Abstract

The particle *de* 的 occurs with higher frequency than any other particle in Mandarin Chinese. Its main function in Chinese noun phrases is to link attributive words or phrases to the head noun. Classification of the different uses of the particle *de* has been of interest to linguists and computational linguists alike, not least because of its importance for machine translation from Chinese to English. The primary aim of this thesis is to describe and, where necessary, systemize existing classifications of the noun phrase internal occurrences of *de*. To this end, we have built a small-annotated corpus of *de* constructions using the TypeCraft Interlinear Glossed Text (IGT) Repository. In addition, we have made use of the TypeCraft Mandarin corpus as the data source for our linguistic classification of *de* constructions. This thesis distinguishes the uses of *de* in modification and relativisation structures, and explores sequences of *de*-attributes.

Acknowledgements

Table of Contents

List of Tables

List of Figures

Abbreviations

ADJ	adjective
ADV	adverb
ADVm	manner adverb
AP	adposition
AS	aspect particle
AUX	auxiliary
CLF	classifier
CLFnum	numeral classifier
CN	common noun
CONJ	conjunction
COP	copula
DEC	de as a complentizer or an associative marker
DEG	de as a genitive marker or an associative marker
DET	determiner
IPHON	ideophone, onomatopoeia
MOD	modifier
N_1	first common noun in a chain
N_2	second common noun in a chain
Np	proper noun
Nploc	name of a location
Npname	personal name
NUM	numeral
PN	pronoun
PP	preposition and postposition
PPOST	postposition
PREP	preposition
PRT	particle
PUN	punctuation
QUANT	quantifier
REL	relative clause marker
SP	sentence-final particle
V	verb
V1	first verb in a chain
V2	second verb in a chain
V3	third verb in a chain
V4	fourth verb in a chain

x

Chapter 1. Introduction

1.1   Topic and goal

In Mandarin Chinese, the particle *de* that most people learn is 的. In fact, the particle *de* corresponds to three characters: 的, 地, 得. In this thesis, we will only discuss 的, which we will refer to as *de*. This particle *de* occurs with higher frequency than any other particle in Mandarin Chinese (Huang, 2007). *De* fulfills different grammatical functions: the marker of nominal modification, relative clause marker, and sentence final marker. This thesis will focus solely on occurrences of *de* in Chinese noun phrases. *De* is ubiquitous in Chinese noun phrases. Its main function is to link attributive words or phrases to the head noun. The attributive words may be nouns, adjectives, pronouns, onomatopoeia, while the attributive phrases may be adpositional attributes or relative clauses.

Chinese is a head-final language, which for example leads to a pattern of modification like *prepositional phrase + de + noun,* while in a head-first language like English, the order of the noun and its modifier is *noun + prepositional phrase*. Chang et al. (2009) propose that this structural difference is one important reason why machine translation from Chinese to English is difficult. To illustrate the point, we can briefly look at relative clauses. While English relative clauses, except for reduced relative clauses, are introduced by a relative pronoun, Chinese does not use relative pronouns (Huang, 1982). It uses *de* as the relative marker:

(1) 教我数学的老师[1]
"the teacher who taught me math"

jiào	wǒ	shùxué		de	lǎoshī
teach	I	math			teacher
V	PN	N		PRT	N

Generated in TypeCraft.

---

[1] http://typecraft.org/tc2/ntceditor.html#2884,58551

In example (1), the grammatical function of *de* is that of a relativizer which relates the relative clause to its head. When translating (1) into English with Google translation, we get: *I taught mathematics*, which of course is a different phrase in Chinese:

(2) 我教数学。 **²**
"I teach mathematics."

wǒ	jiāo	shùxué
I	teach	mathematics
PN	V	N

Generated in TypeCraft.

Example (1) is the original Chinese example, while example (2) is the Chinese equivalent of the incorrect Google translation of example (1). The original Mandarin sentence was a subordinate clause, while its incorrect translation is a simple sentence, just like its English counterpart. The word *de* has been ignored and the word *teacher* has become a verb and is translated as *teach*. The object *me* is translated as a subject to become *I* in example (2). A translation that ignores the function of *de* necessarily misunderstands the relation between the head of the relative clause *teacher* and its modifier, so that the necessary linear reordering of the head noun and its modifier cannot take place. Reordering and reordering problems when translating from Mandarin to English are of particular importance to machine translation (Feng et al., 2003). Chang et al. (2009) notice that reordering of phrases with the particle *de* occurs in relative clauses and prepositional phrases. Also, when the attributive phrase is a prepositional phrase, the function of *de* is to relate the prepositional phrase to the nominal head:

(3) 在沙发上的猫[3]
"the cat on the sofa"

zài	shāfā	shàng	de	māo
at	*sofa*	*surface*.LOC		*cat*
PREP	N	PPOST	PRT	N

Generated in TypeCraft.

---

[2] http://typecraft.org/tc2/ntceditor.html#2884,420170
[3] http://typecraft.org/tc2/ntceditor.html#2884,58552

In example (3), the syntactic structure is *prepositional phrase + de + noun*, where the prepositional phrase zàishāfāshàng (*on the sofa*) modifies the noun māo (*cat*). In this case the Google translation of (3) is correct: namely, *cat on the sofa*. It seems that reordering is a problem in some cases, but not all. The particle *de* exists not only in the relative clause structures and prepositional phrase structures, but also with genitive phrases and adjectival phrases (Shi and Li, 2002).

(4) 西蒙的猫看见了一只苍蝇。[4]
"Simon's cat saw a fly."

xīměng	de	māo	kàn	jiàn	le	yī	zhǐ
simon		cat	see	meet		one	
simon	GEN	*cat*.SBJ.AGT	*see*.PRED	*meet*	PFV	*one*	
Np	PRT	CN	V1	V2	PRT	NUM	CLFnum

cāngyíng
fly
fly
CN

Generated in TypeCraft.

In example (4), *de* is the genitive marker. Chinese does not have possessive pronouns. It uses *de*:

(5) 我的朋友[5]
"my friend"

wǒ	de	péngyǒu
I		friend
PN	PRT	N

Generated in TypeCraft.

(6) 这是一条干净的裙子[6]
"This is a clean dress"

zhèi	shì	yī	tiáo	Gānjìng	de	qúnzi
this	be(is)	one		clean		dress
DEM	COPident	NUM	CL	ADJ		CN

---

[4] http://typecraft.org/tc2/ntceditor.html#2884,58531
[5] http://typecraft.org/tc2/ntceditor.html#2884,448273
[6] http://typecraft.org/tc2/ntceditor.html#2884,58527

In example (6), *de* relates an adjectival phrase to the noun. Notice that in this case *de* is not obligatory and the meaning of the phrase will not change if we delete *de*. Nevertheless, the particle *de* is widely used in this configuration. These few examples already make clear that is not just the linear order of elements in the noun phrase that makes Mandarin different from the Indo-European languages, but also the extensive use of *de*. This thesis will try to contribute to our understanding of the particle *de* by presenting a systematic overview of functions as part of the nominal phrase.

1.2 Methodology

The present thesis is data-driven and descriptive. It makes use of the online linguistic service TypeCraft[7] (Beermann & Michaylov, 2014). TypeCraft is a user-driven natural language database. At the time of writing, TypeCraft hosts 2137 texts from 146 languages. An overview of the size of the database is given in Table 1, which is taken from Beermann et al. (2016).

Table 1 TypeCraft database in terms of stored data and annotations assigned

Data type	Data count
Text count	2145
Phrase count	316,604
Word count	5,297,405
Morpheme count	4,527,478
Part-of-speech tagged words	4,851,807
Gloss-tagged morphemes	330,714
Sense-tagged morphemes	1,173

TypeCraft provides a valuable service for contrastive studies. By means of giving *de* constructions an in-depth linguistic annotation, we have attempted to archive a systematic overview of existing linguistic categorization of this construction. While nominal phrases with a single occurrence of *de* already existed in TypeCraft, we had to add constructions with sequential attributives with *de*. The data that I will present in the corresponding

---

[7] http://typecraft.org/tc2wiki/Main_Page

chapter in this thesis is taken from dialogues, newspapers, books, articles and social media. I will test the different orders of the sequential attributives in this section. I have imported the examples to TypeCraft[8] and provided the necessary annotations using TypeCraft's Gloss[9] and POS[10] annotation sets.

1.3 Outline

In Chapter 1, we present the structure of the thesis, introducing some background and the objective of this study as well as its methodology. Chapter 2 is the literature review from both the NPL side and the linguistic side of the problem that we address. Wang et al. (2007), for example, describe *de* constructions in which the focus is syntactic patterns of noun phrases from the Penn Chinese Treebank 3.0. We will look at this and similar approaches. Shi and Li (2002) present a linguistic classification of *de* constructions, which we will also discuss in the second part of Chapter 2. Besides, we will compare NLP and linguistic literatures. In Chapter 3, we present a detailed linguistic classification of the Chinese *de* constructions on the basis of our own data, and data that we found in TypeCraft. Chapter 4 explores the order of sequential attributives with respect to the use of the particle *de*. Chapter 5 contains the conclusions.

