FUNCTIONS OF CHINESE CLASSIFIERS:

A SYNTAX-SEMANTICS INTERFACE ACCOUNT

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CERTIFICATION OF ORIGINALITY

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it reproduces no material previously published or written, nor material that has been accepted for the award of any other degree or diploma, except where due acknowledgement has been made in the text.

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Abstract

This dissertation aims to investigate grammatical functions of Chinese classifiers and to explore the semantics-to-syntax mapping of numeral classifier constructions. Three main sub-issues will be studied: (i) the semantic and syntactic properties of classifiers, (ii) the underlying structure of different types of numeral classifier constructions, and (iii) the referential properties of [Num-Cl-N].

A unified treatment of grammatical functions of classifiers will be proposed that classifiers, irrespective of their subcategory, uniformly serve as partition units which specify criteria for defining individuated, non-overlapped divisions on a quantity/quality scale. A generalization will be put forth that as for the Chinese classifier system, the semantic factor which truly syntactically matters is whether the classifier is used as a standardized interval unit that encodes a well-determined measure value, while the dichotomies claimed to be syntactically relevant in previous studies, including *classifiers proper* vs. *measure words* (e.g. Tai 1994), *count-classifiers* vs. *massifiers* (Cheng & Sybesma 1998), and *[+Counting] classifiers* vs. *[+Measure] classifiers* (X.-P. Li 2011), are untenable. To syntactically capture this, the present study will distinguish two types of Classifier Phrases, where the semantic and syntactic discrepancies of Chinese classifiers will be attributed to a transitive vs. intransitive configuration distinction (i.e. whether or not taking an NP complement) between the two types of Cls.

The present study will take advantage of insights from the existing syntactic investigation of the internal structure of noun phrases (e.g. Abney 1987; Longobardi 1994; Szabolcsi 1994; Zamparelli 2000) and pursue the idea that a particular interpretive effect should be associated

with the projection of a particular functional layer. Furthermore, integrating Rizzi's (1997, 2004) analysis for the clausal domain into the syntactic study of the nominal phrase, the dissertation will assume that within the nominal phrase "specifiers are licensed by the substantive featural content of their heads" (2004: 243). Along this line, different functional projections will be assigned to different numeral classifier constructions, including the Monotonicity Phrase (MonP in the sense of Schwarzschild (2006)), the Modifier Phrase (cf. Tsai 2011), the DP-internal Focus Phrase (cf. Giusti 1996; Aboh 2004; Ntelitheos 2004; Corver & van Koppen 2009), and the Evaluative Phrase (EvalP in the sense of Doetjes & Rooryck (2002)).

With respect to the referential properties of [Num-Cl-N], the present study will argue that Chinese [Num-Cl-N] is born property-denoting rather than inherently carrying an existential force. In accordance with the Montague Grammar (Heim & Kratzer 1998) in assuming that arguments should be individual-denoting elements (of the semantic type <e> or <<e, t>, t>) whereas predicates must be property-denoting (of the semantic type <e, t>), this dissertation will make a distinction in terms of the syntactic category between argumental and predictive [Num-Cl-N] (cf. Abney 1987; Stowell 1990; Longobardi 1994; Szabolcsi 1994; Chierchia 1998a, 1998b; Zamparelli 2000). It will be hypothesized that the argumental [Num-Cl-N] correlates with a DP layer whereas the predicative [Num-Cl-N] does not project into a DP. Such a DP, headed by a null D, starts out as merely a variable, whose interpretation (definite, existential, or non-referential) needs to be determined by the operator contextually binding it.

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Finally, my deepest gratitude goes to my parents. It is impossible for me to go this far without what they have done for me. This dissertation is dedicated to them.

Table of Contents

List of Abbreviations

A, AP	Adjective, adjective phrase
Acc	Accusative case
Adv, AdvP	Adverb, adverb phrase
Asp, AspP	Aspectual marker (including the perfective aspectual marker *le*, the durative aspectual marker *zhe*, and the experiential aspectual marker *guo*), aspectual phrase
BA	Marker of the disposal construction *ba*
BEI	Passive marker *bei*
D, DP	Determiner, determiner phrase
DE	Prenominal modifier marker, postverbal resultative marker, sentence final particle, or focus marker *de*
Dem, DemP	Demonstrative, demonstrative phrase
DOU	Distributive operator *dou*
Cl, ClP	Classifier, classifier phrase
EvalP	Evaluative Phrase
I, IP	Inflection, inflectional phrase
LF	Logic Form
MeaClP	Measure classifier phrase
ModP	Modifier phrase
MonP	Monotonicity Phrase
N, NP	Noun, noun phrase
Num, NumP	Numeral, numeral phrase
Par	Particle
QP	Quantifier phrase
SFP	Sentence final particle
SG	Singular
PF	Phonetic Form
PL	Plural
V, VP	Verb, verb phrase

Chapter 1 Introduction

1.1 Research objectives

Classifiers have long been the subject of linguistic investigation in Mandarin Chinese. Since 1980s, various approaches have been attempted to provide a formal account for Chinese numeral classifier constructions (cf. Huang 1982; Tang 1990; Cheng & Sybesma 1998, 1999, 2005; Y.-H. Li 1998, 1999; Pan & Hu 2000; Sio 2006; Shi to appear). The past few years have particularly seen a growing concern in this area, and a heated debate is still underway, with main interests in the syntactic/semantics properties of different types of classifiers, the underlying structure of classifier phrases, the referential properties of numeral classifier constructions, etc. (e.g. Tang 2005; Hsieh 2008; Wu & Bodomo 2009; N. Zhang 2009; Her & Hsieh 2010; X.-P. Li 2011; Pan & An 2012)

This dissertation aims to explore the grammatical functions of Chinese classifiers and to conduct a syntax-semantics interface investigation into different types of Chinese numeral classifier constructions. To achieve this goal, the present study will follow the standard assumption in the literature in hypothesizing that Chinese classifiers underlyingly head an independent projection of Classifier Phrase (cf. Tang 1990; Y.-H. Li 1998, 1999; Cheng & Sybesma 1998, 1999; and numerous subsequent studies). Via taking advantage of existing achievements in the syntactic investigation of the internal structure of noun phrases (cf. Abney 1987; Longobardi 1994; Szabolcsi 1994; Zamparelli 2000), it will be assumed that the structure of the Chinese numeral classifier construction should be more complex than was assumed in previous studies. To be specific, adhering to a syntax-semantics interface approach, the present study will endeavor to come up with syntactic representations which can effectively embody (i)

the semantic property of the classifier, (ii) the semantic correlation between the classifier and the noun, and (iii) the interpretation of the whole numeral classifier construction.

The present analysis will be cast in the standard X-bar theory within the generative framework (cf. Radford 1988; Carnie 2007) and adopt some notions (e.g. features, feature-checking) in the Minimalist Program (Chomsky 1995, 2000, 2001; Hornstein *et al.* 2005). Taking syntactic complexity as a reflex of meaning, a core idea to be explored here is that a particular interpretive effect of a nominal phrase should be associated with the projection of a particular functional layer. Moreover, the spirit of Rizzi (1997, 2004) in analyzing the clausal domain will be integrated into the syntactic study of the nominal phrase, namely that "specifiers are licensed by the substantive featural content of their heads" (2004: 243). Along this line, different functional projections will be proposed to account for the underlying structure of different numeral classifier constructions, including Monotonicity Phrase (MonP in the sense of Schwarzschild (2006)), the DP-internal Focus Phrase (cf. Giusti 1996; Aboh 2004; Ntelitheos 2004; Corver & van Koppen 2009), Modifier Phrase (cf. Tsai 2011), Evaluative Phrase (EvalP in the sense of Doetjes & Rooryck (2002)), etc. Meanwhile, in accordance with the Montague Grammar (Heim & Kratzer 1998), the present framework will impose a strict mapping condition between syntactic positions on the one hand and semantic types on the other, assuming that arguments should be individual-denoting elements (of the semantic type <e> or <<e, t>, t>) whereas predicates must be property-denoting (of the semantic type <e, t>). Correspondingly, at the syntactic level a distinction will be made in terms of the syntactic category between argumental and predictive

[Num-Cl-N] (cf. Abney 1987; Stowell 1990; Longobardi 1994; Szabolcsi 1994; Chierchia 1998b; Zamparelli 2000).

The central focus of this dissertation will be put on the following issues:

(I) Are the previously proposed classifier dichotomies – such as *sortal classifiers* vs. *mensural classifiers* (Lyons 1977), *classifiers proper* vs. *measure words* (Tai 1994), *count-classifiers* vs. *massifiers* (Cheng & Sybesma 1998), and most recently, *[+Counting] classifiers* vs. *[+Measure] classifiers* (X.-P Li 2011) – syntactically distinguishable? If not, what is the key semantic factor that is of syntactic relevance to the Chinese classifier system?

(II) How should the discrepancies among different classifiers in terms of e.g. entering into the [Num-Cl-N]/[Num-Cl-*de*-N] alternation and licensing adjectival modification be syntactically represented?

(III) How should the referential properties of [Num-Cl-N] in Chinese be accounted for? Is it fair to treat Chinese numerals as existential quantifiers and Chinese numeral classifier constructions as existential indefinites (cf. Cheng & Sybesma 1999, 2005; Sio 2006)?

Via approaching these questions, this dissertation is expected to contribute to the existing research on Chinese numeral classifier constructions by achieving a better observational/descriptive adequacy on the one hand and developing a theory with stronger explanatory power on the other.

1.2 The notion of Chinese classifiers

Before proceeding, a brief introduction to the notion of classifiers is in order.

The existence of a rich classifier system has been widely considered as a distinctive property which distinguishes Chinese, a typical classifier language, from the so-called non-classifier languages, such as e.g. English. Nevertheless, the term "classifier", despite of being frequently mentioned in the literature, has never received a unanimous treatment among linguists and is often used by different authors in different senses. Generally, there are two representative views on the nature of the Chinese classifier system, with the two contrasting with each other in whether treating classifiers as a "homogeneous" category or a "heterogeneous" category.

Under the homogeneous view, a classifier is defined as an element which classifies nouns according to the salient perceptual characteristic that is inherently, permanently possessed by the noun denotation (cf. Allan 1977; Tai & Wang 1990; Ahrens 1994; Tai 1994). Given such a definition, a transparent, predictable semantic selectional relation is always required between a classifier and a noun. For example, *tiao* classifies entities of a long shape, *li* asks for kernel-like, small objects, *zhang* accommodates entities with a flat surface, as illustrated below:

(1) a. yi tiao shengzi/she
one Cl rope/snake
'one rope/snake'

b. *yi tiao piqiu/beizi
one Cl ball/cup

(2) a. yi li mi/zhongzi
one Cl rice/seed
'one grain of rice/one seed'

b. *yi li piqiu/shengzi
one Cl ball/rope

(3) a. yi zhang zhi/zhuozi
one Cl paper/table
'one piece of paper/one table'

b. *yi zhang shengzi/zhongzi
one Cl rope/seed

Under the homogeneous view, a distinction is drawn between *classifiers proper* on the one hand, such as the above mentioned *tiao*, *li*, and *zhang*, and *measure words* on the other, such as *wan* 'bowl' (e.g. *yi wan fan* 'one bowl of rice'), *jin* 'catty' (e.g. *yi jin pingguo* 'one catty of apples'), and *dui* 'pile' (e.g. *yi dui cao* 'one pile of grass'). Given this, there is no subcategorization such as e.g. container classifiers, measure classifiers, or group classifiers under the homogeneous analysis.

In contrast, a heterogeneous view adheres to a rather general definition for classifiers and does not require semantic matching between the classifier and the noun. Various definitions have been proposed: in terms of distribution, classifiers have been defined as words that "must occur with a number (e.g., *yi* 'one', *ban* 'half', *shi* 'ten') and/or a demonstrative (i.e., *zhei* 'this', *nei* 'that', *nei* 'which'), or certain quantifiers (such as *zheng* 'whole', *ji* 'how many/a few', *mou yi* 'a certain', and *mei* 'every') before the noun" (Li & Thompson 1981: 104); in terms

of syntactic status, classifiers have been defined as bound morphemes combined with numerals (Zhu 1982: 48; also see Chao (1968: 584) for a similar definition while the terminology adopted is "measure" rather than "classifier"); in terms of grammatical meaning (*yufa yiyi*), classifiers have been defined as unit words for counting/measuring (Guo 2004: 201), etc. Under this view, classifiers constitute a heterogeneous system and allows for semantic subcategorization. Below is a list of some most frequently discussed subtypes of classifiers:

(I) *Individual classifier*

An individual classifier is exclusively used with a noun which denotes inherently discrete entities. For example:

(4) a. yi ben shu
one Cl book
'one book'

b. yi zhang chuang
one Cl bed
'one bed'

(II) *Measure classifier*

A measure classifier is associated with measuring certain physical property (e.g., length, weight, cubage, etc.) of the entity denoted by the noun. For example:

(5) a. san chi bu
three foot-Cl cloth
'three feet of cloth'

b. shi li lu
ten mile-Cl road
'ten miles of road'

(III) *Container classifier*

A container classifier provides certain kind of containers to "package" entities denoted by the noun into counting units. For example:

(6) a. yi wan tang
one bowl-Cl soup
'one bowl of soup'

b. yi xiang shu
one box-Cl book
'one box of books'

(IV) *Group classifier*

A group classifier groups/collects individual entities into aggregates. For example:

(7) a. liang shu hua
two bunch-Cl flower
'two bunches of flowers'

b. yi qun xiaoniao
one flock-Cl bird
'one flock of birds'

(V) *Partitive classifier*

A partitive classifier denotes sections/portions of entities. For example:

(8) a. yi jie ganzhe
one section-Cl sugarcane
'a section of sugarcane'

b. yi duan lu
one section-Cl road
'a section of road'

(VI) *Temporary classifier*

A temporary classifier is a noun temporarily used between a numeral and a noun as a classifier. For example:

(9) a. liang huoche mei
two train-Cl coal
'two trains of coal'

b. yi chouti wenjian
one drawer-Cl file
'one drawer of files'

(VII) *Kind classifier*

A kind classifier classifies entities according to some kind-/category-related criterion. For example:

(10) a. san zhong dongwu
three kind-Cl animal
'three kinds of animals'

b. liang lei ren
two kind-Cl person
'two kinds of people'

(VIII) *Frequency classifier*

A frequency classifier denotes a unit for counting the occurrences of events. For example:

(11) a. na bu dianying Lisi zhi kan guo yi ci
that Cl movie Lisi only watch Asp one time-Cl
'That movie Lisi has watched only once.'

b. Lisi qu guo henduo tang Beijing le
Lisi go Asp many time-Cl Beijing SFP
'Lisi has been to Beijing for many times.'

