  
 ‘Minmin slowly left.’

When there is no aspect marking in the post-*de* part of a pre-verbal *de* construction, dropping *de* causes a slight change in the meaning.

- (126) a. 慢慢 地 走  
 manman de zou  
 slow DE walk  
 ‘walk slowly’
- b. 慢慢 走  
 manman zou  
 slow walk  
 ‘Slow down.’

For a post-verbal *de* construction, *de* can also be dropped without causing a meaningful change when the post-*de* part contains aspect marking.

- (127) a. 闵闵 跑 得 快 了。  
 Minmin pao de kuai le  
 Minmin run DE fast ASP  
 ‘Minmin ran fast.’
- b. 闵闵 跑 快 了。  
 Minmin pao kuai le  
 Minmin run fast ASP  
 ‘Minmin ran fast.’

When there is no aspect marking in the post-*de* part of a post-verbal *de* construction, dropping *de* leads to ungrammaticality.

- (128) a. 闵闵 跑 得 快。  
 Minmin pao de kuai  
 Minmin run DE fast

‘Minmin runs fast.’

- b. \* 闵 闵 跑 快。  
Minmin pao kuai  
Minmin run fast  
Intended: ‘Minmin runs fast.’

Research on the recursivity of **de constructions** and the necessity of *de* hopefully will give us more insight into the constraints that the nominal **de constructions** and the verbal **de constructions** share and differ in. By their comparison, we will get a clearer picture of what **de constructions** look like. This dissertation explored a few features of **de constructions** in Mandarin. Although **de phrases** can be described as modification structures, this description does not account for the structure and function of **de phrases**, nor their grammatical constraints. It is interesting that a phrase that has such frequent use still lacks a complete linguistic analysis.

## References

- Cheng, L. L. S. (1986). *de* in Mandarin. *Canadian Journal of Linguistics/Revue canadienne de linguistique*, 31(04), 313–326.
- Cheng, L. L.-S. & Sybesma, R. (2009). *De* as an underspecified classifier: first explorations. *Yuyanxue lincóng*, 39, 123–156.
- Chierchia, G. (1984). *Topics in the Syntax and Semantics of Infinitives and Gerunds*. PhD thesis, University of Massachusetts, Amherst.
- Chierchia, G. (1985). Formal semantics and the grammar of predication. *Linguistic inquiry*, 16(3), 417–443.
- Den Dikken, M. & Singhapreecha, P. (2004). Complex noun phrases and linkers. *Syntax*, 7(1), 1–54.
- Huang, C.-T. J., Li, Y.-h. A., & Li, Y. (2009). *The syntax of Chinese*, volume 8. Cambridge University Press Cambridge.
- Huang, J. (1982). *Logical relations in Chinese and the theory of grammar*. PhD thesis, MIT.
- Huang, S.-Z. (2006). Property theory, adjectives, and modification in Chinese. *Journal of East Asian Linguistics*, 15(4), 343–369.
- Kayne, R. S. (1994). *The antisymmetry of syntax*. 25. MIT Press.
- Li, A. Y. H. (1990). *Order and constituency in Mandarin Chinese*, volume 19 of *Studies in natural language and linguistic theory*. Dordrecht; Boston: Kluwer Academic Publishers.
- Li, C. (2015). On the V-DE construction in Mandarin Chinese. *Lingua Sinica*, 1(1), 1–40.

- Li, C. N. & Thompson, S. A. (1989). *Mandarin Chinese: A functional reference grammar*. University of California Press.
- Paul, W. (2012). Why Chinese de is not like French de: A critical analysis of the predicational approach to nominal modification. *Studies in Chinese Linguistics*, 33(3), 182–210.
- Ross, C. (1984). Adverbial modification in Mandarin / 汉语里的状语修饰. *Journal of Chinese Linguistics*, 12(2), 207–234.
- Simpson, A. (2003). On the status of ‘modifying’ de and the structure of the Chinese DP. In C. Tang, SW & Liu (Ed.), *On the formal way to Chinese languages* (pp. 74–101). CSLI Publications.
- Zhang, N. N. (2013). *Classifier Structures in Mandarin Chinese*, volume 263. Walter de Gruyter.