---

[8] http://typecraft.org/tc2wiki/Main_Page
[9] http://typecraft.org/tc2wiki/Special:TypeCraft/GlossTags/
[10] http://typecraft.org/tc2wiki/Special:TypeCraft/POSTags/

Chapter 2. Literature Review

2.1   The NLP Literature

According to the part-of-speech tagging guidelines for the Penn Chinese Treebank 3.0 (Xia, 2000), the character *de* can be tagged as DEC (*de* in a relative-clause), DEG (associative *de*), AS (aspect particle) and SP (sentence-final particle). *De* in relative clauses (tagged DEC) serves to combine the relative head with the relative clause, as illustrated in (7):

(7) 我们吃的食物[11]
"food that we ate"

wǒmén	chī	de	shìwù
we	eat		food
PN	V	PRT	N

Generated in TypeCraft.

When tagged as DEG, *de* function is a genitive or an associative marker, for example in (8):

(8) 西蒙的猫[12]
"Simon's cat"

xīméng	de	māo
Simon		cat
N	PRT	N

Generated in TypeCraft.

Obviously, the Chinese N_1 DEG N_2 in example (8) is similar to the English possessive structure of N_1's N_2. The Chinese structure N_1 DEG N_2 can express not only possessive relations as shown in (8), but also associate relations as shown in (9):

(9) 环境的改善[13]
"the improvement of the environment"

---

[11] http://typecraft.org/tc2/ntceditor.html#2884,448274
[12] http://typecraft.org/tc2/ntceditor.html#2884,448275
[13] http://typecraft.org/tc2/ntceditor.html#2884,448276

huánjìng		de	gǎishàn
environment		improvement	
N		PRT	N

Generated in TypeCraft.

Still another semantic relation between postpositional phrase and noun related by *de* is shown (10):

(10) 房间里的灯**[14]**
"light in the room"

fángjiān	lǐ	de	dēng
room	in		light
N	PPOST	PRT	N

Generated in TypeCraft.

In (10), the postpositional phrase introduces a location that in English corresponds to a locative PP, while in Mandarin the *de* construction is maintained. Also, in possessive noun phrases, Chinese uses *de* to relate a personal pronoun to the head noun, instead of using a possessive pronoun form like English and other Indo-European languages. This is illustrated in (11):

(11) 我的母亲**[15]**
"my mother"

wǒ	de	mǔqīn
I		mother
PN	PRT	N

Generated in TypeCraft.

De can also be inserted between the adjective and the head noun, as shown in (12):

(12) 红的花**[16]**
"red flower"

hóng	de	huā
red		flower
ADJ	PRT	N

---

[14] http://typecraft.org/tc2/ntceditor.html#2884,448277
[15] http://typecraft.org/tc2/ntceditor.html#2884,448288
[16] http://typecraft.org/tc2/ntceditor.html#2884,448289

Chang, Jurafsky and Manning (2009) claim that the presence of *de* is a major source for Chinese-English translation errors. According to them, *de* in noun phrases can be categorized into five classes considering syntactic and semantic parameters based on how they get translated into English:

Class 1: A B,

Class 2: A's B,

Class 3: A preposition B,

Class 4: B preposition A,

Class 5: relative clause

I will now present these five classes in turn.

Class 1

In the A B class, A is considered as a pre-modifier of B. In most case A is an adjective or possessive adjective form, this category also includes compound nouns in which case A would be a noun. This then leads to three different word category patterns:

a: ADJ N,

b: PN N,

c: N_1 N_2

In terms of phrase structure rules, we arrive at the following three rules:

NP → ADJ DEG N

NP → PN DEG N

NP → N_1 DEG N_2

An example of NP → N_1 DEG N_2 pattern comes from Chang, Jurafsky and Manning (2009), see (13):

(13) 贸易的互补性[17]
"trade complement"
mmàoyì de   hùbǔxìng
trade   complement
N   PRT N
Generated in TypeCraft.

---

[17] http://typecraft.org/tc2/ntceditor.html#2884,448346

Class 2

This A*'s* B pattern in this class, which is translated into English using the *s*-genitive. The pattern in Chinese is N_1 DEG N_2, see (14):

(14) 国家的荣誉[18]
"nation's honor"

guójiā	de	róngyù
nation		honor
N	PRT	N

Generated in TypeCraft.

Class 3

Chang et al.'s A preposition B category, refers to a pattern where a number, percentage, or level word is related by *de* to the noun, which means A precedes B. This pattern is exemplified in (15):

(15) 一百万美金的房子[19]
"one million dollar house"

yì	bǎiwàn	měijīng	de	fángzi
one	million	dollar		house
NUM	NUM	N	PRT	N

Generated in TypeCraft.

Class 4

The B preposition A class contains different constructions. B and A may stand in an *of*-genitive or locative relation. This patterns found in this class are N_1 DEG N_2 or AP DEG N pattern. Our example (9) above illustrates the *of*-genitive constructions while (10) illustrates the locative construction.

Class 5

Class 5 involves relative clause. In this class, the syntactic pattern is RC DEC N, Xia (2000) tags *de* in these constructions as DEC (see example (7)).

---

[18] http://typecraft.org/tc2/ntceditor.html#2884,448281

[19] http://typecraft.org/tc2/ntceditor.html#2884,448282

Table 2 Chang (2009) and Xia (2000)'s classes of *de* in Chinese constructions

Chang's class	Syntactic pattern	Functional type
A B	[ADJ DEG N]	adjectival modification
	[PN DEG N]	possessive noun phrase
	[N_1 DEG N_2]	nominal compounds
A'B	[N_1 DEG N_2]	s-genitive noun phrase
A preposition B	[NUM N_1 DEG N_2]	quantified or classified noun phrase
B preposition A	[N_1 DEG N_2]	of-genitive, composition
	[AP DEG N]	locative noun phrase
Relative clause	[RC DEC N]	relative clause

In Table 2 the square brackets indicate the noun phrases. Part of speech labels represent the prototypical elements of this clause type. Note that we use the labels introduced by Chang and Xia in Table 2. It builds Chang et al. (2009)'s class system on the Chinese Treebank, making use of its tagging guidelines (Xia, 2000). The table above is thought to represent the main pattern of complex Mandarin noun phrases with particle *de*.

2.2 The Linguistic Literature

Shi and Li (2002) recognize four *de* constructions: relative clauses, genitive, adjectival and associate phrases. The following examples illustrate the classes identified by Shi and Li.

(a) Relative clause

(16) 教我数学的老师已经退休了[20]
"The teacher who taught me math has already retired."

jiāo	wǒ	shùxué		de	lǎoshī	yǐjīng	tuìxiū
teach	I	mathematics			teacher	already	retire
V	PN	N		PRT	N	ADV	V

---

[20] http://typecraft.org/tc2/ntceditor.html#2884,448283

le
AUX
Generated in TypeCraft.

(b) Genitive phrase

(17) 那个男孩的桌子非常漂亮[21]
"That boy's tables are very beautiful."

nàgè	nánhái	de	zhuīzi	fēicháng	piàoliàng
that	boy		table	very	nice
PN	N	PRT	N	ADV	ADJ

Generated in TypeCraft.

(c) Adjective phrase

(18) 干干净净的衣服别扔[22]
"Don't throw away those clean clothes."

gāngānjìngjìng	de	yīfú	bié	rēng
clean		cloth	not	throw
ADJ	PRT	N	ADV	V

Generated in TypeCraft.

(d) Associate phrase:

(19) 我见过北京的街道[23]
"I saw the streets of Beijing."

wǒ	jiàn	guò	běijīng	de	jiēdào
I	see	pass	Beijing		street
PN	V	AUX	Nploc	PRT	N

Generated in TypeCraft.

Yin (1990) also considered various kinds of attributive constructions in which *de* appears:

a. Noun or noun phrase + *de*

(20) 弟弟的书包[24]
"brother's bag"

dìdi	de	shūbāo

---

[21] http://typecraft.org/tc2/ntceditor.html#2884,448284

[22] http://typecraft.org/tc2/ntceditor.html#2884,448285

[23] http://typecraft.org/tc2/ntceditor.html#2884,448345

[24] http://typecraft.org/tc2/ntceditor.html#2884,448287

brother			bag
N		PRT	N

Generated in TypeCraft.

b. Pronoun or pronoun phrase + *de*

(21) 我的母亲[25]
"my mother"

wǒ	de	mǔqīn
I		mother
PN	PRT	N

Generated in TypeCraft.

c. Adjective or adjective phrase + *de*

(22) 红的花[26]
"red flower"

hóng	de	huā
red		flower
ADJ	PRT	N

Generated in TypeCraft.

d. Onomatopoeic word + *de*

(23) 哔哔的流水[27]
"a burbling stream"

bībī	de	liúshuǐ
burbling		stream
ADJ	PRT	N

Generated in TypeCraft.

e. Numeral-measure word phrase + *de*

(24) 一脸的汗水[28]
"a face covered with sweat"

yì	liǎn	de	hànshuǐ
one	face		sweat

---

[25] http://typecraft.org/tc2/ntceditor.html#2884,448288
[26] http://typecraft.org/tc2/ntceditor.html#2884,448289
[27] http://typecraft.org/tc2/ntceditor.html#2884,448290
[28] http://typecraft.org/tc2/ntceditor.html#2884,448291

| NUM | N | PRT | N |

Generated in TypeCraft.

f. Postpositional phrase + *de*

(25) 桌子上的猫[29]
"the cat on the table"

zhuōzi	shàng	de	māo
table	on		cat
N	PPOST	PRT	V

Generated in TypeCraft

g. Subject-predicate construction + *de*

(26) 我喜欢的老师[30]
"the teacher that I like"

wǒ	xǐhuān	de	lǎoshī
I	like		teacher
PN	V	PRT	N

Generated in TypeCraft.