(IX) *Duration classifier*

A duration classifier measures the duration of an event. For example:

(12) a. Lisi zai xianggang gongzuo le liang nian
Lisi at Hong Kong work Asp two year-Cl

'Lisi worked in Hong Kong for two years.'

b. Lisi du le liang tian xiaoshuo
Lisi read Asp two day-Cl fiction
'Lisi read fictions for two days.'

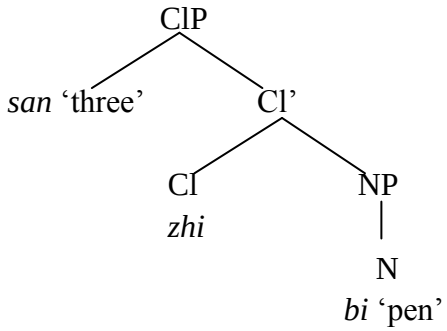
Notice that many subtypes of classifiers introduced above (as those in (II)-(VII)) have been categorized as *measure words*, in contrast with *classifiers (proper)*, under the homogeneous analysis. Under the heterogeneous analysis, the classifier vs. measure word dichotomy is taken as a semantic rather than a categorical distinction. In the terminology of Lyons (1977) (cf. also Senft 2000), which is later adopted by Tang (2005) in dealing with Chinese classifiers, such a dichotomy is described as a *sortal classifier* vs. *mensural classifier* division, with both classifiers proper and measure words in the sense of Tai (1994) being subsumed under the notion of "classifiers". And the difference between the two is considered as that the sortal classifier "individuates whatever it refers to in terms of the kind of entity that it is" whereas the mensural classifier "individuates in terms of quantity" (Lyons 1977: 463).

Another widely influential dichotomy of Chinese classifiers is *count-classifier* vs. *mass-classifier* ("massifier" henceforth), which was first proposed by Cheng & Sybesma (1998; C&S henceforth). It basically corresponds to the *classifier proper* vs. *measure word* and *sortal classifier* vs. *mensural classifier* distinction, with the count-classifier being defined as singling out one unit of naturally countable entities (equivalent to *classifier proper/sortal classifier*) whereas the massifier as creating a countable unit that does not correspond to the built-in individualhood of entities (equivalent to *measure word/mensural classifier*). Within the generative framework, C&S advocates that such a semantic distinction is

of syntactic relevance (see Chapter 2 for counterevidence against this claim; see also Tang 2005, Hsieh 2008, N. Zhang 2009, and X.-P. Li 2011 for critical discussions) and assign different underlying structures to count-classifiers and massifiers. To be specific, the former is assumed to be base-generated under Cl, while the latter is generated under N and obtains a "classifier" status via N-to-Cl movement, as depicted below:

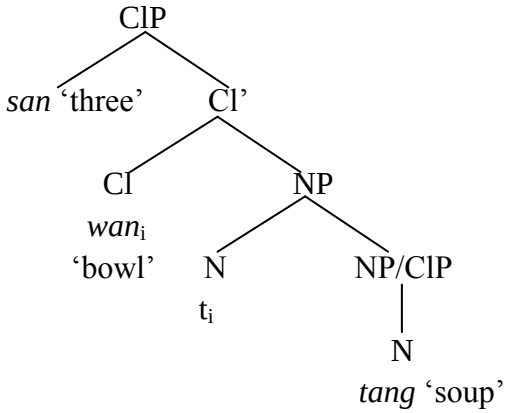
(13) *Count-classifier*

san zhi bi 'three pens'



(14) *Massifier*

san wan tang 'three bowls of soup'



Siding with Chao (1968), Zhu (1982), Lü (1984), and Guo (2004), this dissertation will adopt a heterogeneous view on Chinese classifiers and assume a general definition. Concretely, the present study will be based on a twofold working definition of classifiers as stated below:

(15) An element is a classifier if:

(I) Syntactically, the most adjacent category it allows to precede is a numeral, either overly or covertly realized; [1] and

(II) Semantically, its combination with a numeral serves to establish numerical quantification over entities/events or over a quantifiable quality.

Criterion (I) defines classifiers as an element which is necessarily preceded by a numeral, while leaving the possibility open that the numeral might be either overt or covert. By doing so, it is no longer necessary to incorporate the distribution of classifiers with respect to syntactic categories other than numerals (such as e.g. demonstratives or quantifiers; cf. the definition provided by Li & Thompson (1981)) into the defining characteristics of classifiers. For example, *ben*, *bei*, and *shu* in (16) below will be defined as classifiers simply according to the fact that the numeral *yi* "one", in addition to being semantically detectible (as indicated by the English translation), is syntactically recoverable (see (17)), and that no other constituent can intervene between the recovered numeral 'one' and the head noun:

(16) a. wo xiang mai ben shu
I want buy Cl book
'I want to buy a book.'

b. zhe bei kafei hen haohe

[1] Chapter 4 will discuss adjectival modifiers of classifiers (e.g. *yi da-xiang shu* (a large-box$_{Cl}$ book) 'a large box of books') and argue that in this case the adjective and the classifier form a lexical element. Accordingly, though linearly an adjectival element appears as intervening between a numeral and a classifier, at the structural level the (compound) classifier is still adjacent to the numeral.

this cup-Cl coffee very tasty

'This cup of coffee is tasty.'

c. mei shu hua dou shi cong Helan jinkou de

every bunch-Cl flower DOU be from Holland import DE

'Every bunch of flowers was imported from Holland.'

(17) a. wo xiang mai **yi** ben shu

I want buy one Cl book

'I want to buy a book.'

b. zhe **yi** bei kafei hen haohe

this one cup-Cl coffee very tasty

'This cup of coffee is tasty.'

c. mei **yi** shu hua dou shi cong Helan jinkou de

every one bunch-Cl flower DOU be from Holland import DE

'Every bunch of flowers was imported from Holland.'

Adhering to this criterion, all the aforementioned subtypes of classifiers will be considered as *classifiers proper* in the present study, since they are strictly adjacent to numerals. This is illustrated by the fact that no matter how many different types of prenominal elements (e.g. demonstratives, quantifiers, *de*-marked modifiers, etc.) are involved and what the relative word order among them is, all these subtypes of classifiers must be syntactically adjacent to numerals:

(18) a. *Individual classifier*

*yi zhe/shanliang de ge ren

one this/nice DE Cl person

Intended: 'this person/a nice person'

b. *Measure classifier*

*shi na/xinxian de jin pingguo

ten that/fresh DE catty-Cl apple

Intended: ‘those ten catties of apples/ten catties of fresh apples’

c. *Container classifier*

*liang zhe/hen gui de ping jiu

two this/very expensive DE bottle-Cl wine

Intended: ‘these two bottles of wine/two bottles of very expensive wine’

d. *Group classifier*

*yi zhe/hongse de shu hua

one this/red DE bunch-Cl flower

Intended: ‘this bunch of flowers/a bunch of red flowers’

e. *Partitive classifier*

*yi zhe/duozhi de jie ganzhe

one this/juicy DE section-Cl sugarcane

Intended: ‘this section of sugarcane/a section of juicy sugarcane’

f. *Temporary classifier*

*san na/xinxian de kache pingguo

three that/fresh DE truck-Cl apple

Intended: ‘those three trucks of apples/three trucks of fresh apples ’

g. *Kind classifier*

*yi na/hanjian de zhong hua

one that/rare DE kind-Cl flower

Intended: ‘that kind of flowers/a kind of rare flowers’

h. *Frequency classifier*

*liang na ci

two that time-Cl

Intended: ‘those two times’

i. *Duration classifier*

*wu zhe nian

five this year-Cl

Intended: ‘these five years’

Condition (II) in (15) is concerned with the semantic characteristics of quantification expressed by the combination of numerals and classifiers. Two cases are distinguished. On the one hand, a classifier may participate in quantifying entities or events. Most of the above subtypes of classifiers can be used in this way: individual/container/group/partitive/kind classifiers and a subgroup of measure classifiers (such as *jin* ‘catty’, *mi* ‘meter’) are associated with entity quantification, and frequency/duration classifiers pertain to event quantification.

On the other hand, there is a subgroup of measure classifiers which are *in nature* incompatible with quantification over entities. A numeral classifier expression containing this type of measure classifier serves to specify a quantifiable *qualitative* property of entities rather than reflecting the quantity of entities. In terms of syntax, unlike the classifier associated with entity quantification, the quality-oriented measure classifier can only participate in forming a numeral classifier expression in the form of [Num-Cl-*de*-N] but not [Num-Cl-N], as illustrated below:

(19) a. 100 sheshidu *(de) shui

degree Celsius-Cl DE water

‘100 degree Celsius water’

b. 150 mali *(de) qiche

horsepower-Cl DE car

'a/the 150 horsepower car'

c. 10 an *(de) chazuo
ampere-Cl DE outlet
'a/the 10 ampere outlet'

A comprehensive syntactic and semantic investigation into this type of measure classifiers will be provided in Chapter 3, where it will be argued that non-quantificational measurement constructions should be structurally distinguished from quantificational ones.

1.3 Overview of the dissertation

As a study centering on numeral classifier constructions concerning nominal domains, this dissertation will be devoted to classifiers related to numerical quantification over entities and those associated with quantifiable qualities of entities. Frequency and duration classifiers, which pertain to event quantification, will be set aside.

Focus will be put on the "genuine" classifiers such as e.g. individual/measure/container/group/partitive/kind classifiers but not on temporary classifiers. Temporary classifiers are distinguished from genuine classifiers in that the former, born as nouns, syntactically pattern with ordinary nouns in terms of e.g. licensing a preceding [Num-Cl] when they are not under a classifier usage. This is, nevertheless, impossible for genuine classifiers, as illustrated below:

(20) *Genuine classifiers*

I. Individual classifier

a. yi ben shu
one Cl book
'one book'

a'. *yi ge ben
one Cl Cl

II. Measure classifier

b. yi jin rou
one catty-Cl meat
'one catty of meat'

b'. *yi ge jin
one Cl catty-Cl

III. Container classifier

c. yi xiang pingguo
one box-Cl apple
'one box of apples'

c'. *yi ge xiang
one Cl box-Cl

IV. Group classifier

d. yi qun niao
one flock-Cl bird
'one flock of birds'

d' *yi ge qun
one Cl flock

V. Partivie classifier

e. yi jie ganzhe
one section-Cl sugarcane
'one section of sugarcane'

e'. *yi ge jie
one Cl section-Cl

VI. Kind classifier

f. yi zhong shuiguo
one kind-Cl fruit
'one kind of fruit'

f.' *yi ge zhong
one Cl kind-Cl

(21) *Temporary classifiers*

a. yi shujia shu
one bookshelf-Cl book
'one bookshelf of books'

a'. yi ge shujia
one Cl bookshelf
'one bookshelf'

b. yi zhukuang pinguo

b'. yi ge zhukuang

one bamboo basket-Cl apple *one Cl bamboo basket*

'one bamboo basket of apples' 'one bamboo basket'

c. yi kache mei c'. yi liang kache

one truck-Cl coal *one Cl truck*

'one truck of coal' 'one truck'

The dissertation will be organized as the following. Chapter 2 will be devoted to an in-depth exploration of the grammatical function performed by Chinese classifiers in entity quantification. In the light of Wiese's (2003) analysis for humans' cognitive understanding of numerical quantification, a unified treatment for the Chinese classifier system will be proposed that at the semantic level, classifiers – irrespective of their subcategory – uniformly serve as a partition unit that specifies a criterion for creating well individuated, non-overlapped divisions on a quantity scale for numerical counting. An ontological consideration coupled with semantic verifications will lead to the claim that a distinction should be made between the interval unit vs. the atomic unit in terms of the nature of partition unit represented by classifiers, and it will be demonstrated that there is no rigid, predetermined one-to-one correlation between subcategorization of classifiers on the one hand and the type(s) of partition unit each subtype of classifiers may contextually denote on the other. Based on this, a reexamination will be conducted with respect to some long-lasting issues concerning the syntactic behaviors of different types of classifiers. A new generalization will be that the semantic factor that truly syntactically matters is whether the classifier is used as a standardized interval unit that encodes a well-determined measure value, while the dichotomies claimed to be syntactically relevant in previous studies, including *classifiers proper* vs. *measure words* (e.g. Tai 1994),

count-classifiers vs. *massifiers* (Cheng & Sybesma 1998), and *[+Counting] classifiers* vs. *[+Measure] classifiers* (X.-P. Li 2011), are untenable.