# Appendix A

## List of Abbreviated Categories

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| Categories                                  | Abbreviations                                                                                                                                                                                       |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>non-predicative adjective:</b>           | A                                                                                                                                                                                                   |
| <b>conjunction:</b>                         | Cbb, Cab, Cba, Cbaa, Cbab, Cbb, Cbba, Cbbb, Cbc, Cbca, Cbcb                                                                                                                                         |
| <b>adverb:</b>                              | Daa, Dab (quantity), Dbaa, Dbab, Dbb, Dbc (modal), Dc (negation), Dd (time), Dfa, Dfb (degree), Dg (locative), Dh (manner), Di (aspect), Dj (interrogative), Dk (sentential adverb)                 |
| <b>interjection:</b>                        | I                                                                                                                                                                                                   |
| <b>noun:</b>                                | Naa (mass noun), Nab (common noun), Nac (abstract noun, countable), Nad (abstract noun), Naea, Naeb (group noun), Nba, Nbc (proper noun), Nca, Ncb, Ncc, Ncda, Ncdb (location noun), Nd (time noun) |
| <b>determinative:</b>                       | Neu, Nes, Nep, Neqa, Neqb                                                                                                                                                                           |
| <b>measure word / classifier:</b>           | Nfa, Nfb, Nfc, Nfd, Nfe, Nff, Nfg, Nfh, Nfi                                                                                                                                                         |
| <b>postposition word:</b>                   | Ng                                                                                                                                                                                                  |
| <b>pronoun:</b>                             | Nhaa, Nhab, Nhac, Nhb, Nhc                                                                                                                                                                          |
| <b>preposition:</b>                         | P01~P65                                                                                                                                                                                             |
| <b>particle [verb]:</b>                     | Ta, Tb, Tc, Td                                                                                                                                                                                      |
| <b>active intransitive verb:</b>            | VA11, VA12, VA13, VA2, VA3, VA4                                                                                                                                                                     |
| <b>pseudo active transitive verb:</b>       | VB11, VB12, VB2                                                                                                                                                                                     |
| <b>active transitive verb:</b>              | VC1, VC2, VC31, VC32, VC33                                                                                                                                                                          |
| <b>ditransitive verb:</b>                   | VD1, VD2                                                                                                                                                                                            |
| <b>active verb with sentential object:</b>  | VE11, VE12, VE2                                                                                                                                                                                     |
| <b>active verb with VP object:</b>          | VF1, VF2                                                                                                                                                                                            |
| <b>classificatory verb:</b>                 | VG1, VG2                                                                                                                                                                                            |
| <b>stative intransitive verb:</b>           | VH11, VH12, VH13, VH14, VH15, VH16, VH17, VH21, VH22                                                                                                                                                |
| <b>pseudo stative transitive verb:</b>      | VI1, VI2, VI3                                                                                                                                                                                       |
| <b>stative transitive verb:</b>             | VJ1, VJ2, VJ3                                                                                                                                                                                       |
| <b>stative verb with sentential object:</b> | VK1, VK2                                                                                                                                                                                            |
| <b>stative verb with VP object:</b>         | VL1, VL2, VL3, VL4                                                                                                                                                                                  |

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# Appendix B

## Supplementary Tables

### B.1 De Construction

| rank | categories | count | cumulative percentage (%) |
|------|------------|-------|---------------------------|
| 1    | VP         | 430   | 28.031291                 |
| 2    | VH11       | 217   | 42.177314                 |
| 3    | NP         | 204   | 55.475880                 |
| 4    | S          | 139   | 64.537158                 |
| 5    | Nhaa       | 129   | 72.946545                 |

Table B1: Categories of modifier with modifiee = **Nab**

| rank | categories | count | cumulative percentage (%) |
|------|------------|-------|---------------------------|
| 1    | VP         | 300   | 26.019081                 |
| 2    | S          | 231   | 46.053773                 |
| 3    | NP         | 162   | 60.104076                 |
| 4    | VH11       | 138   | 72.072853                 |
| 5    | Nab        | 44    | 75.888985                 |