Table 3 Shi and Li (2002) and Yin (1990) classes of *de*

Shi and Li (2002)		Ying (1990)	
Syntactic pattern	**Functional type**	**Syntactic pattern**	**Functional type**
[RC N]	relative clause	[RC N]	relative clause
[PN N]	possessive noun phrase	[PN N]	possessive noun phrase
[ADJ N]	adjectival modification	[ADJ N]	adjectival modification
[N$_1$ N$_2$]	associate noun phrase	[N$_1$ N$_2$]	s-genitive noun phrase
[PP N]	locative noun phrase	[PP N]	locative noun phrase

---

[29] http://typecraft.org/tc2/ntceditor.html#2884,448292

[30] http://typecraft.org/tc2/ntceditor.html#2884,448293

Table 3 Shi and Li (2002) and Yin (1990) classes of *de* (Continued)

		[IPHON N]	adjectival modification
		[NUM N$_1$ N$_2$]	quantified noun phrase

Table 4 Comparison of NLP and linguistic literature classes of *de*

NLP literature			**Linguistic literature**		
NLP class	**Syntactic pattern**	**Functional type**	**Linguistic class**	**Syntactic pattern**	**Functional type**
A B	[ADJ N]	adjectival modification	Adjectival phrase	[ADJ N]	adjectival modification
				[IPHON N]	adjectival modification
	[PN N]	possessive noun phrase	Pronoun phrase	[PN N]	possessive noun phrase
	[N$_1$ N$_2$]	nominal compounds			
A'B	[N$_1$ N$_2$]	s-genitive noun phrase	Noun – Noun phrase	[N$_1$ N$_2$]	s-genitive noun phrase
A is preposed B	[NUM N$_1$ N$_2$]	quantified or classified noun phrase		[NUM N$_1$ N$_2$]	quantified or classified noun phrase
B is preposed A	[N$_1$ N$_2$]	of-genitive, composition		[N$_1$ N$_2$]	associate noun phrase
	[PP N]	locative noun phrase	Prepositional and postpositional phrase	[PP N]	locative noun phrase

14

Table 4 Comparison of NLP and Linguistic literature classes of *de* (Continued)

Relative clause	[RC N]	relative clause	Relative clause	[RC N]	relative clause

Both NLP and the linguistic literatures characterize *de* as an element that relates the head noun to adjectives, numeral modifiers, quantifiers or relative clauses. In addition, *de* relates the head nouns that either stand in a possessive-, or more generally in an associate relation, to the modified noun. Especially when it comes to different types of nominal modifiers and to the different semantic relations between associated nouns, a more fine-grained classification would be helpful. In the next chapter, we will present a consolidated classification of *de* nominal constructions building on the existing classifications described so far.

Chapter 3. Classification of the Chinese *De* Constructions

In this chapter, we will focus on the nominal constructions contained in the TypeCraft Mandarin corpus. The Mandarin corpus consists of 563 in-depth annotated sentences, and a POS-tagged news corpus, which was imported from the Lancaster corpus to TypeCraft. This corpus consists of another 2819 sentences. We will not discuss this news corpus in this thesis. For our work, we focus on the 563 sentences, which contain gloss tags, along with POS (part of speech) tags. In addition to POS and gloss tags, TypeCraft also allows sense tags. The TypeCraft annotations' sets and their size are listed in Table 5:

Table 5 The main TypeCraft annotation sets

Data type	Data count
Gloss tags	360
Part-of-speech tags	101
Sense tags	53

In the Mandarin corpus we found 213 phrases that contain the particle *de*, which corresponds to 37.8% of our sentences. An overview of our corpus is given in Figure. 1and Figure. 2:

Search result (3 texts found):

Title	Title translation	Contributor	Sentence count
De within nominal projections		Yutong Pu	164
小鸟	For the bird	Yutong Pu	17
西蒙的猫	Simon's cat	Yutong Pu	33

Figure. 1 TypeCraft linguistic collection and narrations created by the author

Search result (19 texts found):

Title	Title translation	Contributor	Sentence count
西蒙的猫 20 个 V-V 结构 （Xīméng de māo）	Simon's cat (20 V-V patterns)	Miaomiao Zhang	20
西蒙的猫	Simon's cat	Qingqing Wang	36
苏菲的世界	Sophie's World (Data Collection)	Qingqing Wang	20
汉语普通话中的 V-V 结构 1 （54 个句子来自会议文章）	V-V patterns in Mandarin 1 (54 sentences from monographs and conference articles)	Miaomiao Zhang	54
汉语普通话中的 V-V 结构 2 （98 个句子来自书籍和会议文章）	V-V patterns in Mandarin 2 (98 sentences from monographs, conference articles and the Mandarin Grammar online (ManGO)	Miaomiao Zhang	98
汉语普通话中的 V-V 结构 3 （109 个句子来自书籍）	V-V patterns in Mandarin 3 (109 sentences from book)	Miaomiao Zhang	108
不及物动词，及物动词，双宾语动词	verbs with various number of arguments(N.B: not natural examples)	Qingqing Wang	3
从修饰短语中的´的´看中文定语短语的结构	On the Status of 'Modifying' DE and the Structure of the Chinese DP	Qingqing Wang	10

Figure. 2 Additional TypeCraft texts used for this thesis

Since some sentences contained more than one instance of *de*, we found 272 instances of *de* in total. My count also includes instances of *de* that are sentence final markers, which we will not discuss in this thesis, as our focus is on the nominal phrases. Based on our

TypeCraft corpus we now describe different types of noun phrases containing the particle
de from the syntactic and the semantic perspective.

3.1   Adjectival modification

In Mandarin Chinese, nouns modified by an adjective are often preceded by *de* (Yip &
Dong, 2006). If the adjective has more than one syllable (Yip & Rimmington, 2006), the
particle *de* is generally used, as in example (27) below:

(27) 小鸟们没有美丽的羽毛了。[31]
"The little birds do not have feathers now."

xiǎo	niǎo	men	méi	yǒu	měilì	de
little	bird		not	have	beautiful	
ADJ	CN	PRT	ADV	V	ADJ	PRT

yǔmáo				le		
leather						
CN				PRT		

Generated in TypeCraft.

In this example, měilì (*beautiful*) is a polysyllabic adjective, which means *de* is needed to
connect adjective and head noun. When the adjective is a monosyllabic word, *de* can be
omitted (Yip & Rimmington, 2006). Normally, monosyllabic adjectives are placed
directly before nouns hǎo (*good*) shū (*book*) as in (28), unless the adjective is preceded by
an adverb of degree (Yip & Rimmington, 2006), like example (29):

(28) 好书[32]
"good book"

hǎo	shū
good	book
ADJ	N

Generated in TypeCraft.

---

[31] http://typecraft.org/tc2/ntceditor.html#2636,43261
[32] http://typecraft.org/tc2/ntceditor.html#2884,448201

(29) 这时更多的鸟飞了过来。[33]
"At this time, many more birds fly to the wire."

zhèi	shí	gèng	duō	de	niǎo	fēi	le
this	moment	more	much		bird	fly	
DET	CN	ADV	ADJ	PRT	CN	V1	PRT

guò				lái			
across				come			
V2				V3			

Generated in TypeCraft.

In example (28), the monosyllabic adjective hǎo (*good*) is placed directly before the noun shū (*book*) and *de* is omitted in this case, while in example (29), when the adjective duō (*many*) is preceded by an adverb of degree gèng (*more*), *de* is placed after the monosyllabic adjective duō (*many*). When it is a polysyllabic adjective by an adverb of degree, *de* is obligatory as well. It is important to note that monosyllabic adjectives may form compound nouns together with a noun. The compound noun consists of multiple characters without *de*: they represent a single concept, which takes on a distinctive meaning, for example, huáng guā means *cucumber* and huáng *de* guā means *melon with yellow color*.

De cannot be omitted if the modifying adjective is duplicated. In example (30) we deal with a duplicated word.

(30) 红红的花[34]
"red flower"

hóng	hóng	de	huā
red	red		flower
ADJ	ADJ	PRT	N

Generated in TypeCraft.

3.2 Adpositional attributes

In Mandarin Chinese, locative noun phrases always contain adpositional phrases that can occur in both prepositional and postpositional phrases with *de* (Yip & Rimmington,

---

[33] http://typecraft.org/tc2/ntceditor.html#2884,58543

[34] http://typecraft.org/tc2/ntceditor.html#2884,448202

2006).

3.2.1 Prepositional phrase with *de*

It is common to use the preposition zài (*in*, *at*) followed by a location noun to modify a noun, such as in (31):

(31) 在花园的一角，那些术莓树丛后面有一片花草果树不生的浓密灌木林。**35**
"Down in a corner of the garden behind all the raspberry bushes was a dense thicket where neither flowers nor berries would grow."

zài	huāyuán	de	yì	jiǎo	nèixiē		shùméi
at	garden	Loc	one	corner	that	pl.	raspberry
PREP	PN	PRT	NUM	CN	DEM		CN

shùcóng	hòumiàn	yǒu	yí	piàn		huā	cǎo
bushes	back.side	have	one	piece.CLFnom		flower	grass
CN	N	V	NUM	CL		CN	CN

guǒshù	bùshēng		de	nóngmì	guànmù	lín
fruit.tree	not	grow	PART	dense	shruberry	small.forest
CN	V		PRT	ADJ	CN	CN

Generated in TypeCraft.

Zài (*in*) huāyuán (*garden*) is a prepositional phrase, which is related to the head noun it modifies, yìjiǎo (*corner*), by the use of the particle *de*. In this configuration, the particle *de* normally cannot be omitted.