Chapter 3 aims to develop a non-uniform syntactic analysis for [Num-Cl-N]. It will be hypothesized that syntactically Chinese classifiers should be divided into two types: while those irrelevant to a standardized-interval-unit reading correspond to a transitive structure, those denoting standardized interval units are associated with an intransitive configuration. Particularly, a detailed discussion on measurement constructions will be presented. It will be proposed that the [Num-Measure Cl-N] phrase is best hypothesized as correlating with a Monotonicity Phrase (MonP in the sense of Schwarzschild (2006)), while a [Num-Measure Cl-*de*-N] sequence could be either a Modifier Phrase (cf. Tsai 2011) or a DP-internal Focus Phrase (cf. Giusti 1996; Aboh 2004; Ntelitheos 2004; Corver & van Koppen 2009), depending on the semantic correlation between [Num-Measure Cl] and the head noun. Two types of *de*s in measure constructions will be structurally distinguished, which brings about nontrivial empirical and theoretical consequences.

Chapter 4 will center on the numeral classifier construction in which the classifier is modified by an adjective. Endeavors will be made to obtain a better understanding of the motivation for using pre-classifier adjectives and the semantic effect they bring about to the whole expression. It will be argued that semantically Chinese pre-classifier adjectives are uniformly classifier-oriented (contra Yan 2003, Zong 2009, X.-P. Li 2011), and that syntactically they are not phrasal elements but participate in forming a compound classifier (cf. Tang 1990). To syntactically represent the interpretative effect of subjectivity obligatorily conveyed by a numeral classifier construction containing such kind of compound classifier, an Evaluative Phrase analysis in the sense of Doetjes & Rooryck (2002) will

be attempted, by means of which the idiosyncratic semantic property of this construction can be straightforwardly derived.

In Chapter 5, an investigation will be first conducted with respect to the referential properties of the argumental [Num-Cl-N]. Against an influential viewpoint that Chinese numerals are existential quantifiers and that Chinese [Num-Cl-N] sequences are invariably indefinite (Cheng & Sybesma 1999, 2005; Sio 2006), it will be argued instead that Chinese [Num-Cl-N] is born property-denoting. Given this, a hypothesis concerning means of argumentizing [Num-Cl-N] will be put forward, with the argumental [Num-Cl-N] being assumed as always correlating with a DP layer.

Chapter 6 will conclude the dissertation with a discussion on implications of the present project and suggestions for further research.

Chapter 2 The function of Chinese classifiers in entity quantification

This chapter will be devoted to Chinese classifiers involved in numerical quantification over entities. Starting with a discussion on the semantics of numerals and the grammatical representation of numerical quantification in Mandarin Chinese, Section 2.1 will look into the semantic function performed by Chinese classifiers in entity quantification. In Section 2.2, an interval- vs. atomic-unit analysis will be proposed and a syntactically relevant dichotomy concerning the Chinese classifier system will be put forth.

2.1 The classifier as a partition unit

2.1.1 The meaning of numbers

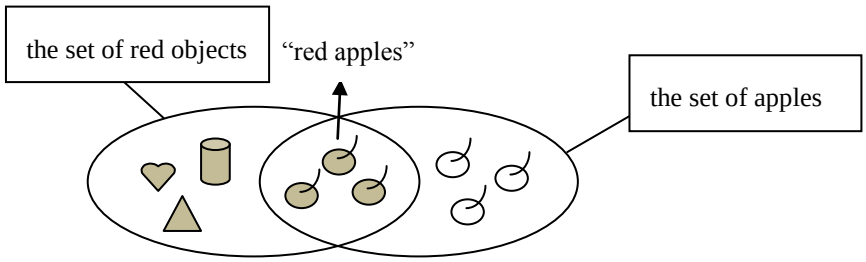
Before exploring the very semantic nature of Chinese classifiers in entity quantification, this section will first investigate the semantics of numerals.

2.1.1.1 Two classic philosophical analyses

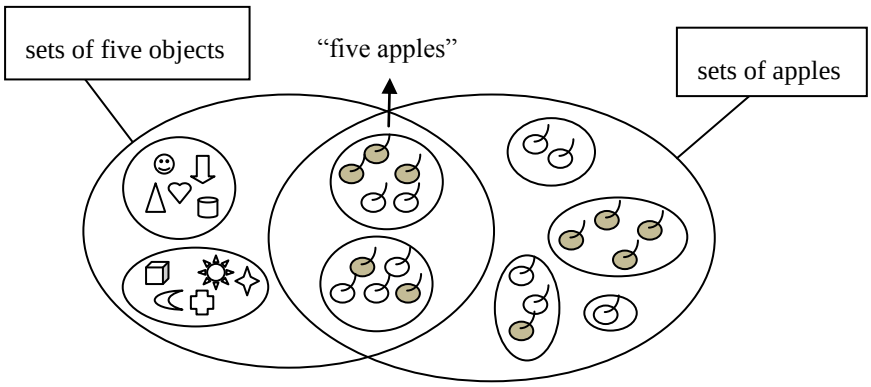
Numbers have long been a focus of interest for philosophers since an early time. Many different philosophical approaches have been attempted to account for how human beings conceptualize numbers as well as how people understand number assignments. Two representative philosophical views concerning this issue will be briefly reviewed below.

One of the most influential definitions of numbers is the "intersective" definition proposed by Frege (1884/1950). According to Frege, numbers, unlike e.g. colors, do not represent a property belonging to individuals but rather a property of sets. Within a set-theoretical framework, which defines a property *x* in terms of the set of entities having the property *x*, along Frege's line, *red*, for instance, would be represented by a set of things that have the red color, and *red apples* would be identified via referring to the intersection between the set of red things on the one hand and the set of apples on the other, as shown in (1). In contrast, *five* would be represented as a set of sets each of which contains five members, and *five apples* denotes an intersection between (i) a set that contains all sets that are composed by five elements, irrespective of the particular entity type(s) involved, and (ii) a set of sets composed by apples, regardless of the number of apples each set contains, as illustrated in (2).

(1) An intersective approach to *red apples*:



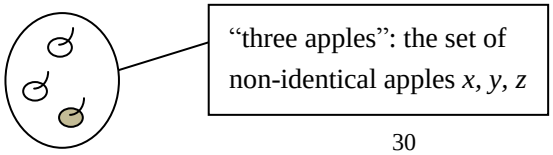
(2) An intersective approach to *five apples*:



Pursuing this line of analysis, Frege advocates that a number *n* is a property abstracted from concrete, particular sets of objects; numbers are abstract cardinalities which constitute a basis for mathematical thinking such as "two plus three".

Opposed to such an intersective analysis of numbers is the so-called "itemizing" approach (in the terminology of Wiese (2003)). Different from Frege's analysis, this approach does not regard numbers as abstract cardinalities which conceptually stand on their own. Rather, it defines numbers strictly in terms of particular sets of objects. Under this view, a number in isolation does not denote anything; instead, it is by nature a syncategorematic element and is necessarily associated with enumeration of members of a set. In particular, this approach considers numbers as merely symbols or abbreviations of a set of entities which are conceptually eliminable and able to be replaced by other expressions. As put by Russell: "all numbers are what I call logical fictions… you do not have, as part of the ultimate constituents of your world, these queer entities that you are inclined to call numbers." (1986: 234) Along this approach, a quantified set denoted by *three apples*, for example, instead of being represented as an intersection between sets of three things and sets of apples, is interpreted by enumerating apples contained in a set in a one-by-one manner like "an apple, and another apple, and another apple". Accordingly, given a sentence like *There are three apples*, the interpretation should be "There is an apple *x*, and another apple *y*, and another apple *x*", with the cardinality of the whole set being captured via itemizing as many as three non-identical apples of the set, as shown below.

(3) An itemizing approach to *three apples*:



Nevertheless, it seems that neither of the two philosophical views could tell the whole story of how humans conceptualize numbers when using numbers for the purpose of quantification. To be specific, as for the intersective approach, which regards the denotation of a number as a priori, abstract property conceptually standing on its own while not depending on any particular, empirical objects, the counterevidence comes from the experiments which are concerned with children's acquisition of concepts of numbers. Notice that if ontologically a number is indeed an abstract property as has been claimed by Frege, it would be expected that when a child has mastered the knowledge of numbers, s/he should be able to understand the meaning of a numeral even when the numeral is used without being associated with any particular objects. This expectation, however, has been proven false by the observation that at an early stage children can only understand a numeral when it is used to count empirical entities. Consider the following interviews conducted by Hughes (1986) with pre-school children.

(4) (*Ram is at the age of 4 years 7 months*)

MH: What is three and one more? How many is three and one more?

Ram: Three and what? One what? Letter? I mean number? [We had earlier been playing a game with magnetic numerals and Ram is presumably referring to them here.]

MH: How many is three and one more?

Ram: One more what?

MH: Just one more, you know?

Ram: (Disgruntled) I *don't* know.

(Hughes 1986: 45)

(5) (*Patrick is at the age of 4 years 1 month*)

MH: How many is two and one more?

Patrick: Four.

MH: Well, how many is two *lollipops* and one more?

Patrick: Three.

MH: How many is two *elephants* and one more?

Patrick: Three.

MH: How many is two *giraffes* and one more?

Patrick: Three.

MH: So how many is *two* and one more?

Patrick: Six.

(Hughes 1986: 47-48)

In (4), Ram's response shows that he is unable to comprehend the context-free usage of the numeral "one". Rather, his inquiries like "One what?", "One more what?" indicate that his understanding of numerals is essentially based on the correlation between numerals on the one hand and concrete entities on the other. In (5), numerals are used in two different ways: they are either associated with specific objects (in the case of "two lollipops/elephants/giraffes") or referring to cardinalities abstracted away from particular objects (in the case of "How many is two and one more?"). Similar to Ram's situation, the answers provided by Patrick show that while he is capable of mastering the use of numerals that are associated with empirical entities, he encounters great difficulties in understanding numerals as an abstract property (in the sense of Frege). In fact, according to Hughes's study, children's full competence in understanding and using numerals in an abstract way (i.e. the mathematical thinking) has to undergo a developmental progress even when they have started school. Such empirical evidence strongly suggests that it be inappropriate to

simply define numerals as an abstract property whose identification is totally context-free.

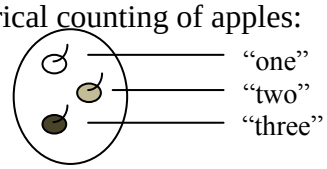
As for the itemizing approach to numbers, note that its applicability would considerably decrease when the quantified set of entities under consideration is large. To illustrate, while an itemizing operation may effectively help one distinguish a set of three apples ("an apple *x,* and another apple *y*, and another apple *z*") from a set of two apples ("an apple *x* and another apple *y*"), in which case the difference in quantity between the two sets lies in only one apple, it is difficult for one to precisely capture the difference in quantity between *529 apples* and *326 appl*es via enumerating individual apples (imagine how long the enumeration would be for *529 apples* and *326 apples* in a form like "one apple, and another apple, and another apple, …"). This strongly suggests that numbers are still of semantic significance for representing entity quantification and should not be subsumed into itemization or identification of entities.

2.1.1.2 Cognitive system of numbers: Wiese's (2003) analysis

To get around the problems raised by previous philosophical analyses, Wiese (2003) proposes a dynamic, evolutional, and synthesized account for the number concept. From her point of view, the itemizing approach and the intersective approach should be associated with two different areas in humans' cognitive number domain, with the former related to the mechanism of enumerating objects, which constitutes a preliminary empirical underpinning for humans to develop a sense of numbers, and the latter to the comprehension of an abstract number concept, where the identification of an number *n* does not rely on particular tokens of entities and numbers can be used as a basis for arithmetical thinking. This section will briefly introduce the evolutional route put forth by Wiese.

Under Wiese's analysis, for a child to acquire the ability of correctly identifying the quantity of a set by means of assigning a number to the set, the activity of one-by-one counting plays a crucial role. A counting procedure takes its ground in the identification of non-identical objects. That is to say, for counting a set of entities, a child first has to itemize individual members contained in this set in a manner claimed by the itemizing approach. As for how to eventually determine how many objects there are, Wiese proposes a mechanism as the following. First, the number sequence like "one, two, three, four, …", which forms a stable, ordered progression, will be employed to tag individual entities in a one-to-one manner; then the quantity of entities will be represented by the last tag used in the count (see also Gelman 1978, 1990; Gelman & Gallistel 1978; Gallistel & Gelman 1990; Starkey *et al.* 1991; Gelman & Meck 1992; Gelman & Brenneman 1994). For instance, in counting a set composed by three apples based on the identification of individual apples like "an apple *x*, and another apple *y*, and another apple *z*" (*x*, *y*, *z* are non-identical), a child first needs to establish a one-to-one mapping between the counting words "one", "two", and "three" (in accordance with the strict number sequence) on the one hand and the apples *x*, *y*, and *z* on the other, as depicted below. As the final number used to tag apples is "three", such a quantified set of apples will be finally identified as "three apples".