Table B2: Categories of modifier with modifiee = **Nac**

| rank | categories | count | cumulative percentage (%) |
|------|------------|-------|---------------------------|
| 1    | VP         | 206   | 22.103004                 |
| 2    | NP         | 138   | 36.909871                 |
| 3    | S          | 137   | 51.609442                 |
| 4    | VH11       | 107   | 63.090129                 |
| 5    | Nhaa       | 49    | 68.347639                 |
| 6    | Nab        | 46    | 73.283262                 |

Table B3: Categories of modifier with modifiee = **Nad**

| rank | categories | count | cumulative percentage (%) |
|------|------------|-------|---------------------------|
| 1    | VP         | 60    | 27.027027                 |
| 2    | S          | 46    | 20.720721                 |
| 3    | NP         | 34    | 15.315315                 |
| 4    | VH11       | 23    | 10.360360                 |
| 5    | PP         | 11    | 4.954955                  |

Table B4: Categories of modifier with modifiee = **VH11**

| rank | categories | count | cumulative percentage (%) |
|------|------------|-------|---------------------------|
| 1    | NP         | 93    | 42.081448                 |
| 2    | VP         | 38    | 59.276018                 |
| 3    | VH11       | 21    | 68.778281                 |
| 4    | PP         | 14    | 75.113122                 |
| 5    | S          | 12    | 80.542986                 |

Table B5: Categories of modifier with modifiee = **Nv1**

| rank | categories | count | cumulative percentage (%) |
|------|------------|-------|---------------------------|
| 1    | NP         | 101   | 47.196262                 |
| 2    | VP         | 25    | 58.878505                 |
| 3    | VH11       | 22    | 69.158879                 |
| 4    | S          | 9     | 73.364486                 |
| 5    | Nac        | 8     | 77.102804                 |

Table B6: Categories of modifier with modifiee = **Nv4**

| rank | categories | count | cumulative percentage (%) |
|------|------------|-------|---------------------------|
| 1    | VP         | 70    | 32.863850                 |
| 2    | NP         | 36    | 49.765258                 |
| 3    | S          | 27    | 62.441315                 |
| 4    | VH11       | 18    | 70.892019                 |
| 5    | Nca        | 10    | 75.586854                 |

Table B7: Categories of modifier with modifiee = **NP**

| rank | categories | count | cumulative percentage (%) |
|------|------------|-------|---------------------------|
| 1    | VP         | 87    | 42.439024                 |
| 2    | S          | 49    | 66.341463                 |
| 3    | VH11       | 12    | 72.195122                 |
| 4    | NP         | 12    | 78.048780                 |
| 5    | Nac        | 8     | 81.951220                 |

Table B8: Categories of modifier with modifiee = **none**

| rank | categories | count | cumulative percentage (%) |
|------|------------|-------|---------------------------|
| 1    | VP         | 53    | 28.648649                 |
| 2    | S          | 52    | 56.756757                 |
| 3    | NP         | 29    | 72.432432                 |
| 4    | VH11       | 7     | 76.216216                 |
| 5    | GP         | 6     | 79.459459                 |

Table B9: Categories of modifier with modifiee = **DM**

| rank | categories | count | cumulative percentage (%) |
|------|------------|-------|---------------------------|
| 1    | VP         | 40    | 22.222222                 |
| 2    | NP         | 29    | 38.333333                 |
| 3    | VH11       | 26    | 52.777778                 |
| 4    | Nhaa       | 16    | 61.666667                 |
| 5    | S          | 15    | 70.000000                 |

Table B10: Categories of modifier with modifiee = **Ncb**

| rank | categories | count | cumulative percentage (%) |
|------|------------|-------|---------------------------|
| 1    | VH11       | 35    | 22.292994                 |
| 2    | VP         | 27    | 39.490446                 |
| 3    | NP         | 20    | 52.229299                 |
| 4    | S          | 14    | 61.146497                 |
| 5    | Nca        | 10    | 67.515924                 |

Table B11: Categories of modifier with modifiee = **Naa**

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | VP         | 79    | 52.666667                       |
| 2    | NP         | 17    | 64.000000                       |
| 3    | S          | 16    | 74.666667                       |
| 4    | Nca        | 7     | 79.333333                       |
| 5    | VH11       | 6     | 83.333333                       |