Turning now to co-verbs, in Mandarin Chinese, co-verbs resemble both verbs and prepositions. Like the co-verb duì (*to/toward*) in Chinese*,* it is used to indicate the concept of "to" or "towards" an object or target. This is illustrated in example (32):

(32) 对他的信任**36**
"the trust towards him"

duì	tā	de	xìnrèn
toward	he		trust
PREP	PN	PRT	CN

---

[35] http://typecraft.org/tc2/ntceditor.html#2884,58512
[36] http://typecraft.org/tc2/ntceditor.html#1820,35116

3.2.2 Postpositional phrase with *de*

Another more common form of locative modification involves postpositions like zhōng (*in*), lǐ (*in*), shàng (*at*). This configuration requires *de* to connect a postpositional phrase and a noun phrase as shown in (33):

(33) 她爬过那个小洞，就置身于灌木丛中的一个大洞穴。[37]
"When she crawled through the grotto, she came into a large cave between the bushes."

tā	pá	guò	nèi	gè	xiǎodòng
she	crawl	across	that	CL	little.hole
PN	V1	V2	DET	CL	N

jiù	zhì	shēn	yú	guànmùcóng	zhōng	de	yí
respect.of	put	body	at	bushes	in	PART	one
CONJ	V	N	PREP	N	PPOST	PRT	NUM

gè	dà	dòngxué
CLF	large	cave
CL	ADJ	N

Generated in TypeCraft.

In (33) zhōng (*between, in*) is the postposition following the noun guànmùcóng (*bushes*). In this case the postpositional phrase modifies a noun phrase dàdòngxuè (*a large cave*).

3.3 Pronominal modification

Pronouns, such as personal pronouns, demonstrative pronouns, interrogative pronouns and other pronouns, combine with head nouns to form different types of noun phrases. (Yip & Rimmington, 2006)

3.3.1 Personal pronouns

In Mandarin Chinese, *personal pronoun + de* is used to form a possessive expression such as example (34):

(34) 大鸟看到他们的样子笑了起来。[38]
"The big bird laughed when he saw them."

dà	niǎo	kàn	dào	tā	men	de

---

[37] http://typecraft.org/tc2/ntceditor.html#2884,58513
[38] http://typecraft.org/tc2/ntceditor.html#2884,58500

big	bird	see	reach	he		
ADJ	CN	V1	V2	PN	AUX	PRT

yàng		zi	xiào	le	qǐ
appearance			laugh		begin
CN		PRT	V1	PRT	V2

lái
come
V3
Generated in TypeCraft.

While possessive modification requires common nouns with the presence of *de,* this is not the case for kinship terms, for example (35):

(35) 我爸爸[39]
"my dad"

wǒ	bàba
I	dad
PN	N

Generated in TypeCraft.

Wǒ (*I*) bàba (*dad*) and wǒ (*I*) *de* bàba (*dad*) are both grammatical, because bàba (*dad*) is a kinship term that refers to a relative. *De* can be omitted in (35). Predicative structures are a different matter: *de* cannot be omitted (36).

(36) 这是我的[40]
"This is mine."

zhè	shì	wǒ	de
this	is	I	
PN	V	PN	PRT

Generated in TypeCraft.

(37) shows that when a noun is combined with a numeral in a partitive construction, a preceding possessive must be followed by *de*:

---

[39] http://typecraft.org/tc2/ntceditor.html#2884,448188
[40] http://typecraft.org/tc2/ntceditor.html#2884,448189

(37) 他的一个孩子[41]
"one of his children"

tā	de	yí	gè	háizi
he		one		child
PN	PRT	NUM	CLF	N

Generated in TypeCraft.

3.3.2 Demonstrative pronouns

Zhè (*this*) and nà (*that*) are Mandarin demonstratives (Yip & Rimmington, 2006). When these demonstrative pronouns are followed by the particle *de*, a locative expression is created, as shown in example (38):

(38) 这的酒店很好。[42]
"The hotel here is very nice."

zhè	de	jiǔdiàn	hěn	hǎo	。
this		hotel	very	nice	
PN	PRT	N	ADV	ADJ	PUN

Generated in TypeCraft.

When demonstratives are used with numeral measure words and a possessive is also present, the order is the possessive pronoun, demonstrative, numeral, classifier, and noun. *De* usually follows the personal pronoun, such as in (39):

(39) 我的这三本书[43]
"these three books of mine"

wǒ	de	zhè	sān	běn	shū
I		this	three		book
PN	PRT	PN	NUM	CLFnum	N

Generated in TypeCraft.

---

[41] http://typecraft.org/tc2/ntceditor.html#2884,448191

[42] http://typecraft.org/tc2/ntceditor.html#2884,448193

[43] http://typecraft.org/tc2/ntceditor.html#2884,448192

What we need to point out is that demonstrative pronouns with *de* and without *de* have different expressions. When the demonstrative pronoun is accompanied by *de*, it creates a locative expression, like example (38), while it refers to a definite article without *de* (40):

(40) 这书店关门了[44]
"This book store is closed."

zhè shū   diàn guān mén le
this book store close door
PN   N   N   V   N   AUX
Generated in TypeCraft.

3.3.3 Interrogative pronouns

The main interrogative pronouns followed by *de* in Mandarin Chinese are shuí (*who*) and nǎ (*where*) (Yip & Rimmington, 2006). Just like the personal pronoun, the interrogative pronoun also receives a possessive interpretation when followed by the particle *de*, as shown in example (41) and (42):

(41) 这是谁的行李？[45]
"Whose luggage is this?"

zhè	shì	shuí	de	xíngli	？
this	is	who		luggage	
PN	V	PN	PRT	N	PUN

Generated in TypeCraft.

In example (41), shuí (who), when followed by *de*, receives a possessive interpretation and *de* cannot be omitted, while in example (42), *de* is optional.

(42) 你是哪的人？[46]
"Where are you from?"

nǐ	shì	nǎ	de	rén
you	is	where		people

---

[44] http://typecraft.org/tc2/ntceditor.html#2884,448347
[45] http://typecraft.org/tc2/ntceditor.html#2884,448194
[46] http://typecraft.org/tc2/ntceditor.html#2884,448195

PN	V	PN	PRT	N

Generated in TypeCraft.

3.3.4 Other pronouns

There are some other pronouns in Chinese, such as dàjiā (everyone), zìjǐ (oneself), rénjiā (other). Some linguists (e.g. Yip and Rimmington (2006)) classify these pronouns separately, and we will consequently discuss in an independent section in this thesis. *De* is obligatory when other pronouns are followed by *de,* for example (43):

(43) 大家的书[47]
"everyone's book"

dàjiā	de	shū
everyone		book
PN	PRT	N

Generated in TypeCraft.

3.4   Noun – Noun constructions

N_1 N_2 construction is either possessive or associative in nature. Additionally, we find constructions with numeral-measure words.

3.4.1 N_1 + *de* +N_2

The particle *de* occurs between two nominals, indicating possession (44) or close association (45):

(44) 西蒙的猫看见了一只苍蝇。[48]
"Simon's cat saw a fly."

xīměng	de	māo	kàn	jiàn	le	yī	zhǐ
simon		cat	see	meet		one	
N_1	PRT	N_2	V1	V2	PRT	NUM	CLFnum

cāngyíng
fly
CN

---

[47] http://typecraft.org/tc2/ntceditor.html#2884,448197
[48] http://typecraft.org/tc2/ntceditor.html#2884,58531

(44) is a possessive construction. N$_2$ *cat* belongs to N$_1$ *Simon*.

(45) 我们已经看到他们如何试图为大自然的变化寻求自然的解释[49]
"We have seen how they tried to find a natural explanation for the change(s) in nature."

wǒmen	yǐjīng	kàn	dào	tāmen	rúhé	shìtú	wèi	dàzìrán
we	already	saw	reach	they	how	try	for	nature
PN	ADV	V1	V2	PN	ADV	V	PREP	N

de	biànhuà	xúnqiú	zìrán	de	jiěshì
PART	change	seek	natural	Adj.Suffix	explanation
PRT	N	V	N	PRT	N

Generated in TypeCraft.

In example (45), the construction N$_1$ (dàzìrán:*nature*) + *de* +N$_2$ (biànhuà:*change*) is an associate phrase.

3.4.2   Numeral-measure word N$_1$ + *de* +N$_2$

This pattern consists of a numeral classifier noun and another noun (46):

(46) 两百美金的书[50]
"two hundred dollar book

liǎng	bǎi	měijīng	de	shū
two	hundred	dollar		book
NUM	NUM	N	PRT	N

Generated in TypeCraft.

3.5   Relative clauses

Chinese RCs precede their head nouns (Hsiao & Gibson, 2003). They can either be subject-extracted relative clauses or object-extracted relative clauses. *De* serves to combine the relative head and the relative clause. Example (47) illustrates a subject-extracted relative clause and (48) is an object-extracted one:

---

[49] http://typecraft.org/tc2/ntceditor.html#2884,58518

[50] http://typecraft.org/tc2/ntceditor.html#2884,448198

(47) 教我数学的老师[51]

"the teacher who taught me math"

jiào	wǒ	shùxué	de	lǎoshī
teach	I	math		teacher
V	PN	N	PRT	N

Generated in TypeCraft.

(48) 那边有一本我要研究的书。[52]

"There is a book that I want to research."

nèibiān	yǒu	yībǔn	wǒ	yào
there	have	one	I	want
ADVm	COP	QUANT	PN	V

yánjiū	de	shū
research		book
V	PRT	Ncomm

Generated in TypeCraft.