(6) Numerical counting of apples:



As for a rather abstract understanding of numbers, namely the concept of numbers in the sense of Frege, Wiese claims that it is generalized and abstracted from the numerical quantity of particular entities at a later stage

of children's cognitive number systems. Following Frege's core spirit, Wiese regards a number that stands alone without being linking up with any particular entities as denoting a proper name which refers to a cardinality. At the stage where an abstract concept of numbers has been acquired, a child is able to use a "bare" numeral for mathematical thinking without resorting to any particular objects. According to this, the above mentioned Hughes's (1986) findings turns out to be unsurprising, as this exactly reflects that pre-school children's understanding of numerical quantity is still at a stage before the abstract concept of numbers has been mastered.

Summarizing, Wiese's account synthesizes both an itemizing approach and an intersective approach and provides an evolutional scenario of humans' understanding of numerical quantification. Under her analysis, itemizing entities lays the ground for a one-to-one correlation between a number progression like "one", "two", "three", "four" and non-overlapped entities. Such a one-to-one correlation requires that there are as many numbers being adopted as entities under counting. The ability of employing the last "tagging" number to identify the quantity of a set of entities indicates that children genuinely establish a dependent linking between numbers and quantities of entities (cf. Wiese 2003: 167). The understanding of an "abstract" concept of numbers is developed at a later stage when children have been capable of identifying the quantitative meaning of a number *n* without counting particular entities.

2.1.2 The basic function of Chinese classifiers in numerical quantification

In light of Wiese's study on numbers, it is claimed in the present study that entity quantification based on the use of numerals should

necessarily take its ground in the existence of individualized, non-overlapped items (in order to meet the cognitive prerequisite for number counting, i.e. the one-to-one correlation between a progression of well distinguished numbers on the one hand and counting targets on the other). Based on this, this section will proceed to investigate the basic semantic function of Chinese classifiers.

A long discovered fact concerning the Chinese numerical quantification construction is that, even if a noun denotation is associated with objects which naturally present themselves as individual entities in the real world, at the syntactic level, the presence of a proper (individual) classifier is obligatory for numerically quantifying this noun, as exemplified below (cf. also Tang 1990; N. Zhang 2009; among many others).

(7) a. liang *(ge) ren
two Cl person
'two people'

b. wu *(ben) shu
five Cl book
'five books'

c. shi *(ba) dao
ten Cl knife
'ten knives'

Such a syntactic requirement on linguistically representing numerical quantification is in fact not specific to Chinese. A cross-linguistic generalization has been made that a language may employ either classifiers or plural inflections to syntactically instantiate a semantic division when expressing numerical quantification. A typology has been

proposed between the typical classifier language on the one hand, which involves a classifier system (e.g. Chinese), and the typical non-classifier language on the other, which adopts plural inflections (e.g. English).[2] (cf. Doetjes 1996, 1997; Chierchia 1998a, 1998b; Borer 2005) In view of this, Borer (2005) proposed that all nouns in all languages are inherently mass and cannot grammatically enter into a number counting system until a division function – instantiated by either classifiers or plural inflections – has applied to convert mass noun denotations into countable elements.[3]

The present study will follow the spirit of Krifka (1995), Chierchia (1998a, 1998b), and Borer (2005) in assuming that bare nouns in

[2] In cases where a language happens to have both classifiers and plural morphologies, such as Armenian, it has been observed that they can never co-occur, where the advocated complementary distribution between classifiers and plural inflections still holds (cf. T'sou 1976; Borer 2005). See the relevant data in Armenian below (from Borer (2005): 94, (6b-d)):

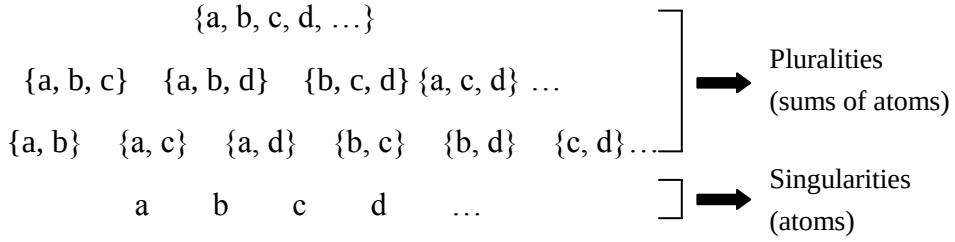
(i) a. Classifier, no plural morphology:
yergu had hovanoc uni-m
two Cl umbrella have-1SG
'I have two umbrellas.'
b. No classifier, plural morphology:
yergu hovanoc-ner unim
two umbrella-PL have-1SG
'I have two umbrellas.'
c. Classifier, plural morphology:
*yergu had hovanoc-ner unim
two Cl umbrella-PL have-1SG
'I have two umbrellas.'

[3] However, such an all-nouns-as-mass view and an either-classifier-or-plural-inflection typology are greatly challenged by data in Dëne Sųłiné (a Northern Athapaskan language), in which it is fine for some bare nouns to combine with numerals without employing either classifiers or plural morphologies, as shown below. See Wilhelm (2008) for a detailed discussion.

(i) a. sǫlághe k'ásba
five chicken
'five chickens'
b. sǫl ágheˊ ɬɪ̨
five dog
'five dogs' (from Wilhelm 2008: (1))

Mandarin Chinese are singular-/plural-neutralized by nature and come out of the lexicon without specifying a proper semantic partition that licenses numerical counting (also Yang 2001; X.-P. Li 2011). Specifically, with respect to the very semantic property of a Chinese bare noun, it is assumed that it denotes a kind, with its extension being a totality of singularities and pluralities that satisfy the descriptive content of the noun. The domain provided by a bare noun exhibits a "part-of" structure, as visualized below (cf. Chierchia 1998a, 1998b).

(8)



To be more specific, it is assumed in the present study that the bottom line of the entity domain denoted by a bare noun represents minimal tokens (i.e. "atoms") that are conceptually available in a given context. By doing so, such a "part-of"-shaped domain is applicable to not only the entity type whose (natural) minimal tokens can always be well identified in the empirical world, such as e.g. *ren* 'person' or *dao* 'knife', but also to the entity type whose minimal tokens are generally vaguely determined, such as *shui* 'water' or *tang* 'soup'. Taking *shui* 'water' for example, according to the present analysis, in the context where its minimal tokens are glasses of water, each singularity appearing at the bottom of the domain provided by *shui* would represent a glass of water; while if the context determines the minimal tokens of *shui* at a molecular level, then each singularity at the bottom would represent a H_2O molecule.

Given that "the property of being an instance of a kind does not differentiate between singular and plural instances" (Chierchia 1998b:

351), assuming Chinese bare nouns as denoting kinds brings about a corollary that in terms of the number feature, Chinese bare nouns should be semantically singular-/plural-neutral (cf. Chierchia 1998a, 1998b). This point does receive robust empirical support. First, consider cases where Chinese bare nouns serve as descriptive post-copular predicates.[4] According to Chierchia, for an inherently kind-denoting bare noun (of the semantic type <e>) to serve as a predicative, property-denoting element (of the semantic type <e, t>), an interpretational mechanism called "predictivizing" function has to apply. To be concrete, given a bare noun denoting the kind *K*, its predictivized counterpart would denote a property of being an instance of the kind *K*. Observe that Chinese bare nouns, when serving as descriptive predicates, could be predicated of either a semantically singular or plural subject, as shown below. This corroborates the claim that Chinese bare nouns inherently denote kinds, i.e. sums of both singularities and pluralities.

[4] A descriptive post-copular nominal is different from an equative post-copular nominal in that while the former is non-referneital and property-denoting, the latter is referential and individual-denoting. This can be tested out by the fact that only an equative post-copular nominal but not a descriptive one can switch its position with the subject without changing the truth value of the proposition, as illustrated below:

(i) *Descriptive post-copular nominal:*

a. Lisi shi xuesheng
Lisi be student
'Lisi is a student.'

b. * xuesheng shi Lisi
student be Lisi

(ii) *Equative post-copular nominal:*

a. Lisi shi na ge zui gao de nansheng
Lisi be that Cl most tall DE boy
'Lisi is that tallest boy.'

b. na ge zui gao de nansheng shi Lisi
that Cl most tall DE boy be Lisi
'That tallest boy is Lisi.'

(9) a. ta shi xuesheng

s/he be student

'S/he is a student.'

b. tamen shi xuesheng

they be student

'They are all students.'

Another supporting argument comes from the interpretation of argumental bare nouns. It has been long observed that argumental bare nouns in Mandarin Chinese may exhibit definite, indefinite, or generic readings, depending on the specific context they occur (cf. Chen 1987; Cheng & Sybesma 1999; among others). Relevant to the discussion here is the fact that irrespective of their referential nature, argumental bare nouns are able to accommodate either a singular or a plural interpretation. As exemplified below, without any number-specifying element, the bare noun *pingguo* 'apple' may refer to either a singular apple or plural apples, totally depending on the speaker's intension. This further corroborates the claim that in terms of lexical semantics, Chinese bare nouns, born as kind-denoting, neutralize the singularity vs. plurality distinction.

(10) a. pingguo huai le

apple rotten Asp

'The apple was rotten./The apples were rotten.'

b. Lisi chi le pingguo

Lisi eat Asp apple

'Lisi ate an apple./Lisi ate apples.'

Now consider how the treatment of Chinese bare nouns as kind-denoting in conjunction with the above discussion on numbers allows

us to provide a straightforward explanation for why Chinese bare nouns cannot directly combine with numerals. Given that a bare noun intrinsically specifies no criterion for determining well itemized entities but rather is associated with a part-of entity domain as illustrated in (8), this determines that an overlapping between members of a bare noun's denotation is always unavoidable. Recalling that numerical quantification is necessarily based on a one-to-one correlation between counting words (represented by numerals such as "one", "two", "three", etc.) and counting targets (i.e. itemized entities) (cf. Wiese 2003), it is suggested in the present study that the impossibility of directly quantifying bare nouns with numerals in Chinese should be explained in terms of a failure of the one-to-one mapping requirement on numerical quantification. To illustrate, suppose a case where a "part-of"-shaped entity domain containing three members, viz. *a*, *b*, and {*a*, *b*}, is intended to correlate with the counting word "one", "two", and "three", respectively. One may quickly notice that this would lead to a scenario in which *a* and *b* are each tagged by two counting words, with one tagging the sole *a* or *b* and the other tagging the sum containing both *a* and *b*. Evidently, this is a violation to the one-to-one mapping condition in the sense of Wiese.

(11)

Counting target:	x	y	{x, y}
Counting words:	"one"	"two"	"three"

Based on this, in dealing with the basic grammatical function performed by Chinese classifiers in entity quantification, the present study assumes that classifiers essentially serve as partition units which are responsible for introducing a semantic level at which numerical counting can be legitimately licensed (cf. also Iljic 1994; Chierchia 1998a, 1998b; Doetjes 1996, 1997; Cheng & Sybesma 1999; Sybesma 2007, 2008).

Especially crucial to the present proposal is the treatment that classifiers, irrespective of their subcategorization, uniformly represent a partitioning criterion according to which itemized elements of certain kind can be created for linguistically expressing numerical quantification (against an analysis that only individual classifiers are grammatical markers of countability, as claimed by e.g. Borer (2005)). To illustrate, in *liang ge pingguo* (two Cl apple), the individual classifier *ge* indicates that the domain denoted by 'apple' (henceforth represented as the capitalized "APPLE") is numerically quantified based on the semantic partition corresponding to the built-in, natural division of apples in the empirical world; in *liang xiang pingguo* (two box-Cl apple), the numerical quantification over APPLE is determined at the level where APPLE is itemized into countable aggregates by 'box'; in *liang dui pingguo* (two pile-Cl apple), APPLE is allowed to interact with the number system as it is properly partitioned into itemized piles by *dui*; in *liang zhong pingguo* (two kind-Cl apple), the numeral counting can legitimately apply as APPLE has been endowed with countability in terms of a category-/taxonomy-concerned partition introduced by *zhong* 'kind'; in *liang jin pingguo* (two catty-Cl apple), APPLE is numerically quantified via being measured against *jin*, a conventionalized, standard unit which is invented for the purpose of numerical measurement. To generalize, a licensing condition on numerical quantification can be proposed as the following:

(12) *Syntactic Licensing Condition on Representing Numerical Entity Quantification*

In Mandarin Chinese, the syntactic representation of numerical quantification over an entity domain is licensed by the use of a classifier.

To sum up, with the attempt of fully capturing the commonality shared by different subtypes of classifiers in terms of licensing numerical quantification over an entity domain, a unified semantic analysis was proposed for the Chinese classifier system. Under the assumption that Chinese bare nouns are kind-denoting, singular-/plural-neutral by nature, it was claimed that in numerical entity quantification, classifiers serve as partition units which help to establish a level at which non-overlapped items eligible for numerical counting can be determined. Based on this, a syntactic licensing condition was proposed that the existence of a classifier is a prerequisite for grammatically forming a numerical quantification construction in Mandarin Chinese.

2.2 The nature of partition units

2.2.1 Syntactically relevant dichotomies: Previous studies

This section will revisit the issue concerning the syntax-relevant dichotomy of Chinese classifiers.