Table B12: Categories of modifier with modifiee = **Nba**

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | VP         | 51    | 36.690647                       |
| 2    | S          | 25    | 54.676259                       |
| 3    | NP         | 19    | 68.345324                       |
| 4    | VH11       | 18    | 81.294964                       |
| 5    | Nca        | 6     | 85.611511                       |

Table B13: Categories of modifier with modifiee = **Nca**

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | VP         | 32    | 27.118644                       |
| 2    | S          | 21    | 44.915254                       |
| 3    | VH11       | 16    | 58.474576                       |
| 4    | NP         | 13    | 69.491525                       |
| 5    | DM         | 6     | 74.576271                       |

Table B14: Categories of modifier with modifiee = **Naeb**

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | VP         | 23    | 25.274725                       |
| 2    | NP         | 14    | 40.659341                       |
| 3    | VH11       | 14    | 56.043956                       |
| 4    | S          | 10    | 67.032967                       |
| 5    | Nad        | 5     | 72.527473                       |

Table B15: Categories of modifier with modifiee = **VH13**

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | NP         | 14    | 19.444444                       |
| 2    | S          | 10    | 33.333333                       |
| 3    | PP         | 8     | 44.444444                       |
| 4    | VH11       | 7     | 54.166667                       |
| 5    | GP         | 5     | 61.111111                       |

Table B16: Categories of modifier with modifiee = **N**

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | VP         | 16    | 26.666667                       |
| 2    | S          | 16    | 53.333333                       |
| 3    | NP         | 13    | 75.000000                       |
| 4    | Nca        | 3     | 80.000000                       |
| 5    | GP         | 3     | 85.000000                       |

Table B17: Categories of modifier with modifiee = **A**

## B.2 *de*-less constructions

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | DM         | 530   | 10.952676                       |
| 2    | N· 的       | 399   | 19.198181                       |
| 3    | VP· 的      | 398   | 27.423021                       |
| 4    | VH13       | 318   | 33.994627                       |
| 5    | V· 的       | 298   | 40.152924                       |
| 6    | VH11       | 262   | 45.567266                       |
| 7    | Nab        | 251   | 50.754288                       |
| 8    | Nca        | 226   | 55.424675                       |
| 9    | NP· 的      | 201   | 59.578425                       |
| 10   | NP         | 193   | 63.566853                       |
| 11   | Nba        | 177   | 67.224633                       |
| 12   | Nad        | 155   | 70.427774                       |
| 13   | Neqa       | 143   | 73.382930                       |
| 14   | Neu        | 131   | 76.090101                       |
| 15   | S· 的       | 121   | 78.590618                       |
| 16   | Nbc        | 119   | 81.049804                       |

Table B18: Categories of modifier with modifiee=**Nab** in **noun phrases**

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | VH13       | 318   | 11.220889                       |
| 2    | VH11       | 262   | 20.465773                       |
| 3    | Nab        | 251   | 29.322512                       |
| 4    | Nca        | 226   | 37.297107                       |
| 5    | NP         | 193   | 44.107269                       |
| 6    | Nba        | 177   | 50.352858                       |
| 7    | Nad        | 155   | 55.822159                       |

Table B19: Categories of modifier with modifiee=**Nab** in ***de*-less constructions**



| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | VP· 的      | 262   | 8.272813                        |
| 2    | DM         | 255   | 16.324597                       |
| 3    | S· 的       | 226   | 23.460688                       |
| 4    | Nad        | 203   | 29.870540                       |
| 5    | V· 的       | 192   | 35.933060                       |
| 6    | N· 的       | 187   | 41.837701                       |
| 7    | VH11       | 179   | 47.489738                       |
| 8    | Nv1        | 163   | 52.636565                       |
| 9    | NP· 的      | 147   | 57.278181                       |
| 10   | Nab        | 145   | 61.856647                       |
| 11   | Nv4        | 112   | 65.393117                       |
| 12   | Nac        | 112   | 68.929586                       |
| 13   | NP         | 105   | 72.245027                       |
| 14   | Neu        | 99    | 75.371014                       |
| 15   | Nca        | 88    | 78.149668                       |
| 16   | Neqa       | 70    | 80.359962                       |