In this chapter, we have discussed classes of nominal *de* constructions. We found five general classifications: nouns modified by adjectives, nouns combining with the adpositional phrase, nouns modified by pronouns, noun-noun modifications and nouns modified by relative clauses. We can summarize our findings as follows:

Class1: ADJ *de* N,

Class2: AP *de* N, (where AP stands for adpositional phrase)

Class3: PN *de* N,

Class4: N_1 *de* N_2,

Class5: RC *de* N.

---

[51] http://typecraft.org/tc2/ntceditor.html#2884,58551

[52] http://typecraft.org/tc2/ntceditor.html#2884,58494

Table 6 The classifications of *de* construction

The classes of *de*-construction		Syntactic pattern	Types of noun phrase
Adjectival modification	adjectives with *de*	[ADJ N]	modified noun phrase
Adpositional attributes	prepositional phrases with *de*	[AP N]	locative noun phrase
	postpositional phrases with *de*		
Pronominal modification	personal pronouns	[PN N]	possessive noun phrase
	demonstrative pronouns		deictic noun phrase
	interrogative pronouns		
	other pronouns		
Noun – noun constructions	N_1 + *de* +N_2	[N_1 N_2]	possessive or associative noun phrase
	numeral-measure word N_1 + *de* +N_2	[NUM N_1 N_2]	quantified or classified noun phrase
Relative clauses	subject-extracted relative clauses	[RC N]	noun phrases containing a relative clause
	object-extracted relative clauses		

We have given a more detailed description of noun phrases containing *de*-expressions building on the classifications that we have found in the NLP and linguistic literatures. For example, we recognized the class of adpositional modification, and presented prepositional and postpositional phrases. Also, with respect to pronominal modification, we recognized several subtypes of pronominal modification, such as modification by the personal pronoun, demonstrative, interrogative, and other pronouns. We explored the different meanings of demonstrative pronouns with *de* and without *de*. Noun-noun constructions and relative clause modification also played an important role in our presentation.

This chapter has given a detailed systematic presentation of nominal constructions. We have used examples from the TypeCraft Mandarin corpus to illustrate each class. Our data is open access and through the URLs that we provide the reader has direct access to our corpus online.

Chapter 4. The Order of Sequential Attributives

When several types of attributives occur in one phrase in Chinese, certain rules apply. The previous chapter presented five general classifications of nominal *de* constructions: adjectival, adpositional, pronominal, nominal attributes and verbal attributes in the form of relative clauses. This chapter will explore the order of sequential attributives of these five general classifications, and we will only discuss two sequential attributives in each phrase or sentence in this chapter. One *de* tends to be omitted after an attribute in some examples. The data that I will present in this section is taken from dialogues, newspapers, books, articles and social media. I have imported the examples in this chapter into TC for further annotation[53].

4.1   Adjectival attributes

In this section, we will discuss how to order the adjectival attributes relative to the other possible attributes.

4.1.1   Adjectival attributes and adpositional attributes

When an adjectival attribute co-occurs with an adpositional attribute, the adpositional attributes will consistently precede the adjectival attributes. The pattern is AP ADJ N, and it is exemplified in (49) and (50):

(49) (在)街角安静的咖啡店[54]
"the quiet cafe in the corner"

zài	jiējiǎo	ānjìng	de	kāfēidiàn
at	corner	quiet		cafe
PREP	N	ADJ	PRT	N

In (49) the prepositional phrase precedes the adjective. The same is the case for the postpositional phrase in (50):

---

[53] http://typecraft.org/tc2/ntceditor.html#2884
[54] http://typecraft.org/tc2/ntceditor.html#2884,448203

(50) 水下美丽的鱼儿[55]

"the beautiful fish under the water"

shuǐ	xià	měilì	de	yúer
water	under	beautiful		fish
N	PPOST	ADJ	PRT	N

Generated in TypeCraft.

4.1.2   Adjectival attributes and pronominal attributes

Ordering constraints also apply when adjectival attributes co-occur with personal pronouns. The order is PN ADJ N, as in example (51):

(51) 我美丽的妈妈[56]

"my beautiful mother"

wǒ	měilì	de	māma
I	beautiful		mother
PN	ADJ	PRT	N

Generated in TypeCraft.

Demonstrative pronouns precede adjectival attributes, as shown in example (52):

(52) 这奢华的酒店[57]

"this luxurious hotel here"

zhè	shēhuá	de	jiǔdiàn
this	luxurious		hotel
PN	ADJ	PRT	N

Generated in TypeCraft.

There is no example when interrogative pronouns co-occur with adjectival attributes.

In chapter 3 we mentioned dàjiā (*everyone*) and zìjǐ (*myself*). These pronouns also precede attributive adjectives.

---

[55] http://typecraft.org/tc2/ntceditor.html#2884,448204

[56] http://typecraft.org/tc2/ntceditor.html#2884,448205

[57] http://typecraft.org/tc2/ntceditor.html#2884,448206

(53) 自己动人的歌声[58]
"my own lovely sound"

zìjǐ	dòngrén	de	gēshēng
myself	lovely		sound
PN	ADJ	PRT	N

Generated in TypeCraft.

4.1.3 Adjectival attributes and nominal attributes

In chapter 3, we discussed three different nominal attributes. When adjectival attributes co-occur with nominal attributes indicating possession, such as someone's name, relatives (family members), institution or organization, the nominal attributes will precede the adjectival attributes, creating the pattern N_1 ADJ N_2. Consider (54):

(54) 姐姐的蓝色裙子[59]
"my sister's blue skirt"

jiějie	de	lánsè	qúnzi
sister		blue	skirt
N	PRT	ADJ	N

Generated in TypeCraft.

Other nominal attributes indicating close association precede adjectival attributes; the pattern is N_1 ADJ N_2, as shown in (55):

(55) 那封信的神秘回复[60]
"the mysterious response to that letter"

nà	fēng	xìn	de	shénmì	huífù
that		letter		mysterious	response
PN	CLF	N	PRT	ADJ	N

Generated in TypeCraft.

Numeral-measure words behave just like other nominal attributes and precede the adjectival attributes in the pattern [(NUM) N_1] ADJ N_2 (56):

---

[58] http://typecraft.org/tc2/ntceditor.html#2884,448208

[59] http://typecraft.org/tc2/ntceditor.html#2884,448209

[60] http://typecraft.org/tc2/ntceditor.html#2884,448210

32

(56) 两百万美金奢华的房子[61]
"a luxurious house worth two million dollars"

liǎng	bǎiwàn	měijīng	shēhuá	de	fángzi
two	million	dollar	luxurious		house
NUM	NUM	N	ADJ	PRT	N

Generated in TypeCraft.

4.1.4   Adjectival attributes and verbal attributes

For subject-extracted relative clauses the pattern is RC ADJ N, for example (57):

(57) 教我数学的年轻老师[62]
"the young teacher who taught me math"

jiào	wǒ	shùxué	de	niánqīn	lǎoshī
teach	I	mathematics		young	teacher
V	PN	N	PRT	ADJ	N

Generated in TypeCraft.

Finally, we can look at object-extracted relative clauses, which also precede adjectives. The pattern here is RC ADJ N (58):

(58) 我要研究的深奥的书[63]
"a profound book that I want to research"

wǒ	yào	yánjiū	de	shēngào	de	shū
I	want	research		profound		book
PN	V	V	PRT	ADJ	PRT	N

Generated in TypeCraft.

We observed that under double modification the adjective is always the modifier occurring closest to the head noun in the following pattern:

---

[61] http://typecraft.org/tc2/ntceditor.html#2884,448211

[62] http://typecraft.org/tc2/ntceditor.html#2884,448212

[63] http://typecraft.org/tc2/ntceditor.html#2884,448213

Table 7 The order of adjectival attributes and the other attributes

Type of attributive	Syntactic pattern	The order of two attributives
ADJ AP	AP ADJ N	AP>ADJ
ADJ PN	PN ADJ N	PN>ADJ
ADJ N	[(NUM) N_1] ADJ N_2	N_1>ADJ
ADJ RC	RC ADJ N	RC >ADJ

Note: A>B means A precedes B.

This finding indicates that, if the phrases have adjectival attributes and other attributes, the other attributes will always precede the adjectival attributes.

4.2   Adpositional attributes

4.2.1   Adpositional attributes and pronominal attributes

Let us first consider the case where adpositional attributes combine with pronominal attributes. The latter come in four different categories, which are personal pronouns, demonstrative pronouns, interrogative pronouns and other pronouns. We first describe the combination with personal pronouns. The patterns that we observed are AP PN N and PN AP N, as in (59) and (60):

(59) 我在湖边的同学[64]
"my classmate by the lake"

wǒ	zài	hú	biān	de	tóngxué
I	at	lake	side		classmate
PN	PREP	N	N	PRT	N

Generated in TypeCraft.

(60) 在湖边的我同学*[65]
"my classmate by the lake"

zài	hú	biān	de	wǒ	tóngxué
at	lake	side		I	classmate

---

[64] http://typecraft.org/tc2/ntceditor.html#2884,448222
[65] http://typecraft.org/tc2/ntceditor.html#2884,448214

PREP   N   N   PRT   PN   N
Generated in TypeCraft.   35

The configuration shown in (60) is not common, and example (60) cannot be considered an everyday phrase in Chinese. Zàihúbiān (*by the lake*) is a locative modification, rather than a possessive modification wǒ (*I*), and is consequently positioned closer to the head noun. The pattern PN AP N is correct. Also relative to the demonstrative pronouns are zhè (*this*) and nà (*that*). We observe the patterns PN AP N and AP PN N, such as (61) and (62):

(61) 在北京的那些酒店[66]
"these hotels in Beijing"

zài   běijīng de   nàxiē jiǔdiàn
at   Beijing   these hotel
PREP Nploc   PRT PN   N
Generated in TypeCraft.