It has been long claimed that the dichotomies such as *classifiers proper* vs. *measure words* / *count-classifiers* vs. *massifiers* / *sortal classifiers* vs. *mensural classifiers* are syntactically distinguishable (e.g. Tai 1994; Cheng & Sybesma 1998; Borer 2005). The evidence most frequently mentioned in the literature includes the following. First, it was claimed that an optional linking morpheme *de* is only allowed between the measure word/massifier/mensural classifier and the head noun but not between the classifier proper/count-classifier/sortal classifier and the head noun, as illustrated by the contrast below:

(13) a. san jin/xiang (de) pingguo

three catty-Cl/box-Cl DE apple

'three catties/boxes of apples'

b. san ge (*de) ren

three Cl DE person

'three persons'

Second, it was advocated that adjectives may precede measure words/massifiers/mensural classifiers but not classifiers proper/count-classifiers/sortal classifiers, as shown below[5]:

(14) a. yi da-xiang shu

one big-box$_{Cl}$ book

'a big box of books'

b. *yi da-wei laoshi

one big-Cl teacher

Upon a closer examination, nevertheless, it turns out that neither of the two tests is reliable. As for the *de*-test, counterexamples are easy to be found in which [Num-Classifier proper/Count-classifier/Sortal classifier-N] licenses an intervening *de* [6] (as in (15)) whereas [Num-Measure

[5] The present study assumes a word-level status of the "A+Cl" combination (also Tang 1990). See Chapter 4 for a detailed discussion.

[6] Another observation made by Hsieh (2008), X.-P. Li (2007), X.-P. Li & Rothstein (2010), and X.-P. Li (2011) is that *de* may also be licensed to occur in [Num-Individual Cl-N] if an "aboutness", "approximateness" context is involved or the numeral is a high round number, as illustrated below:

(i) a. Lisi peng zhe shi duo ben (^{OK}de) shu

Lisi carry Asp ten more Cl DE book

'Lisi is carrying 10 something books.'

b. women you babai tou (^{OK}de) niu

we have 800 Cl DE cow

'We have eight hundred cows.'

words/Massifiers/Mensural classifiers-N] does not (as in (16)) (also see Tang 2005; Hsieh 2008; N. Zhang 2009; X.-P. Li 2011):

(15) Lisi chi-diao le 1/3 ge (^{OK}de) xigua
Lisi eat-up Asp Cl DE watermelon
'Lisi ate up 1/3 watermelon.'

(16) a. Lisi da-sui le liang ping (*de) jiu
Lisi break-broken Asp two bottle-Cl DE wine
'Lisi broke two bottles of wine.'

b. Lisi song-gei Mali yi shu (*de) hua
Lisi give-to Mali one bunch-Cl DE flower
'Lisi gave Mary a bunch of flowers.'

As for the (non-)licensing of pre-classifier adjectives, it is observed that count-classifiers/sortal classifiers in fact also allow for preceding adjectives, as illustrated below (e.g. Tang 2005; N. Zhang 2009; X.-P. Li 2011):

(17) a. yi xiao-mei yingbi
one small-Cl coin
'a small coin'

b. yi chang-tiao daiyu
one long-Cl hairtail
'a long hairtail'

c. san da-zhi gouxiong (from N. Zhang 2009: (38b))
three big-Cl bear
'three big bears'

This chapter will put aside these rather special cases for the moment. These examples will be returned to in Chapter 4.

A most recently proposed dichotomy is the *[+Counting] classifier* vs. *[+Measure] classifier* distinction put forth by X.-P. Li (2011). X.-P. Li proposes two features, i.e. counting and measure, to capture the semantic function of classifiers. The basic idea is that, on the counting interpretation, classifiers realize an operation $COUNT_k$ in the sense of Rothstein (2010), namely mapping kinds denoted by nouns (assuming Chinese nouns as kind-denoting) onto sets of atomic instantiations, with each instantiation counting as one in the context k. While on the measure interpretation, classifiers are associated with a measure function, mapping from kinds denoted by nouns onto sets of instantiations with a certain quantity. Based on the [±Counting] and [±Measure] feature ([±C]/[±M] henceforth), X.-P. Li classifies Chinese classifiers into four types as below:

(18) I. [+C, -M] classifiers, which are by default counting classifiers: individual classifiers;

II. [-C, +M] classifiers, which are by default measure classifiers: measure classifiers, temporary classifiers;

III. [+C, +M] classifiers, for which counting and measure readings are equally available: container classifiers, group classifiers, partitive classifiers;

IV. [-C, -M] classifiers, which are irrelevant to counting or measure: kind classifiers.

The author provides four tests to argue that such a semantic distinction is justifiable at the syntactic level. Firstly, it is indicated that the [Cl-N] construction only permit [+C] classifiers but not [+M] classifiers, supported by the contrast below:

(19) a. *[+C] classifier*

wo mai le ping jiu

I buy Asp bottle-Cl wine

'I bought a bottle of wine.'

b. *[+M] classifier*

*ta de jiuliang shi ping hongjiu

he DE drinking-capacity be bottle-Cl red-wine

Intended: 'His drinking capacity is a bottle of red wine.'

Secondly, it is claimed that *duo* 'more' can only occur between a [+M] classifier and a noun, but not between a [+C] classifiers and a noun, as shown below:

(20) a. *[+C] classifier*

*shi ge duo pingguo

ten Cl more apple

'more than three apples'

b. *[+M] classifier*

shi gongjin duo pingguo

ten kilo-Cl more apple

'more than ten kilos of apples'

Thirdly, it is advocated that the post-classifier *de* is compatible with only [+M] classifiers but not [+C] classifiers, with evidence as below:

(21) a. *[+C] classifier*

*you san ge de pingguo cong louti shang gun xialai

have three Cl DE apple from stair on roll down

'Three apples rolled down from the stairway.'

b. *[+M] classifier*

wo mai le san gongjin de pingguo

I buy Asp three kilo-Cl DE apple

'I bought three kilos of apples.'

Fourthly, it is claimed that [+C] classifiers can be reduplicated while [+M] classifiers cannot, as supported by the examples below:

(22) a. *[+C] classifier*

wo mai le liang ping jiu, ping-ping dou hen gui

I buy Asp two bottle-Cl wine bottle$_{Cl}$-bottle$_{Cl}$ DOU very expensive

'I bought two bottles of wine, each of which is expensive.'

b. *[+M] classifier*

zhe ge tong zhuang le san ping jiu,

this Cl bucket contain Asp three bottle-Cl wine

*ping-ping dou hen gui

bottle$_{Cl}$-bottle$_{Cl}$ DOU very expensive

'This bucket contains three bottles of wine, each of which is expensive.' (*ping* intended under a [+M] reading)

However, a careful reexamination reveals that the above diagnostics are not reliable in testifying the syntactic relevance of the [+C] vs. [+M] dichotomy. As for the [Cl-N] test, the claim to be made here is that the ungrammatical [Cl-N] expressions discussed by X.-P. Li should in fact be attributed to independent reasons other than the [+C] vs. [+M] distinction. To be specific, on the one hand, some ungrammatical [Cl-N] examples as those in (23) should be best explained in that they are intended as quantity-denoting, non-referential expressions. Note that to grammatically designate a quantity in Mandarin Chinese, generally both the numeral and

the classifier have to occur, which holds not only for [+M] classifiers but also for [+C] classifiers. As demonstrated in (24), notwithstanding the use of a typical [+C] classifier and the impossibility of coercing a [+M] reading, [Cl-N] that is intended as purely quantity-denoting is always ruled out. This challenges the claim that the exclusion of [Cl-N] is due to the [+M] feature of the classifier.

(23) *[+M] classifier*

a. *ta de jiuliang shi ping hong-jiu
he DE drinking-capacity be bottle-Cl red-wine
Intended: 'His drinking capacity is a bottle of red wine.'
(from X.-P. Li 2011: Ch. 3, (22b))

b. *zhe ge jiaoshi zhi neng rongxia pai xuesheng
this Cl classroom only can contain row-Cl student
Intended: 'This classroom can only contain a row of student.'
(from X.-P. Li 2011: Ch. 4, (54b))

(24) *[+C] classifier*

a. tamen xi mei nian zhi zhao *(yi) ge xuesheng
they department every year only admit one Cl student
'Their department admits only one student every year.'

b. san ge baomu zhaogu *(yi) ge haizi kending gou
three Cl nanny take.care.of one Cl child undoubtedly sufficient
'(Generally,) three nannies are undoubtedly sufficient to take care of one child.'

While other ungrammatical examples provided by X.-P. Li involve an additional nominal element intervening between [Cl-N] and a verb, as shown in (25). This kind of examples, nevertheless, seem not fully valid in justifying [+M] classifiers, as in Mandarin Chinese a [V-N_1-Cl-N_2]

sequence containing a [+C] classifier may also be ruled out, as demonstrated in (26).[7] This further weakens X.-P. Li's argument on the licensing condition of [Cl-N]:

(25) *[+M] classifier*

* xie zhe pian wenzhang yong le wo di moshui.
write this Cl article use Asp I drop-Cl ink
'It took me one drop of ink to write this article.'

(from X.-P. Li 2011: Ch. 4, (55b))

(26) *[+C] classifier*

a. Lisi chai le Zhangsan jia *(yi) shan men

[7] It is nevertheless observed that some [V-N_1-Cl-N_2] expressions might be acceptable for Mandarin speakers:

(i) a. Lisi qiang le wo ben shu (D.-X. Shi, p.c.)
Lisi snatch Asp I Cl book
'Lisi snatched a book from me.'
b. wo yao baogao ni ge hao-xiaoxi (Chen 1987: (72))
I will inform you Cl good-news
'I will inform you of a piece of good news.'

Although the reason for such a contrast in acceptability of [V-N_1-Cl-N_2] is not clear, it seems to be promising to approach this issue in terms of the complexity of V and/or N_1. To be concrete, it seems to be the case that the more complex V or N_1 is, the less acceptable the [V-N_1-Cl-N_2] expression would be. Compare (ii) with (i):

(ii) a. * Lisi qiang-zou le wo ben shu
Lisi snatch-away Asp I Cl book
'Lisi snatched away a book from me.'
b. * wo yao baogao gebi bangongshi de tongshi ge hao-xiaoxi
I will inform next.door office DE colleague Cl good-news
'I will inform the colleagues in the office next door a piece of good news.'

Here (ii) is minimally different from (i) in that (iia) involves a V-V complex *qiang-zou* 'snatch-away' while (ia) a simplex verb *qiang* 'snatch', and that N_1 in (iib) is a complex nominal phrase 'the colleagues in the office next door' while N_2 in (ia) is a simple pronoun *wo* 'I'. As this issue is beyond the scope of the dissertation, I will leave it for a separate study.

Lisi remove Asp Zhangsan home one Cl door

'Lisi removed a door from Zhangsan's house.'

b. Lisi ji-gei le Zhangsan *(yi) ben shu

Lisi send-to Asp Zhangsan one Cl book

'Lisi sent a book to Zhangsan.'

Regarding the *duo*-test and the *de*-test, troubles arise when it comes to individual/group/partitive classifiers. Observe that these three types of classifiers cannot well participate in forming either [Num-Cl-*duo*-N] or [Num-Cl-*de*-N] (even if intended as conveying a [+M] reading in the sense of X.-P. Li), as shown by the ungrammatical expressions below.[8]

(27) a. *yi ge duo mangguo

one Cl more mango

b. *yi qun duo ren

one crowd-Cl more person

c. *yi duan duo mucai

one section-Cl more wood

(28) a. *yi ge de mangguo

one Cl DE mango

b. *yi qun de ren

one crowd-Cl DE person

c. *yi duan de mucai

one section-Cl DE wood

[8] Although X.-P. Li himself also notices that group classifiers and partitive classifiers (called "partition classifiers" by X.-P. Li) cannot take *duo* or *de*, he does not attempt the problem in detail in his thesis but simply claims that "the difficulty of using *de* and *duo* with group and partition classifiers is related to the complexity of their interpretation" (2011: 136).

Lastly, as for the test of classifier reduplication, all ungrammatical [Cl-Cl] examples discussed by X.-P. Li are intended as anaphoric expressions co-indexed with an antecedent [Num-Cl-N]. However, the antecedent [Num-Cl-N] involved are all used as quantity-denoting rather than entity-denoting expressions. As exemplified below, in (a), *san ping jiu* is intended to mean "an amount of wine that can fill three bottles" rather than referring to identifiable objects in the context (e.g. "three existing concrete bottles of wine" or "a specific portion of wine the speaker has in mind which has a quantity equivalent to the total volume of three bottles"); for a modal sentence like (b), [Num-Cl-N] acquires a pure quantity-denoting, non-referential reading (cf. Y.-H. Li 1998; Tsai 2001). In both examples, the [Cl-Cl] combination, which is intended as an anaphoric expression, cannot be licensed.

(29) a. zhe ge tong zhuang le san ping jiu;
this Cl bucket contain Asp three bottle-Cl wine
*ping-ping dou hen haohe.
bottle$_{Cl}$-bottle$_{Cl}$ DOU very delicious
Intended: 'This bucket contains three bottles of wine, each of which tastes good.'

(from X.-P. Li 2011: Ch. 4, (29b))

b. zhe ge jiaoshi zhi neng rongna liang zu xuesheng;
thisCl classroom only can contain two group-Cl student
*zu-zu dou shi shiwu ren.
group$_{Cl}$- group$_{Cl}$ DOU be 15 people
Intended: 'This classroom can only hold two groups of students, each of which has fifteen people.'

(from X.-P. Li 2011: Ch. 4, (57))

At this point, notice that even if the classifier involved is [+C], a [Cl-Cl] expression intended as being anaphorically associated with a non-referential [Num-Cl-N] would also be ruled out, as shown by the examples below:

(30) a. ni mingtian keyi dai san ben shu guolai,
you tomorrow can bring three Cl book come
* ben-ben dou yao gen kaoshi youguan
Cl-Cl DOU have.to with exam relevant
'Tomorrow you can bring along three books, *each of which has to be relevant to the exam.'

b. wo zhi yao liang ge xuesheng jiu gou le,
I only need two Cl student already enough SFP
* ge-ge dou shi boshisheng
Cl-Cl DOU be Ph.D. student
'Only two students would be enough for me, *each of whom is a Ph.D. student.'