Table B20: Categories of modifier with modifiee=**Nac** in **noun phrases**

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | Nad        | 203   | 11.038608                       |
| 2    | VH11       | 179   | 20.772159                       |
| 3    | Nv1        | 163   | 29.635672                       |
| 4    | Nab        | 145   | 37.520392                       |
| 5    | Nac        | 112   | 43.610658                       |
| 6    | Nv4        | 112   | 49.700924                       |
| 7    | NP         | 105   | 55.410549                       |

Table B21: Categories of modifier with modifiee=**Nac** in **de-less** constructions

| rank | categories | count | cumulative percentage (%) |
|------|------------|-------|---------------------------|
| 1    | N· 的       | 203   | 10.849813                 |
| 2    | Nad        | 149   | 18.813469                 |
| 3    | VP· 的      | 148   | 26.723677                 |
| 4    | V· 的       | 145   | 34.473544                 |
| 5    | S· 的       | 119   | 40.833779                 |
| 6    | NP· 的      | 117   | 47.087119                 |
| 7    | VH11       | 107   | 52.805986                 |
| 8    | Nab        | 84    | 57.295564                 |
| 9    | DM         | 71    | 61.090326                 |
| 10   | Nv1        | 68    | 64.724746                 |
| 11   | Nca        | 66    | 68.252272                 |
| 12   | Nac        | 58    | 71.352218                 |
| 13   | NP         | 56    | 74.345270                 |
| 14   | Nv4        | 48    | 76.910743                 |
| 15   | A          | 37    | 78.888295                 |
| 16   | Nep        | 37    | 80.865847                 |
| 17   | Neu        | 33    | 82.629610                 |
| 18   | VP         | 29    | 84.179583                 |
| 19   | Neqa       | 29    | 85.729556                 |
| 20   | Ncb        | 25    | 87.065740                 |
| 21   | PP· 的      | 20    | 88.134687                 |
| 22   | VH13       | 19    | 89.150187                 |
| 23   | Nhaa       | 18    | 90.112239                 |

Table B22: Categories of modifier with modifiee=**Nad** in **noun phrases**

| rank | categories | count | cumulative percentage (%) |
|------|------------|-------|---------------------------|
| 1    | Nad        | 149   | 14.679803                 |
| 2    | VH11       | 107   | 25.221675                 |
| 3    | Nab        | 84    | 33.497537                 |
| 4    | Nv1        | 68    | 40.197044                 |
| 5    | Nca        | 66    | 46.699507                 |
| 6    | Nac        | 58    | 52.413793                 |
| 7    | NP         | 56    | 57.931034                 |

Table B23: Categories of modifier with modifiee=**Nad** in **de-less constructions**

| rank | categories | count | cumulative percentage (%) |
|------|------------|-------|---------------------------|
| 1    | Caa        | 1116  | 65.377856                 |
| 2    | NP         | 173   | 75.512595                 |
| 3    | VP· 的      | 52    | 78.558875                 |
| 4    | N· 的       | 33    | 80.492091                 |
| 5    | NP· 的      | 33    | 82.425308                 |
| 6    | Nab        | 27    | 84.007030                 |
| 7    | DM         | 27    | 85.588752                 |
| 8    | Nhaa       | 25    | 87.053310                 |
| 9    | V· 的       | 24    | 88.459285                 |
| 10   | Nca        | 20    | 89.630931                 |
| 11   | S          | 17    | 90.626831                 |

Table B24: Categories of modifier with modifiee=**NP** in **noun phrases**

| rank | categories | count | cumulative percentage (%) |
|------|------------|-------|---------------------------|
| 1    | NP         | 173   | 44.473008                 |
| 2    | Nab        | 27    | 51.413882                 |
| 3    | Nhaa       | 25    | 57.840617                 |
| 4    | Nca        | 20    | 62.982005                 |
| 5    | Nba        | 17    | 67.352185                 |
| 6    | S          | 17    | 71.722365                 |

Table B25: Categories of modifier with modifiee=**NP** in **de-less constructions**