(62) 那些在北京的酒店[67]
"these hotels in Beijing"

nàxiē zài   běijīng de   běijīng
these in   Beijing   hotel
PN   PREP Nploc   PRT N
Generated in TypeCraft.

When a demonstrative pronoun and an adpositional attribute co-occur, the pattern is AP PN N or PN AP N. Both patterns are correct. There is no example relative to the occurrence of an interrogative pronoun and an adpositional attribute.

The pattern already observed for personal pronouns can also be found with dàjiā (*everyone*), zìjǐ (*oneself*), rénjiā (*other*). We observe (63) and (64).

---

[66] http://typecraft.org/tc2/ntceditor.html#2884,448216
[67] http://typecraft.org/tc2/ntceditor.html#2884,448360

(63) 大家在北京的朋友[68]
"everyone's friend in Beijing"

dàjiā	zài	běijīng	de	péngyǒu
everyone	at	Beijing		friend
PN	PREP	Nploc	PRT	N

Generated in TypeCraft.

(64) 在北京大家的朋友*[69]
"everyone's friend in Beijing"

zài	běijīng	dàjiā	de	péngyǒu
at	Beijing	everyone		friend
PPOST	Nploc	PN	PRT	N

Generated in TypeCraft.

Example (64) cannot be considered an everyday phrase in Chinese. Zàiběijīng (*in Beijing*) is a locative modification, rather than a possessive modification dàjiā (*everyone*), and is consequently positioned closer to the head noun. The pattern is again PN AP N.

4.2.2 Adpositional attributes and nominal attributes

Turning now to possessive in combination with adpositional attributes, we observe the following pattern AP N_1 N_2 or N_1 AP N_2, as in (65) and (66):

(65) 爸爸在上海的朋友[70]
"dad's friend in Shanghai"

bàbà	zài	shànghǎi	de	péngyǒu
dad	at	Shanghai		friend
N	PREP	Nploc	PRT	N

Generated in TypeCraft.

(66) 在上海爸爸的朋友*[71]

zài	shànghǎi	bàbà	de	péngyǒu
at	Shanghai	dad		friend
PREP	Nploc	N	PRT	N

---

[68] http://typecraft.org/tc2/ntceditor.html#2884,448224
[69] http://typecraft.org/tc2/ntceditor.html#2884,448225
[70] http://typecraft.org/tc2/ntceditor.html#2884,448228
[71] http://typecraft.org/tc2/ntceditor.html#2884,448227

Example (66) is likely to cause ambiguity. It is hard to distinguish whether zàishànghǎi (*in Shanghai*) modifies bàbà (*father*) or péngyǒu (*friend*). Same as the previous one, a locative modification, rather than a possessive modification, and is consequently positioned closer to the head noun. The pattern is N_1 AP N_2. When the nominal attributes indicate close association, the pattern is same as the previous one, as illustrated in example (67) and (68):

(67) 学校在上海的校区[72]
"school campus in Shanghai"

xuéxiào	zài	shànghǎi	de	xiàoqū
school	at	Shanghai		campus
N	PREP	Nploc	PRT	N

Generated in TypeCraft.

(68) 在上海的学校的校区*[73]

zài	shànghǎi	de	xuéxiào	de	xiàoqū
at	Shanghai		school		campus
PREP	Nploc	PRT	N	PRT	N

Generated in TypeCraft.

As example (66), example (68) is ambiguous: it is difficult to tell whether zàishànghǎi (*in Shanghai*) modifies xuéxiào (*school*) or xiàoqū (*campus*). The correct pattern is N_1 AP N_2. Combing adpositional modifiers with numeral measure noun attributes, we observe the pattern shown in (69) and (70):

(69) 在香港一百万港币的房子[74]
"a million HK dollar house in Hong Kong"

zài	xiānggǎng	yì	bǎiwàn	gǎngbì	de	fángzi
at	HongKong	one	million	HKdollar		house
PREP	Nploc	NUM	NUM	N	PRT	N

(70) 一百万港币在香港的房子[75]
"a million HK dollar house in Hong Kong"

---

[72] http://typecraft.org/tc2/ntceditor.html#2884,448231

[73] http://typecraft.org/tc2/ntceditor.html#2884,448232

[74] http://typecraft.org/tc2/ntceditor.html#2884,448233

[75] http://typecraft.org/tc2/ntceditor.html#2884,448234

yì	bǎiwàn	gǎngbì	zài	xiānggǎng	de	fángzi
one	million	HKdollar	at	HongKong		house
NUM	NUM	N	PREP	Nploc	PRT	N

Generated in TypeCraft.

In example (69) and (70), the pattern is AP NUM N_1 N_2 or NUM N_1 AP N_2. Adpositional attributes and numeral-measure nominal attributes could be both given precedence, depending on which carries the emphasis. Example (69) emphasizes *a million HK dollars*, and example (70) emphasizes *in Hong Kong*. The attributes, which carry the emphasis, will be positioned closer to the head noun.

4.2.3 Adpositional attributes and verbal attributes

Turning now to relative clauses, we observe both pattern AP RC N and pattern RC AP N, as shown in (71) and (72):

(71) 在上海教我数学的老师[76]
"the teacher who taught me math in Shanghai"

zài	shànghǎi	jiāo	wǒ	shùxué	de
at	ShangHai	teach	I	mathematics	
PREP	Nploc	V	PN	N	PRT

lǎoshī
teacher
N

Generated in TypeCraft.

(72) 教我数学的在上海的老师*[77]
"the teacher who taught me math is in Shanghai"

jiāo	wǒ	shùxué	de	zài	shànghǎi	de
teach	I	mathematics		at	ShangHai	
V	PN	N	PRT	PREP	Nploc	PRT

lǎoshī
teacher
N

---

[76] http://typecraft.org/tc2/ntceditor.html#2884,448235

[77] http://typecraft.org/tc2/ntceditor.html#2884,448236

Example (71) and (72) are both correct syntactically, but different semantically. Example (71) emphasizes jiāowǒshùxué (*teach me math*) while example (72) emphasizes zàishànghǎi (*in Shanghai*). So, as in: "*the teacher WHO TAUGHT ME MATH in Shanghai*" (71) as opposed to "*the teacher who taught me math is IN SHANGHAI NOW*" (72). The configuration shown in (72) is not common, and example (72) cannot be considered an everyday phrase in Chinese. The pattern is AP RC N. The same is true for object-extracted relative clauses such as (73) and (74):

(73) 在海边玩沙子的孩子**[78]**
"the child who played in the sand by the sea"

zài	hǎi	biān	wán	shānzi	de	háizi
at	sea	side	play	sand		child
PREP	N	N	V	N	PRT	N

Generated in TypeCraft.

(74) 玩沙子的在海边的孩子∗**[79]**
"the child who played in the sand by the sea"

wán	shānzi	de	zài	hǎi	biān	de	háizi
play	sand		at	sea	side		child
V	N	PRT	PREP	N	N	PRT	N

Generated in TypeCraft.

Example (73) emphasizes wánshāzi (*play in the sand*) and example (74) emphasizes zàihǎibiān (*by the sea*). So, as in: *"the child who PLAYED IN THE SAND by the sea"* (73) as opposed to *"The child who played in the sand is BY THE SEA"* (74). Example (74) cannot be considered an everyday phrase in Chinese. The correct pattern is AP RC N. In this part, we discussed the order of adpositional attributes and other attributes. The patterns are summarized in Table 8.

---

[78] http://typecraft.org/tc2/ntceditor.html#2884,448557

[79] http://typecraft.org/tc2/ntceditor.html#2884,448558

Table 8 The order of adpositional attributes and the other attributes

Type of attributive	Syntactic pattern	The order of two attributives
AP PN	PN AP N AP PN N	PN >AP PN(demonstrative pronouns) =AP
AP N	N_1 AP N_2 [NUM N_1] AP N_2 AP [NUM N_1] N_2	N_1>AP [NUM N_1] = AP
AP RC	RC AP N AP RC N	AP >RC

Note: A>B means A precedes B.

A=B means A could be either before or after B.

Table 8 shows the order of sequential attributives that contain adpositional attributes and other attributes. The pronominal attributes precede the adpositional attributes. Unless the pronominal attributes are the demonstrative pronouns, the demonstrative pronouns could be either before or after the adpositional attributes. The nominal attributes indicating possession or close association precede the adpositional attributes. The numeral-measure nominal attributes can be placed either before or after the adpositional attributes, depending on which attributes are emphasized. The emphasized attributes are closer to the modified noun. The adpositional attributes precede the verbal attributes in the form of relative clauses.

4.3   Pronominal attributes

4.3.1   Pronominal attributes and nominal attributes

We will now explore the order of modification element focusing on pronouns. When a personal pronoun and a noun phrase indicating possession co-occur, the personal pronoun precedes the nominal attribute indicating possession, giving rise to the pattern PN N_1 N_2, for example (75):

(75) 我爸爸的朋友[80]
"my father's friend"

wǒ	bàba	de	péngyǒu
I	father		friend
PN	N	PRT	N

Generated in TypeCraft.