In view of this, it seems to be fair to claim that the non-licensing of [Cl-Cl] here should be best treated as a result of the contradiction in terms of referentiality between the antecedent [Num-Cl-N] and the anaphoric [Cl-Cl] instead of the [+M] vs. [+C] feature of the classifier.

Pictures taken together, it is now clear that the syntactic behaviors exhibited by [+M] classifiers and [+C] classifiers in terms of e.g. licensing a following *duo* 'more' and participating in constituting [Num-Cl-*de*-N]/[Cl-N]/[Cl-Cl] are in fact highly alike and subject to similar conditions. This leads to the conclusion that X.-P. Li's [+M] vs. [+C] distinction, just like other previously mentioned classifier dichotomies, is also not syntactically justifiable.

2.2.2 An interval-unit vs. atomic-unit distinction

2.2.2.1 Preliminary

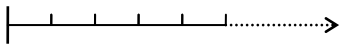
The subsequent subsections will explore what is the fundamental semantic factor responsible for the discrepancy between Chinese classifiers.

As a preliminary, the present analysis will represent "quantity" as a scale and treat classifiers as partition units creating scalar divisions. Given this, numerical entity quantification is viewed as being necessarily licensed by the one-to-one correlation between well individuated scalar divisions on the one hand and a number progression on the other, with each scalar division representing a counting token of the associated entity domain.

At this point, notice that ontologically there are two possibilities concerning the nature of partitioning introduced by a classifier: it may help to create (i) countable items that represent certain kind of non-minimal tokens (viz. sums/groups) of the associated entity type, or (ii) countable items that represent minimal tokens of the associated entity type (cf. also X.-P. Li 2011). Correspondingly, it is proposed in the present study that there is an *interval-unit* vs. *atomic-unit* dichotomy in terms of the denotational meaning of classifiers. The basic idea is that a classifier which helps to define non-minimal countable tokens denotes an interval unit which gives rise to scalar divisions in the form of *continuous intervals* (with each interval representing a non-minimal token), whereas a classifier which brings about minimal countable tokens denotes an atomic unit that creates scalar divisions in the form of *discrete atoms* (with each atom representing a minimal token). The concept of atomicity is used in the

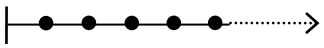
sense of Chierchia (1998b), featured by the impossibility of further division. See below for a depiction of each type of partition unit:

(31) A quantity scale partitioned by an interval unit "⌊⎯⌋":



0 1 2 3 4 5 …

(32) A quantity scale partitioned by an atomic unit "●":



0 1 2 3 4 5 …

In particular, as for cases involving the classifier denoting an interval unit ("INT-classifier" henceforth), along the line of Chierchia who puts that "every group of something is a quantity of that something and vice-versa", "quantity and group…seems to be nearly synonyms" (1998b: 73), it is assumed that there is a coextensive relation between the magnitude of a scalar interval on the one hand and the quantity of the corresponding non-atomic token on the other. That is to say, an integrated scalar interval is quantitatively associated with the summary amount of entities that constitute a non-atomic token, while a subinterval represents a sub-amount of the non-atomic token; each interval not only stands for a countable sum/group token of the associated noun denotation, but also monotonically represents the quantity of the token. In this respect, a classifier denoting an atomic unit ("ATOM-classifier" henceforth) distinctively differs from an INT-classifier in that it brings about minimal tokens with no divisibility; each atom on the quantity scale simply represents a singular cardinality while irrelevant to quantity specification of the associated token.

With in mind, in what follows I will look into the semantic function of Chinese classifiers by examining the partition type(s) available for each subtype of classifiers.

*2.2.2.2 Probe: Compatibility between [*yi *'one'-Cl-N] and* dou

It has been demonstrated above that the classifier dichotomies proposed in previous studies are based on untenable syntactic arguments. To test out the atomic- vs. interval-unit denotation of classifiers, the present analysis will not adopt these diagnostics but instead employ the (in)compatibility between [*yi* 'one'-Cl-N] and *dou* as a probe.

The classic semantic analysis on plurality vs. singularity defines a sum of entities (which consists of proper parts) as *plurality* while an atom (which has nothing to do with a proper part-whole structure) as *singularity* (cf. Bunt 1985; Landman 1998a, 1998b). According to this, a counting token brought about by an interval unit (which is a non-minimal entity) should be semantically plural whereas that corresponding to an atomic unit (which is a minimal entity) semantically singular. To see whether a classifier is used to denote an interval unit or an atomic unit, the present study will take the interpretation of ['one'-Cl-N] in terms of plurality/singularity as a probe. If ['one'-Cl-N] conveys a plural reading, it implies a "sum" nature of the counting token and indicates that the classifier involved is used as an interval unit; whereas if ['one'-Cl-N] expresses a singular reading, it manifests that the classifier contained is used to denote an atomic unit.

Specifically, the plural vs. singular meaning of ['one'-Cl-N] will be tested against *dou*. Albeit the very function served by *dou* is still debatable in the literature (cf. Lee *et al.* 2009), a consensus reached by linguists is that *dou* must be associated with a semantically plural nominal expression.

According to Lin (1998), this is because *dou* is "a generalized distributivity operator distributing over the members of a plurality cover" (1998: 203); if a nominal phrase denotes a singular individual, there would be no appropriate target for *dou* to distribute over, as illustrated by the contrast below.

(33) a. *wo ba yi ben shu dou song-gei le Lisi
I BA one Cl book DOU give-to Asp Lisi
Intended: 'I gave a book to Lisi.'

b. wo ba shi ben shu dou song-gei le Lisi
I BA ten Cl book DOU give-to Asp Lisi
'I gave ten books to Lisi.'

Notice that semantically [Num-Kind Cl-N] does not serve as a reflection of the greatness/smallness of the quantity of entities but is concerned with the diversity/scarcity of entity categories. Crucially different from ['one'-Cl-N] containing other types of classifiers, whether ['one'-Kind Cl-N] is semantically singular or plural is a context-based *fact* rather than a semantic/interpretational issue. For example, *yi zhong pingguo* (one kind-Cl apple) might be used to refer to as few as only one apple or as many as 100 apples; the actual quantity of the apple(s) depends on the number of the apple(s) available in the context that are identified as constituting a category yet is not encoded in the denotation of the kind classifier. Given this, in examining the denotation of classifiers in terms of the atomic- vs. interval-unit distinction, the present study will put aside kind classifiers for the moment and mainly focus on measure/individual/group/partitive classifiers.

2.2.2.3 Examination on four subtypes of classifiers

This section will examine the denotation of four subtypes of classifiers.

Let's start with measure classifiers. The picture seems to be clear: ['one'-Measure Cl-N] always well accommodates *dou*, indicating an interval-unit denotation of this type of classifiers.

(34) na yi jin pingguo dou hen xinxian
that one catty-Cl apple DOU very fresh
'That catty of apples are all very fresh.'

When it comes to container classifiers, a discrepancy emerges in terms of the licensing of the co-occurrence of *dou* and ['one'-Cl-N], which indicates that container classifiers might be used as either an interval unit or an atomic unit.

(35) a. na yi bei cha (*dou) shi Lisi dian de
that one cup-Cl tea DOU be Lisi order DE
'That cup of tea was ordered by Lisi.'

b. na yi bei cha dou bei Lisi he le
that one cup-Cl tea DOU BEI Lisi drink Asp
'That cup of tea was drunk (up) by Lisi.'

(36) a. Lisi buxiaoxin ba yi ping jiu (*dou) da-po le
Lisi carelessly BA one bottle-Cl wine DOU break-broken Asp
'Lisi carelessly broke a bottle of wine.'

b. Lisi ba yi ping jiu dou dao-diao le
Lisi BA one bottle-Cl wine DOU tip.away Asp
'Lisi tipped away a bottle of wine.'

Such a semantic distinction is not surprising if one takes into consideration the interaction between the referent of [‘one’-Container Cl-N] and the particular event in which [‘one’-Container Cl-N] is used. To be concrete, for (35a), since the action of ordering tea commonly takes as the minimal target a cup of tea *as a whole*, only an atomic-unit usage of the classifier *bei* would be felicitous. Similarly for (36a), as the action of breaking a bottle of wine can only target a bottle of wine as a whole, the classifier *ping* can only be interpreted as an atomic unit. In contrast, in the context involving the so-called consumption predicate such as *he* ‘drink’ in (35b), given that the referent of *yi bei cha* is an incremental theme whose extent is isomorphically tied to the progress of the drinking event (Verkuyl 1972, 1993; Dowty 1979, 1991; Tenny 1987, 1992, 1994; Jackendoff 1996), the classifier *bei* necessarily serves as an interval unit. For the context of “tipping a bottle of wine” as in (36b), given that every snapshot during a progress of wine-tipping is related to a subpart of wine contained in the bottle and thus *yi ping jiu* needs to obtain a divisive, plural reading, an interval-unit interpretation is required for the classifier *ping*.[9]

Now turn to individual classifiers. [‘One’-Individual Cl-N] may also be either semantically singular or plural, as verified by the following contrast in terms of accommodating *dou*. This indicates that individual classifiers can well embrace either an atomic-unit or an interval-unit denotation.

(37) a. na yi ben shu wo (*dou) mai le
that one Cl book I DOU buy Asp

[9] It is worth pointing out that the contexts exemplified here are all able to clearly distinguish an atomic-unit reading from an interval-unit one, while within the present analysis the possibility is left open that under some circumstances there might be no overwhelming preference for either of the two readings, where the atomic-unit and the interval-unit interpretation could be equally available and an ambiguity might arise.

'As for that book, I bought it.'

b. na yi ben shu wo dou du-wan le
that one Cl book I DOU read-finish Asp
'As for that book, I have finished reading it.'

(38) a. na yi zhi ji (*dou) shi Lisi zhuo de
that one Cl chicken DOU be Lisi catch DE
'That chicken was caught by Lisi.'

b. na yi zhi ji dou bei Lisi chi le
that one Cl chicken DOU BEI Lisi eat Asp
'That chicken was eaten up by Lisi.'

Similarly to cases involving container classifiers, whether an individual classifier is used as an atomic or interval unit is basically determined by the context. In (37a), given that commonly the minimal token of 'book' that could be involved in a buying event is an integrated volume rather than any of its subparts, only an atomic-unit usage of the classifier *ben* can be allowed. For (38a), as the action of catching necessarily takes an integrated chicken as the minimal available target, an atomic-unit reading of the classifier *zhi* is the only appropriate option. By contrast, for (37b), given that a book-reading event necessarily involves a part-by-part process, a "sum" understanding of *yi ben shu* is highly salient, and thus the classifier *ben* well serves as an interval unit. In (38b), the referent of *yi zhi ji*, as the object of the consumption predicate 'eat', needs to be understood as an aggregate of smaller pieces of chicken flesh. This requires the classifier *zhi* to be under an interval-unit usage.

Lastly, as for group/partitive classifiers. In much the same way like ['one'-Container/Individual Cl-N], ['one'-Group/Partitive Cl-N] may also be semantically singular or plural, as evidenced by the following contrast in terms of the licensing of *dou*. This indicates that group/partitive

classifiers are also compatible with either an interval-unit or an atomic-unit interpretation.

(39) *Group classifiers*

a. Lisi ba na yi kun cao (*dou) bang de hen jin
Lisi BA that one bunch-Cl grass DOU bind DE very tight
'Lisi bound that bunch of grass very tightly.'

b. na yi kun cao dou yong-lai wei niu le
that one bunch-Cl grass DOU use.to feed cow Asp
'That bunch of grass were used to feed cows.'

(40) *Partitive classifiers*

a. na yi jie ganzhe
that one section-Cl sugarcane
(*dou) bei na-lai dang gunzi yong le
DOU BEI take.to as stick use Asp
'That section of sugarcane was taken to be used as a stick.'

b. na yi jie ganzhe dou bei chi-wan le
that one section-Cl sugarcane DOU BEI eat-finish Asp
'That section of sugarcane was eaten up.'

For (a)-sentences, since this is a bunch of grass/a section of sugarcane as a whole that is bound tightly/used as a stick, both *yi kun cao* and *yi jie ganzhe* need to be interpreted as a minimal singleton. Concomitantly, the classifier *kun* and *jie* should be used as atomic units. For (b)-examples, in contrast, 'one bunch of grass' and 'one section of sugarcane' are incremental themes of 'feed'/'eat' and thus need to be interpreted as a non-minimal aggregate. Consequently, an interval-unit usage is required for *kun* 'bunch' and *jie* 'section'.

Summarizing, upon an examination on the singular/plural interpretation of [‘one’-Cl-N], it was shown that apart from measure classifiers which consistently exhibit an interval-unit denotation, individual/container/group/partitive classifiers can all be associated with either an interval-unit or an atomic-unit usage, bringing about either sum tokens or minimal tokens for numerical quantification.

2.2.3 Semantic verifications

This section will provide two more semantic tests to justify the interval- vs. atomic-unit distinction.

2.2.3.1 Test 1: Quantity judgment

The first test concerns quantity judgment of [Num-Cl-N].[10] In this test, two [Num-Cl-N] expressions will be first presented which contain identical classifiers and identical head nouns under the same context, guaranteeing that the classifiers involved denote the same type of partition unit. While the numerals are different, based on which a quantity comparison between two [Num-Cl-N] sequences will be conducted, conveyed by a judgment statement. Then, upon checking the truth value of the judgment statement, it will be examined how the denotation of classifiers may have a bearing on the semantics of [Num-Cl-N].