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | Nca        | 141   | 11.128650                       |
| 2    | Nad        | 106   | 19.494870                       |
| 3    | Nab        | 91    | 26.677190                       |
| 4    | Nba        | 88    | 33.622731                       |
| 5    | Neqa       | 81    | 40.015785                       |
| 6    | Nes        | 64    | 45.067088                       |
| 7    | N· 的       | 56    | 49.486977                       |
| 8    | NP         | 52    | 53.591160                       |
| 9    | Nac        | 50    | 57.537490                       |
| 10   | A          | 44    | 61.010260                       |
| 11   | Ncb        | 43    | 64.404104                       |
| 12   | DM         | 40    | 67.561168                       |
| 13   | Nhaa       | 35    | 70.323599                       |
| 14   | Nv4        | 35    | 73.086030                       |
| 15   | Neu        | 34    | 75.769534                       |
| 16   | VP· 的      | 31    | 78.216259                       |
| 17   | VH11       | 29    | 80.505130                       |
| 18   | Nv1        | 28    | 82.715075                       |
| 19   | VH13       | 28    | 84.925020                       |
| 20   | V· 的       | 27    | 87.056038                       |
| 21   | NP· 的      | 26    | 89.108129                       |
| 22   | Naeb       | 20    | 90.686661                       |

Table B26: Categories of modifier with modifiee=**Ncb** in **noun phrases**

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | Nca        | 141   | 13.264346                       |
| 2    | Nad        | 106   | 23.236124                       |
| 3    | Nab        | 91    | 31.796802                       |
| 4    | Nba        | 88    | 40.075259                       |
| 5    | Neqa       | 81    | 47.695202                       |
| 6    | Nes        | 64    | 53.715898                       |
| 7    | NP         | 52    | 58.607714                       |
| 8    | Nac        | 50    | 63.311383                       |

Table B27: Categories of modifier with modifiee=**Ncb** in **de-less** ocstructions

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | Nab        | 509   | 44.531934                       |
| 2    | NP         | 314   | 72.003500                       |
| 3    | Ncb        | 151   | 85.214348                       |
| 4    | Naa        | 55    | 90.026247                       |

Table B28: Categories of modifier with modifiee=Ncda in **noun phrases**

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | Nab        | 509   | 44.649123                       |
| 2    | NP         | 314   | 72.192982                       |
| 3    | Ncb        | 151   | 85.438596                       |
| 4    | Naa        | 55    | 90.263158                       |

Table B29: Categories of modifier with modifiee=Ncda in **de-less constructions**

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | NP         | 262   | 51.676529                       |
| 2    | Nab        | 71    | 65.680473                       |
| 3    | VP·的       | 59    | 77.317554                       |
| 4    | Nca        | 36    | 84.418146                       |
| 5    | N·的        | 20    | 88.362919                       |
| 6    | Nba        | 12    | 90.729783                       |

Table B30: Categories of modifier with modifiee=Nba in **noun phrases**

| rank | categories | count | cumulative percentage (%) |
|------|------------|-------|---------------------------|
| 1    | NP         | 262   | 66.836735                 |
| 2    | Nab        | 71    | 84.948980                 |
| 3    | Nca        | 36    | 94.132653                 |
| 4    | Nba        | 12    | 97.193878                 |

Table B31: Categories of modifier with modifiee=**Nba** in **de-less** constructions

| rank | categories | count | cumulative percentage (%) |
|------|------------|-------|---------------------------|
| 1    | VH11       | 39    | 11.206897                 |
| 2    | N·的        | 33    | 20.689655                 |
| 3    | V·的        | 33    | 30.172414                 |
| 4    | DM         | 26    | 37.643678                 |
| 5    | VP·的       | 23    | 44.252874                 |
| 6    | NP·的       | 22    | 50.574713                 |
| 7    | NP         | 18    | 55.747126                 |
| 8    | Nad        | 18    | 60.919540                 |
| 9    | Nes        | 17    | 65.804598                 |
| 10   | Nab        | 16    | 70.402299                 |
| 11   | S·的        | 13    | 74.137931                 |
| 12   | Nca        | 11    | 77.298851                 |
| 13   | VH13       | 10    | 80.172414                 |
| 14   | Neqa       | 10    | 83.045977                 |
| 15   | Naa        | 8     | 85.344828                 |
| 16   | A          | 7     | 87.356322                 |
| 17   | Nv1        | 6     | 89.080460                 |
| 18   | Nba        | 5     | 90.517241                 |