The same holds for nominal modifiers indicating close association and numeral-measure word noun phrases as the attributes (76) and (77):

(76) 我学校的校服[81]
"my school's uniform"

wǒ	xuéxiào	de	xiàofú
I	school		uniform
PN	N	PRT	N

Generated in TypeCraft.

(77) 她一百万美金的房子[82]
"her one million dollars house"

tā	yì	bǎiwàn	měijīn	de	fàngzi
she	one	million	dollar		house
PN	NUM	NUM	N	PRT	N

Generated in TypeCraft.

Demonstrative pronoun precedes noun phrase indicating close association, which means the pattern will be PN N_1 N_2 as in (78):

(78) 这酒店的窗户不干净[83]
"The window of this hotel is not clean."

zhè	jiǔdiàn	de	chuānghu	bù	gānjìng
this	hotel		window	not	clean
PN	N	PRT	N	ADV	ADJ

Generated in TypeCraft.

---

[80] http://typecraft.org/tc2/ntceditor.html#2884,448241

[81] http://typecraft.org/tc2/ntceditor.html#2884,448242

[82] http://typecraft.org/tc2/ntceditor.html#2884,448243

[83] http://typecraft.org/tc2/ntceditor.html#2884,448247

The same holds for numeral-measure word nouns. Here, too, the pattern is PN NUM N_1 N_2, for example (79):

(79) 这一百万美金的房子是太贵了[84]
"One million dollars house is too expensive here."

zhè	yì	bǎiwàn	měijīn	de	fángzi	shì	tài	guì		le
this	one	million	dollar		house	is	too	expensive		
PN	NUM	NUM	N	PRT	N	V	ADV	ADJ		AUX

Generated in TypeCraft.

We could not find an example in which both a demonstrative pronoun and a nominal attribute indicating possession co-occurred. There is no example of an interrogative pronoun with a nominal attribute as well. The last type of pronoun is other pronouns, which could also add the suffix *de.* In this case, other pronouns precede the nominal attributes indicating possession, which means the pattern is PN N_1 N_2, like example (80):

(80) 大家爸爸的水平都很高。[85]
"The skills of everyone's father are very high."

dàjiā	bàba	de	shuǐpín	dōu	hěn	gāo	。
everyone	father		skill	all	very	high	
PN	N	PRT	N	ADV	ADV	ADJ	PUN

Generated in TypeCraft.

The same holds for nominal attributes indicating close association:

(81) 人家学校的操场很大。[86]
"The playground of the other's school is big."

rénjiā	xuéxiào	de	cāochǎng	hěn	dà	。
other	school		playground	very	big	
N	N	PRT	N	ADV	ADJ	PUN

Generated in TypeCraft.

For relative numeral-measure words, the order remains as described:

---

[84] http://typecraft.org/tc2/ntceditor.html#2884,448248
[85] http://typecraft.org/tc2/ntceditor.html#2884,448251
[86] http://typecraft.org/tc2/ntceditor.html#2884,448252

(82) 别人几百美金的自行车不要乱借。[87]

"Do not borrow the other's bike which is several hundred dollars."

biéren	jǐ	bǎi	měijīng	de	zìxíngchē	bú	yào
other	several	hundred	dollar		bike	not	want
PN	NUM	NUM	N	PRT	N	ADV	V

luàn		jiè		。
casually		borrow		
ADV		V		PUN

Generated in TypeCraft.

In conclusion, when pronominal attributes and nominal attributes occur together, the order will be PN (NUM) N_1 N_2.

4.3.2 Pronominal attributes and verbal attributes

Let us now consider relative clauses, we observe the pattern PN RC N and RC PN N, for example (83) and (84):

(83) 她教数学的老师[88]

"her teacher who taught math"

tā	jiāo	shùxué		de	lǎoshī
she	teach	mathematics			teacher
PN	V	N		PRT	N

Generated in TypeCraft.

(84) 教数学的她老师* [89]

"her teacher who taught math"

jiāo	shùxué		de	tā	lǎoshī
teach	mathematics			she	teacher
V	N		PRT	PN	N

Generated in TypeCraft.

Tā (*she*) is a possessive modification to the head noun and jiāoshùxué (*teach mathmatic*) is a verbal attribute to the head noun. The verbal attributes, rather than the possessive

---

[87] http://typecraft.org/tc2/ntceditor.html#2884,448253

[88] http://typecraft.org/tc2/ntceditor.html#2884,448256

[89] http://typecraft.org/tc2/ntceditor.html#2884,448255

modifications, are consistently closer to the head noun. The pattern is PN RC N. When demonstrative pronouns combine with modificational verbal phrases, the order must be PN RC N, such as example (85):

(85) 这会说英文的老师很多。[90]
"There are a lot of teachers here who can speak English."

zhè	huì	shuō	yīngwén	de	lǎoshī	hěn	duō	。
this	can	speak	English		teacher	very	much	
PN	V	V	Np	PRT	N	ADV	ADJ	PUN

Generated in TypeCraft.

There is no example when interrogative pronominal attributes and verbal attributes co-occur. However, when we combine other pronouns and a verbal attribute both orders will be possible:

(86) 大家会说法语的老师走了[91]
"Everyone's teacher who could speak French left."

dàjiā	huì	shuō	fǎyǔ	de	lǎoshī	zǒu	le
everyone	can	speak	French		teacher	leave	
PN	V	V		PRT	N	V	AUX

Generated in TypeCraft.

(87) 会说法语的大家的老师走了*[92]
"Everyone's teacher who could speak French left."

huì	shuō	fǎyǔ	de	dàjiā	de	lǎoshī	zǒu	le
can	speak	French		everyone		teach	leave	
V	V		PRT	PN	PRT	N	V	AUX

Generated in TypeCraft.

Huìshuōfǎyǔ (*can speak French*) is a verbal attribute to the head noun, rather than a pronominal attribute dàjiā (*everyone*), and is consequently positioned closer to the head noun. The correct pattern is PN RC N. To sum up, when the attributives contain the pronominal attributes and the verbal attributes, PN RC N is in order.

---

[90] http://typecraft.org/tc2/ntceditor.html#2884,448259
[91] http://typecraft.org/tc2/ntceditor.html#2884,448261
[92] http://typecraft.org/tc2/ntceditor.html#2884,448262

Table 9 The order of pronominal attributes and the other attributes

Type of attributive	Syntactic pattern	The order of two attributives
PN N	PN [(NUM) N_1] N_2	PN> N_1
PN RC	PN RC N	PN> RC

Note: A>B means A precedes B.

In this section, we have discussed the order of pronominal attributes and other attributes. The pronominal attributes always precede the nominal attributes and the relative clauses.

4.4   Nominal attributes

Last but not least, we focus on the nominal attributes. We have already discussed most of the attributes with nominal attributes but not verbal attributes in the form of relative clauses. When the combination of attributives is a possessive noun and a relative clause, we observe the pattern: N_1 RC N_2 or RC N_1 N_2, such as (88) and (89):

(88) 小明会跳舞的妹妹出国了[93]
"Xiao Ming's sister who could dance went abroad."
xiǎomíng	huì	tiàowǔ	de	mèimei	chū	guó	le
Xiaoming	can	dance		sister	go	country	
N	V	V	PRT	N	V	Npname	AUX

Generated in TypeCraft.

(89) 会跳舞的小明的妹妹出国了*[94]

huì	tiàowǔ	de	xiǎomíng	de	mèimei	chū	guó	le
can	dance		Xiaoming		sister	go	country	
V	V	PRT	N	PRT	N	V	Npname	AUX

Generated in TypeCraft.

Example (89) is likely to cause ambiguity. It is not clear to say whether the relative clause huìtiàowǔ (*can dance*) modifies the second attributive xiǎomíng (*Xiao Ming: name*) or the head noun mèimei (*sister*). The correct pattern will be N_1 *de* RC *de* N_2. The

---

[93] http://typecraft.org/tc2/ntceditor.html#2884,448264
[94] http://typecraft.org/tc2/ntceditor.html#2884,448265

nominal attribute indicating possession precedes the verbal attribute. Nominal attribute indicating close association and relative clause combine as shown in (90) and (91):

(90) 学校可以容纳百人的体育馆关门了[95]
"The school's gym which could contain hundreds of people is closed."

xuéxiào	kěyǐ	róngnà	bǎi	rén	de	tǐyùguǎn	guān	mén
school	may	contain	hundred	people		gym	close	door
N	V	V	NUM	N	PRT	N	V	N

le
AUX

(91)可以容纳百人的学校的体育馆关门了*[96]

kěyǐ	róngnà	bǎi	rén	de	xuéxiào	de	tǐyùguǎn	guān	mén
may	contain	hundred	people		school		gym	close	door
V	V	NUM	N	PRT	N	PRT	N	V	N

le
AUX

The same as example (89), example (91) is likely to cause ambiguity. It is difficult to distinguish whether the relative clause kěyǐróngnàbǎirén (*can contain one hundred people*) modifies the attributive noun xuéxiào (*school*) or the head noun tǐyùguǎn (*gym*). The pattern N_1 RC N_2 is correct. Combining numeral-measure word noun phrase with subject-extracted relative clause, we get the pattern: NUM N_1 RC N_2 or RC NUM N_1 N_2 (92) and (93).

(92) 二十刀可以手写的手机不能买 [97]
"You can't buy the mobile phone which has hand-writing function with twenty dollar.