First of all, with respect to examples in which classifiers are used to denote atomic units, it is observed that the truth value of the judgment statement can always be determined as true. This indicates that in this case

[10] This test is inspired by Barner & Snedeker’s (2005) experiments on the semantics of the mass-count distinction.

quantity comparison between [Num-Cl-N] boils down to a comparison between numerals.

(41) *Container classifier*

Zhangsan dian le liang bei cha,

Zhangsan order Asp two cup-Cl tea

Lisi dian le yi bei cha.

Lisi order Asp one cup-Cl tea

'Zhangsan ordered two cups of tea; Lisi ordered one cup of tea.'

→ Judgment statement: True

Zhangsan dian de bi Lisi duo[11]

Zhangsan order DE than Lisi more

'Zhangsan ordered more than Lisi.'

(42) *Individual classifier*

Zhangsan mai le liang ben shu,

Zhangsan buy Asp two Cl book

Lisi mai le yi ben shu.

Lisi buy Asp one Cl book

'Zhangsan bought two books; Lisi bought one book.'

→ Judgment statement: True

Zhangsan mai de bi Lisi duo

Zhangsan buy DE than Lisi more

'Zhangsan bought more than Lisi.'

(43) *Group classifier*

Zhangsan bang-hao le liang kun cao

Zhangsan bind-well Asp two bunch-Cl grass

Lisi bang-hao le yi kun cao

[11] In all the comparative sentences presented here, *de* refers to the postverbal resultative marker 得 rather than the prenominal modifier marker 的.

Lisi bind-well Asp one bunch-Cl grass

'Zhangsan finished binding two bunches of straws; Lisi finished binding one bunch of straws.'

→ Judgment statement: True

Zhangsan bang de bi Lisi duo

Zhangsan bind DE than Lisi more

'Zhangsan bound more than Lisi.'

(44) *Partitive classifier*

Zhangsan na le liang jie ganzhe dang gunzi yong,

Zhangsan take Asp two section-Cl sugarcane as stick use

Lisi na le yi jie ganzhe dang gunzi yong.

Lisi take Asp one section-Cl sugarcane as stick use

'Zhangsan used two sections of sugarcane as sticks; Lisi used one section of sugarcane as a stick.'

→ Judgment statement: True

Zhangsan na de bi Lisi duo

Zhangsan take DE than Lisi more

'Zhangsan took more than Lisi.'

Now consider [Num-Cl-N] in which classifiers serve to denote interval units. Notice that except (45), the quantity comparison cannot be simply reduced to a comparison between numerals.

(45) *Measure classifier*

Zhangsan mai le liang jin rou,

Zhangsan buy Asp two catty-Cl meat

Lisi mai le yi jin rou.

Lisi buy Asp one catty-Cl meat

'Zhangsan bought two catties of meat; Lisi bought one catty of meat.'

→ Judgment statement: True

Zhangsan mai de bi Lisi duo

Zhangsan buy DE than Lisi more

'Zhangsan bought more than Lisi.'

(46) *Container classifier*

Zhangsan he le liang bei jiu,

Zhangsan drink Asp two cup-Cl wine

Lisi he le yi bei jiu.

Lisi drink Asp one cup-Cl wine

'Zhangsan drank two cups of wine; Lisi drank one cup of wine.'

→ Judgment statement: Truth value undefined

Zhangsan he de bi Lisi duo

Zhangsan drink DE than Lisi more

'Zhangsan drank more than Lisi.'

(47) *Individual classifier*

Zhangsan chi-diao le liang zhi ji,

Zhangsan eat-up Asp two Cl chicken

Lisi chi-diao le yi zhi ji

Lisi eat-up Asp one Cl chicken

'Zhangsan ate up two chickens; Lisi ate up one chicken.'

→ Judgment statement: Truth value undefined

Zhangsan chi de bi Lisi duo

Zhangsan eat DE than Lisi more

'Zhangsan ate more than Lisi.'

(48) *Group classifier*

na tou niu chi le liang kun cao,

that Cl cow eat Asp two bunch-Cl grass

zhe tou niu chi le yi kun cao.

this Cl cow eat Asp one bunch-Cl grass

'That cow ate two bunches of grass; this cow ate one bunch of grass.'

→ Judgment statement: Truth value undefined

na tou niu chi de bi zhe tou niu duo

that Cl cow eat DE than this Cl cow more

'That cow ate more than this cow.'

(49) *Partitive classifier*

Zhangsan chi-diao le liang jie ganzhe,

Zhangsan eat-up Asp two section-Cl sugarcane

Lisi chi-diao le yi jie ganzhe

Lisi eat-up Asp one section-Cl sugarcane

'Zhangsan ate up two sections of sugarcane; Lisi ate up one section of sugarcane.'

→ Judgment statement: Truth value undefined

Zhangsan chi de bi Lisi duo

Zhangsan eat DE than Lisi more

'Zhangsan ate more than Lisi.'

As for (46), though the cups of wine drank by Zhangsan outnumber that drank by Lisi, it is still possible that Zhangsan drank less than Lisi if the cup used by Lisi is large enough to hold a greater quantity of wine than the total amount consumed by Zhangsan. Likewise, in (47), albeit the number of the chickens eaten by Zhangsan is greater than that eaten by Lisi, it does not necessarily mean Zhangsan ate more because it is possible that the two chickens eaten by Zhangsan are pretty small while that eaten by Lisi is pretty big, as a result of which the total amount consumed by Zhangsan is less than Lisi. Similarly for (48) and (49), one cannot determine which cow ate more grass without obtaining relevant information concerning the particular size of each bunch of grass, nor can

one tell who ate more sugarcane unless the amount of sugarcane each section contains has been specified.

In view of this, it now seems to be fair to make the following generalization: while the quantity comparison between [Num-Cl-N] expressions which contain identical ATOM-classifiers and identical head nouns could be well determined by numerals alone, the quantity comparison between [Num-Cl-N] sequences involving INT-classifiers has to take into consideration both the cardinality denoted by numerals and the quantity specification encoded in classifiers. By "quantity specification encoded in classifiers", I mean the quantitative information isomorphically represented by the interval unit denoted by classifiers (cf. Section 2.2.2.1). In this respect a measure classifier is different from an INT-container/individual/group/partitive classifier in that the quantity specification encoded in the former has been rigidly set in the lexicon and does not vary with contexts. This is why one can well determine the truth value of the quantity judgment statement in (45) without resorting to (contextual) information other than numerals. The discrepancy in quantity judgment between [Num-Cl_{ATOM}-N] and [Num-Cl_{INT}-N] manifests that an interval unit, semantically different from an atomic one, not only stands as a counting unit but also makes nontrivial semantic contributions to the quantity meaning of the whole [Num-Cl-N].

2.2.3.2 Test 2: Transformation of number assignment

Another fact able to test out the interval- vs. atomic-unit distinction concerns the (non-)licensing of number transformation of [Num-Cl-N]. Given that an INT-classifier semantically encodes quantity specification, to express a *given* quantity, the choice of an INT-classifier would directly bear on the assignment of its co-occurring numeral. To be concrete, to

denote a specific quantity *Q*, if the interval unit involved represents a relatively large amount, the numeral assigned would be relatively small; while if the interval unit in question is associated with a relatively small amount, the numeral adopted would be relatively large. This is best demonstrated by cases involving measure classifiers. For example, to denote a specific weight of apples, *gongjin* 'kilo', which represents a larger measure value than *jin* 'catty', would be accompanied by a numeral smaller than that co-occurring with 'catty':

(50) wu gongjin pingguo ⇔ shi jin pingguo[12]
five kilo-Cl apple ten catty-Cl apple

Not only the measure classifier, [Num-Cl-N] containing an INT-container/individual/group/partitive classifier can also exhibit such kind of numeral transformation. As shown by the examples below, in the context where there are more than one INT-classifier available for numerical quantification, a [Num-Cl-N] expression can always be well transformed into another [Num-Cl-N] as long as the two denote the same quantity:

(51) tamen dao-diao le liang ping jiu / si sheng jiu
they tip-away Asp two bottle-Cl wine/ four liter-Cl wine
'They tipped away two bottles of wine/four liters of wine.'
(Context: the wine contained in each bottle is 2 liters,
i.e.: "two bottle-Cl water" ⇔ "four liter-Cl water".)

(52) Lisi du-wan le
Lisi read-finish Asp

[12] The two-direction arrow "⇔" indicates a transformational relation. The same hereinafter.

yi ben yingwenshu /300 ye yingwenshu

one Cl English-book / page-Cl English-book

'Lisi finished reading an English book/300 pages of English book.'

(Context: the book read by Lisi contains 300 pages in total,

i.e.: "one Cl book" ⇔ "300 page-Cl book".)

(53) na tou niu chi le liang kun cao / shi jin cao

that Cl cow eat Asp two bunch-Cl grass/ ten catty-Cl grass

'That cow ate two piles of grass/ten catties of grass.'

(Context: each pile of grass weighs five catties,

i.e., "two bunch-Cl grass" ⇔ "ten catty-Cl grass".)

(54) tamen xiu-hao le

they repair-well Asp

liang duan tiegui /si qianmi tiegui

two section-Cl railway / four kilometer-Cl railway

'They repaired two sections of railways/four kilometers of railways.'

(Context: each section of railway is two kilometers long,

i.e., "two section-Cl railway" ⇔ "four kilometer-Cl railway".)

By contrast, since the criterion for atomizing a noun denotation is always uniquely determined once the context has been set, number assignment involving ATOM-classifiers generally resists transformation, as illustrated below:

(55) tamen da-sui le liang ping jiu/ #si sheng jiu

they break-broken Asp two bottle-Cl wine/ four liter-Cl wine

'They broke two bottles/#four liters of wine.'

(Even though the wine contained in each bottle is 2 liters; contra (51))

(56) Lisi mai le

Lisi buy Asp

yi ben yingwenshu /# 300 ye yingwenshu

one Cl English-book / page-Cl English-book

'Lisi bought an English book/#300 pages of English book.'

(Even though the book bought by Lisi contains 300 pages; contra (52))

(57) Lisi ba liang kun cao /#shi jin cao

Lisi BA two bunch-Cl grass / ten catty-Cl grass

dou bang de hen jin

DOU bind DE very tight

'Lisi bound each of the two bunches of grass/#ten catties of grass very tightly.'

(Even though each bunch of grass weighs five catties; contra (53))

(58) Lisi na le liang jie ganzhe /#yi jin ganzhe

Lisi take Asp two section-Cl sugarcane/one catty-Cl sugarcane

dang gunzi yong

as stick use

'Lisi used two sections of sugarcane/#one catty of sugarcane as sticks.'

(Even though each section of sugarcane weighs 0.5 catties; contra (54))

The contrast between (51-54) on the one hand and (55-58) on the other in licensing transformation of numeral assignment further justifies the interval- vs. atomic-unit distinction with respect to the denotation of classifiers.

2.2.4 The standardized vs. non-standardized interval unit

2.2.4.1 (Non-)standardness of interval units as a syntacally relevant property

To extend the discussion in Section 2.2.1, this section will explore what is the syntactically justifiable semantic property in the Chinese classifier system. The standpoint to be argued here is that what truly matters at the syntactic level pertains to the (ir-)relevance of a standardized-interval-unit denotation of the classifier.

Let's start with the standardized vs. non-standardized distinction with respect to INT-classifiers. By "standardized interval unit", I mean the interval unit which encodes a standardized, fixed quantity specification. In this respect, a line can be clearly drawn between measure classifiers and other types of INT-classifiers. The measure classifier, born as a standard gauge for measuring entities along certain dimension, encodes a quantity specification which is by nature precisely, conventionally determined. For instance, the length represented by *mi* 'meter', the volume associated with *sheng* 'liter', and the weight corresponding to *gongjin* 'kilo' are all rigidly set measure values. By contrast, other INT-classifiers, such as INT-container/individual/group/partitive classifiers, are not lexically possessed with a standard, conventionalized quantity specification. Such a distinction can be best manifested by the distinction between the two groups of classifiers in terms of quantity judgment, as has been demonstrated in Section 2.2.3.1. Another phenomenon manifesting such a standardized vs. non-standardized distinction is, while [Num-Measure Cl] can be used to denote a quantity in its own right without requiring a particular entity domain (either overtly expressed or covertly presupposed), the [Num-Cl] expression containing other INT-classifiers necessarily

requires the existence of an entity domain. Compare (a)-examples with (b)-examples below:

(59) a. yi jin bu suan zhong
one catty-Cl not count.as heavy
'One catty does not count as heavy.'

b. yi xiang *(yingtao) bu suan zhong
one box-Cl cherry not count.as heavy
'One box *(of cherries) does not count as heavy.'

(60) a. shi dun shi yi ge hen da de liang
ten ton-Cl be one Cl very big DE amount
'Ten tons is a very big amount.'

b. shi tiao *(yu) shi yi ge hen da de liang
ten Cl fish be one Cl very big DE amount
'Ten *(fishes) is a very big amount.'

(61) a. yi limi hen duan
one centimeter-Cl very short
'One centimeter is very short.'

b. yi jie *(xiangyan) hen duan
one section-Cl cigarette very short
'One section *(of cigarette) is very short.'