Table B32: Categories of modifier with modifiee=**Naa** in **noun phrases**

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | VH11       | 39    | 20.967742                       |
| 2    | Nad        | 18    | 30.645161                       |
| 3    | NP         | 18    | 40.322581                       |
| 4    | Nes        | 17    | 49.462366                       |
| 5    | Nab        | 16    | 58.064516                       |
| 6    | Nca        | 11    | 63.978495                       |
| 7    | VH13       | 10    | 69.354839                       |

Table B33: Categories of modifier with modifiee=**Naa** in *de*-less constructions

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | DE         | 150   | 43.988270                       |
| 2    | NP         | 32    | 53.372434                       |
| 3    | Nad        | 32    | 62.756598                       |
| 4    | VH11       | 25    | 70.087977                       |
| 5    | Nac        | 12    | 73.607038                       |
| 6    | Nv4        | 11    | 76.832845                       |
| 7    | Nab        | 10    | 79.765396                       |
| 8    | Nv1        | 10    | 82.697947                       |

Table B34: Categories of modifier with modifiee=**Nv1** in **noun phrases**

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | Nad        | 32    | 17.877095                       |
| 2    | NP         | 32    | 35.754190                       |
| 3    | VH11       | 25    | 49.720670                       |
| 4    | Nac        | 12    | 56.424581                       |
| 5    | Nv4        | 11    | 62.569832                       |
| 6    | Nv1        | 10    | 68.156425                       |
| 7    | Nab        | 10    | 73.743017                       |
| 8    | Ncb        | 6     | 77.094972                       |

Table B35: Categories of modifier with modifiee=**Nv1** in *de*-less constructions

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | DE         | 151   | 45.481928                       |
| 2    | NP         | 43    | 58.433735                       |
| 3    | Nad        | 25    | 65.963855                       |
| 4    | Nab        | 11    | 69.277108                       |
| 5    | DM         | 11    | 72.590361                       |
| 6    | Nac        | 10    | 75.602410                       |

Table B36: Categories of modifier with modifiee=**Nv4** in noun phrases

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | NP         | 43    | 26.543210                       |
| 2    | Nad        | 25    | 41.975309                       |
| 3    | Nab        | 11    | 48.765432                       |
| 4    | Nac        | 10    | 54.938272                       |
| 5    | A          | 9     | 60.493827                       |
| 6    | VH11       | 8     | 65.432099                       |
| 7    | VH13       | 7     | 69.753086                       |

Table B37: Categories of modifier with modifiee=**Nv4** in *de*-less constructions



| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | DM         | 24    | 7.228916                        |
| 2    | VP· 的      | 24    | 14.457831                       |
| 3    | VH11       | 24    | 21.686747                       |
| 4    | Nad        | 24    | 28.915663                       |
| 5    | Nca        | 21    | 35.240964                       |
| 6    | N· 的       | 18    | 40.662651                       |
| 7    | V· 的       | 18    | 46.084337                       |
| 8    | S· 的       | 17    | 51.204819                       |

Table B38: Categories of modifier with modifiee=**Naeb** in **noun phrases**

| rank | categories | count | cumulative<br>percentage<br>(%) |
|------|------------|-------|---------------------------------|
| 1    | Nad        | 24    | 11.267606                       |
| 2    | VH11       | 24    | 22.535211                       |
| 3    | Nca        | 21    | 32.394366                       |
| 4    | Neqa       | 13    | 38.497653                       |
| 5    | Nab        | 12    | 44.131455                       |
| 6    | A          | 12    | 49.765258                       |
| 7    | Naeb       | 12    | 55.399061                       |
| 8    | NP         | 11    | 60.563380                       |
| 9    | Nac        | 10    | 65.258216                       |
| 10   | Nba        | 10    | 69.953052                       |

Table B39: Categories of modifier with modifiee=**Naeb** in **de-less constructions**