èr	shí	dāo	kěyǐ	shǒu	xiě	de	shǒujī	bù	néng
two	ten	dollar	may	hand	write		mobile phone	not	can
NUM	NUM	N	V	N	V	PRT	N	ADV	V

mǎi
buy
V

---

[95] http://typecraft.org/tc2/ntceditor.html#2884,448266

[96] http://typecraft.org/tc2/ntceditor.html#2884,448267

[97] http://typecraft.org/tc2/ntceditor.html#2884,448269

(93) 可以手写的二十刀的手机不能买 [98]

"You can't buy the mobile phone which has hand-writing function with twenty dollar."

kěyǐ	shǒu	xiě	de	èr	shí	dāo	de	shǒujī	bù	néng
may	hand	write		two	ten	dollar		mobile phone	not	can
V	N	V	PRT	NUM	NUM	N	PRT	N	ADV	V

mǎi
buy
V
Generated in TypeCraft.

Table 10 summarizes the patterns we get when nominal attributes and relative clauses are contained in a single phrase:

Table 10 The order of nominal attributes and relative clauses

Type of attributive	Syntactic pattern	The order of two attributives
N RC	N_1 RC N_2	N_1 > RC
	[NUM N_1] RC N_2	[NUM N_1] = RC
	RC [NUM N_1] N_2	

Note: A>B means A precedes B.

A=B means A could be either before or after B.

Table 10 shows the order of nominal attributes and relative clauses. The nominal attributes precede the relative clauses, unless the nominal attributes are the numeral measure nouns, which could be either before or after the relative clauses. To summarize, the order of sequential attributives is given in Table 11:

---

[98] http://typecraft.org/tc2/ntceditor.html#2884,448270

Table 11 The order of sequential attributives of *de* construction in Chinese

Type of attributive	Syntactic pattern	The order of two attributives
ADJ AP	AP ADJ N	AP>ADJ
ADJ PN	PN ADJ N	PN>ADJ
ADJ N	[(NUM) N_1] ADJ N_2	N_1>ADJ
ADJ RC	RC ADJ N	RC >ADJ
AP PN	PN AP N AP PN N	PN >AP PN(demonstrative pronouns) =AP
AP N	N_1 AP N_2 [NUM N_1] AP N_2 AP [NUM N_1] N_2	N_1 > AP [NUM N_1] = AP
AP RC	RC AP N AP RC N	AP > RC
PN N	PN [(NUM) N_1] N_2	PN> N_1
PN RC	PN RC N	PN> RC
N RC	N_1 RC N_2 [NUM N_1] RC N_2 RC [NUM N_1] N_2	N_1 > RC [NUM N_1] = RC

Note: A>B means A precedes B.

A=B means A could be either before or after B.

This table indicates the order of sequential attributives of *de* constructions in Mandarin Chinese. The adjective attributes always occur closest to the nominal head, which means the order will be always AP/PN/N_1/RC ADJ N. The pronominal attributes precede the adpositional attributes. In this case, the order will be PN AP N, unless the pronominal attributes are demonstrative pronouns, the demonstrative pronouns could be either before or after the adpositional attributes (PN AP N or AP PN N). The nominal attributes go before the adpositional attributes, meaning that the order is N_1 AP N_2, unless the numeral

classifier nominal attributes can be positioned either before or after the adpositional attributes (NUM N_1 AP N_2 or AP NUM N_1 N_2). The adpositional attributes precede the verbal attributes in the form of relative clauses (AP RC N). The pronominal attributes precede the nominal attributes, meaning that the order is PN N_1. The pronominal attributes go before the relative clauses (PN RC N). When nominal attributes and relative clauses co-occur as the attributives, the nominal attributes precede the relative clauses, which means the order is N_1 RC, unless the relative clauses can be placed either before or after the numeral-measure nominal attributes (NUM N_1 RC N_2 or RC NUM N_1 N_2). To sum up, the order of sequential attributives can be concluded: PN>N_1>AP>RC>ADJ, unless the attributives are numeral measure words, numeral-measure nominal attributes could go before or after either verbal attributes or adpositional attributes (NUM N_1=RC and NUM N_1=AP). When the pronominal attributes are demonstrative pronouns, the demonstrative pronouns and the adpositional attributes can be both precedence. The order is PN (demonstrative pronouns)=AP. In spite of the fact that sequential modification is a common phenomenon, the linguistic as well as the NLP literatures pay little attention to this fact, which justifies the detail with which we have treated sequential modification in this chapter.

Chapter 5. Conclusion

As a ubiquitous particle in Chinese noun phrases, *de* has different grammatical functions. It links attributive words or phrases to the head noun. Using our own and other public Mandarin data in TypeCraft, a user-driven online database for Interlinear Glossed Text, we studied adjectival, adpositional, pronominal, nominal and verbal attributes in the form of relative clauses. Our goal was to describe and give a systematic description of nominal *de* constructions. The result of our work is a more specific and more detailed description of nominal *de* constructions in Mandarin Chinese. So far little attention has been given to sequential modification in detail. Our detailed description of different combinations of two modifiers thus covers relatively new ground, in particular when it comes to a detailed illustration of different patterns of linearization.

For this work, we have only used a small data set since time limits did not allow us to prepare the Lancaster Press Corpus for our purpose. The corpus is at this point only part of speech tagged. Working with a rather small data set might mean that when we extend our data sample that we have to add new classes to our system. We would not expect that the classes that we have described here in some detail become remain valid. In fact, it would have been desirable to work with a larger data set for example in order to pursue the issue of sequential modification.

References

Beermann, D., Haugland, T., Hellan, L., Quasthoff, U., Eckart, T. & Kuras, C. (2016). Quantitative and Qualitative Analysis in the work with African Languages. Workshop on Collaboration and Computing for Under-Resourced Languages (CCURL), LREC, Portorož.

Beermann, D. & Mihaylov, P. (2014). TypeCraft collaborative databasing and resource sharing for linguists. *Language resources and evaluation* 48 (2), (pp. 203-225).

Chang, P. C., Jurafsky, D., & Manning, C. D. (2009). Disambiguating DE for Chinese-English machine translation. In Proceedings of the Fourth Workshop on Statistical Machine Translation (pp. 215-223). Association for Computational Linguistics.

Chang, P. C., Tseng, H., Jurafsky, D., & Manning, C. D. (2009). Discriminative reordering with Chinese grammatical relations features. *SSST '09 Proceedings of the Third Workshop on Syntax and Structure in Statistical Translation* (pp.51-59).

Chappell, H. & Thompson, S. (1992). The semantics and pragmatics of associative DE in Mandarin discourse. In: *Cahiers de linguistique-Asie orientale* (pp. 199-229).

Du, J. H. & Way, A. (2001) Improved Chinese-English SMT with Chinese "DE" Construction Classification and Reording. *ACM Transactions on Asian Language Information Processing (TALIP).* Volume 10 Issue 4.

Fan, J. (2008). The influence of covertness and overtness of de on noun-attribute. *Journal of Xihua University 27* (pp. 44-53).

Feng, M. W., Jan-Thorsten, P. & Hermann, N. (2013). Advancements in Reordering Models for Statistical Machine Translation. Human Language Technology and Pattern Recognition. RWTH Aachen University, Aachen, Germany.

Huang, J. (1982). Logical relations in Chinese and the theory of grammar. MIT, Ph.D. dissertation.

Huichi Lee. (2005). On *DE* in *SHI...DE* Construction. National Tsing Hua University.

Huang, Z. H. (2007). The function of DE in Chinese RCs. Department of Chinese and Bilingual Studies: Hong Kong.

Hsiao, F. & Gibson, E. (2003). Processing relative clauses in Chinese. *Cognition* 90 (pp. 3–27).

Li, S. Q. (2007). Creativity and mechanism of the implicit meaning of "N1+de+N2" structure. *Academic Exchange* 163 (pp. 134-136).

Li, X. P. (2011). On the semantics of classifiers in Chinese. Senate of Bar-Ilan University.

Lin, C. C. (2010). Comprehending Chinese Relative Clauses in Context: Thematic Patterns and Grammatical Functions. *The 22nd North American Conference on Chinese Linguitics. Vol.1.* (pp. 413-428).

Guo, R. (2000). The conversion of the expressional functions and an analysis of the particle de in Mandarin Chinese. *Modern Linguistics* (pp. 37-52).

Shi, Y. Z & Charles N. L. (2002). The establishment of the classifier system and the grammaticalization of the morphosyntactic particle de in Chinese. *Language Science 24* (pp. 1-15).

Simpson, A. (2002). On the status of 'modifying' DE and the structure of the Chinese DP. *On the Formal Way to Chinese Languages*. Stanford: CSLI.

Wang, C., Collins, M., & Koehn, P. (2007). Chinese Syntactic Reordering for Statistical Machine Translation. In *EMNLP-CoNLL* (pp. 737-745).

Xia, F. (2000). The part-of-speech tagging guidelines for the Penn Chinese Treebank (3.0). *IRCS Technical Reports Series*

Yin, B. Y. (1990). Chinese romanization: pronunciation and orthography. *Sinolingua*.

Yue, Z. Q. (2002). The semantic discrepancies of Subordinative constructions between the noun phrase with or without the *de*. *Journal of Henan University*. Vol.42. (pp. 55-59)

Yin, B. Y. & Felley, M. (1990). Chinese Romanization: Pronunciation and Orthography. *Sinolingua*.

Yip, P. C. & Rimmington, D. (2006). Chinese: an essential grammar. Routledge: New York.