(62) a. liang lifangmi de tiji bu da
two cubic meter-Cl DE volume not big
'The volume of two cubic meters is not big.'

b. liang kun *(daocao) de tiji bu da
two bunch-Cl straw DE volume not big
'The volume of two bunches *(of straws) is not big.'

As shown here, appearing in identical environments, [Num-Measure Cl] but not [Num-Container/Individual/Group/Partitive Cl] can stand on its own without requiring a following noun. Taking (59), while the property of "not counting as heavy" can be directly ascribed to *yi jin* 'one catty', a weight value neither linguistically nor contextually associated with particular entities, it cannot apply to a noun-less *yi xiang* 'one box-Cl'. Similarly in (61), "being very short" can be predicated of the length represented by *yi limi* 'one centimeter', which itself is not related to any particular objects, whereas it is inapplicable to *yi jie* 'one section-Cl' if there is no associated noun being presupposed.

It is worth further pointing out that among different subtypes of non-standardized INT-classifiers, INT-container classifiers differ from INT-individual/group/partitive classifiers in that they are always well *standardizable*. Generally, contextual standardization of an INT-container classifier takes place when the participant(s) of the conversation has/have already had an idea about the volume of the container in question. Under this usage, a standardized INT-container classifier is essentially akin to a measure classifier in that it encodes a (contextually) rigidly determined measure value (more precisely, in terms of volume). This can be verified by the fact that a [Num-Cl] sequence containing a standardized INT-container classifier, like [Num-Measure Cl], may independently express an "abstract" quantity without presupposing the existence of a particular measure target. As illustrated below, the noun-less [Num-Container Cl] expression is fine when it is uttered under the context where the speaker has known what the specific volume 'one box' represents (say, equivalent to one cubic meter).

(63) liang xiang de tiji qishi bu da
two box-Cl DE volume in.fact not big

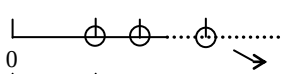
'The volume of two boxes is in fact not big.'

In contrast, it is far more difficult for an INT-individual/group/partitive classifier to be interpreted as a derived standardized unit, as evidenced by the fact that it is awkward to intend [Num-Individual/Group/Partitive Cl] as independently designating a quantity without presupposing an associated entity domain. For the INT-individual classifier, this is because its quantity specification always has to be determined by its semantic correlation with an entity domain. Compare *yi zhi niao* (one *zhi*-Cl bird)/*yi zhi laohu* (one *zhi*-Cl tiger) with *yi xiang shu* (one box-Cl book)/*yi xiang cidai* (one box-Cl tape), for example. While the quantity specification encoded in *xiang* 'box' can be well associated with a rigidly fixed volume for partitioning BOOK (the capitalized word is used to represent the entity domain denoted by the noun; the same hereafter) and TAPE into sums each of which has the same quantity (say, equivalent to 1 cubic meter), it is quite odd to comprehend *zhi* as a standard gauge which partitions BIRD and TIGER into sums each of which has the same quantity (which is in turn because according to our world knowledge the counting token of BIRD determined by *zhi* would normally be smaller than that of TIGER determined by *zhi*). That the quantity specification encoded in INT-individual classifiers always varies with the associated entity type makes it difficult for INT-individual classifiers to stand as a context-free, standardized measure gauge.

As for why the INT-group/partitive classifier cannot naturally obtain a standardized reading, it is suggested that the key reason should lie in that the interval unit associated with this type of classifier is born with no well-determined boundary, due to which its quantity specification is destined to be involved in vagueness and inherently incompatible with a standardized usage. Take *yi shu hua* (one bunch-Cl flower) and *yi duan lu*

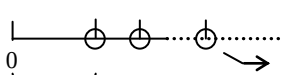
(one section-Cl road). Note that neither *shu* 'bunch' nor *duan* 'section' provides a well-defined criterion for determining what quantity counts as a "bunch" or a "section": *yi shu hua* could be used to denote any plural number of flowers bunched together, and *yi duan lu* may intend any length of road, as depicted in (64), respectively. In this respect, the interval unit denoted by a group/partitive classifier sharply contrasts with that denoted by a container classifier in that the latter is well-bounded by the maximum capacity of a certain kind of container, as illustrated in (65).

(64) a. yi shu hua 'one bunch of flowers'



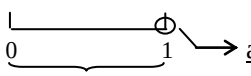
(unit for partitioning intervals: *shu* 'bunch')
0 no well-determined bound for "one bunch"
"one bunch" (*e.g. containing 5 flowers*)
"one bunch" (*e.g. containing 8 flowers*)
"one bunch" (*e.g. containing 20 flowers*)

b. yi duan lu 'one section of road'



(unit for partitioning intervals: *duan* 'section')
0 no well-determined bound for "one section"
"one section" (*e.g. of 5 meters*)
"one section" (*e.g. of 8 meters*)
"one section" (*e.g. of 20 meters*)

(65) yi xiang hua 'one box of flowers'



(unit for partitioning intervals: *xiang* 'box')
0 1 a well-determined bound for "one box"
one box (*e.g. containing flowers sufficient to fill a box to the full*)

Of crucial relevance to the discussion here is the observation that such a standardized vs. non-standardized distinction is distinguishable at the syntactic level, as manifested by the contrast below between measure classifiers/INT-container classifiers on the one hand and INT-individual/group/partitive classifiers on the other in terms of licensing

a [Num-Cl-N]/[Num-Cl-*de*-N] alternation.[13] Here the predicates like 'eat' and 'drink' (which necessitate an incremental understanding of the object ['one'-Cl-N]) are adopted to guarantee an interval-unit usage of the classifier (cf. Section 2.2.2.2).

(66) a. Lisi chi le liang jin (de) pingguo
Lisi eat Asp two catty-Cl DE apple
'Lisi ate up two catties of apples.'

b. Lisi he le liang bei (de) hongjiu
Lisi drink Asp two cup-Cl DE wine
'Lisi drank up two cups of wine.'

(67) a. Lisi chi le liang ge (*de) pingguo
Lisi eat Asp two Cl DE apple
'Lisi ate up two apples.'

b. niu chi le liang kun (*de) cao
cow eat Asp two bunch-Cl DE grass
'The cow ate up two bunches of straws.'

c. Lisi chi le liang jie (*de) ganzhe
Lisi eat Asp two section-Cl DE sugarcane
'Lisi ate up two sections of sugarcane.'

Particularly, for the [Num-Cl-*de*-N] alternative in (66b) to be felicitously accepted, *bei* 'cup' is necessarily interpreted as a standardized interval unit. This is corroborated by the fact that in cases involving a continuation which implies that the speaker cannot well-determine the quantity specification encoded by *bei*, the use of *de* would result in infelicity:

[13] This chapter will put aside the modificational construction in the form of [Num-Cl-*de*-N] for the moment. A comparison between the modificational vs. quantificational [Num-Cl-*de*-N] will be presented in Chapter 3, where the two constructions will be structurally distinguished.

(68) Lisi he le liang bei (#de) hongjiu,
Lisi drink Asp two cup-Cl DE wine
dan wo bu zhidao zongliang shi duoshao
but I not know total-amount be how.much
'Lisi drank two cups of wine, but I do not know what is the total amount.'

Further notice that generally ATOM-classifiers cannot constitute a quantificational [Num-Cl-*de*-N] expression[14]:

(69) a. Lisi dian le yi bei (*de) cha
Lisi order Asp one cup-Cl DE tea
'Lisi ordered a cup of tea.'
b. Lisi zhuo le liang zhi (*de) ji
Lisi catch Asp two Cl DE chicken
'Lisi caught two chickens.'
c. Lisi ba yi kun (*de) cao bang de hen jin
Lisi BA one bunch-Cl DE grass bind DE very tight
'Lisi bound a bunch of grass very tightly.'
d. Lisi ba liang jie (*de) ganzhe dang gunzi yong
Lisi BA two section-Cl DE sugarcane as stick use
'Lisi used two sections of sugarcanes as sticks.'

Upon taking together the pictures involving INT-classifiers on the one hand and those involving ATOM-classifiers on the other, the generalization to be made is that the (non-)licensing of a quantificational [Num-Cl-*de*-N] expression lies in the presence/lack of a

[14] Chapter 4 will discuss a rather special case that *de* might be permitted to occur in [Num-Individual Cl-N] in an "aboutness", "approximateness" context or when the numeral is a high round number (cf. Hsieh 2008; X.-P. Li & Rothstein 2010, 2012; X.-P. Li 2011).

standardized-interval-unit denotation of the classifier, as summed up below:

(70) *Denotation of Classifiers and (Non-)licensing of the Quantificational* [Num-Cl-*de*-N]

Semantic classification of Cls		**Quantificational [Num-Cl-*de*-N]**
INT-Cls	Standardized INT-Cls	✓
	Non-standardized INT-Cls	×
ATOM-Cls		×

2.2.4.2 Devices for coercing a standardized-interval-unit reading

This section will discuss the devices that can be employed to coerce a standardized-interval interpretation of INT-individual/group/partitive classifiers.

The first device concerns the use of fractions. The relevant observation is that substituting a fraction for an integer can save a bad [Num-Individual/Group/Partitive Cl-*de*-N] expression, as illustrated below (see also Her & Hsieh 2010; X.-P. Li & Rothstein 2010, 2012; X.-P. Li 2011):

(71) a. *Lisi du-wan le yi ben de shu
Lisi read-finish Asp one Cl DE book
'Lisi finished reading a book.'

b. Lisi du-wan le 1/3 ben de shu
Lisi read-finish Asp Cl DE book
'Lisi finished reading one third of a book.'

(72) a. *niu chi le yi kun de cao
cow eat Asp one bunch-Cl DE grass
'The cows ate a bunch of grass.'

b. niu chi le 1/3 kun de cao
cow eat Asp bunch-Cl DE grass
'The cows ate one third of a bunch of grass.'

(73) a. *gongren yijing pu-hao le yi duan de lu
worker already cover-well Asp one section-Cl DE road
'The workers have already covered a section of road.'

b. gongren yijing pu-hao le 3/4 duan de lu
worker already cover-well Asp section-Cl DE road
'The workers have already covered 3/4 of a section of road.'

To account for this fact, it is important to understand that a fraction is semantically concerned with a part-whole, proportional relation, a relation which cannot be determined without taking a specific quantity as a reference to define what counts as an integrated whole. Therefore, an individual/group/partitive classifier accompanied by a fraction is necessarily interpreted as being associated with a specific quantity specification and endowed with a standardized-interval interpretation. As a classifier denoting a standardized interval unit can always legitimately participate in forming a quantificational [Num-Cl-*de*-N], the grammaticality of [Num-Individual/Group/Partitive Cl-*de*-N] as shown in (b)-examples naturally follows.

Another device for coercing a standardized interval reading is the use of a pre-classifier adjectival modifier *zheng* 'whole', as corroborated by the contrast below in terms of licensing *de*[15]:

[15] See Chapter 4 for arguments on the word-level status of "*zheng*+Cl".

(74) a. Lisi du-wan le yi (*zheng-)ben de shu
Lisi read-finish Asp one whole-Cl DE book
'Lisi has finished reading a (whole) book.'

b. niu chi-wan le yi (*zheng-)kun de cao
cow eat-finish Asp one whole-bunch$_{Cl}$ DE grass
'The cow has finished eating a (whole) bunch of grass.'

c. gongren xiu-hao le yi (*zheng-)duan de lu
worker repair-well Asp one whole-section$_{Cl}$ DE road
'The worker repaired a (whole) section of road.'

To explore the very semantic contribution made by the pre-classifier *zheng*, I will take the adverb *chabuduo* 'almost' before [Num-Cl-N] as a probe. Note that modifying [Num-Cl-N] with *chabuduo* means that the intended quantity is quite near yet still less than the quantity represented by [Num-Cl-N]. This determines that the use of *chabuduo* is subject to two requirements: (i) the number expression following it denotes a specific quantity that can appropriately serve as a reference value for estimating the intended quantity; (ii) the number expression following it is not a (contextually) minimum value (as it is semantically impossible to intend a quantity that is even less than a minimum value; also cf. Q.-W. Zhang 2009). To illustrate, consider the examples below:

(75) a. *zuotian lai le chabuduo henduo yanyuan
yesterday come Asp almost many actor
'*Yesterday almost many actors came.'

b. *zuotian lai le chabuduo yi wei yanyuan
yesterday come Asp almost one Cl actor
'*Yesterday almost one actor came.'

c. zuotian lai le chabuduo 20 wei yanyuan
yesterday come Asp almost Cl actor
'Yesterday almost twenty actors came.'

In (a), 'many actors' represents an unspecific quantity, unsatisfying the requirement (i); in (b), 'one actor' denotes the minimum number of head counting, violating the requirement (ii). Therefore, both of them cannot be modified by *chabuduo* 'almost'. By contrast, in (c), since 'twenty actors' represents a specific, non-minimum quantity and both of the two requirements on the use of *chabuduo* are well respected, the modification by *chabuduo* is fine.

With this in mind, now consider [*chabuduo*-'one'-Cl-N]. As for the ['one'-Cl-N] expression involving a classifier denoting an interval unit, an expectation following the above requirement (i) and (ii) is that, modifying ['one'-Cl-N] by 'almost' would only be allowed when the classifier contained denotes a standardized interval unit, a case in which the classifier encodes a well-determined quantity specification and thus the corresponding ['one'-Cl-N] expresses a specific, non-minimum quantity. This is corroborated by the following contrast between cases involving measure classifiers/standardized INT-container classifiers on the one hand and those involving INT-individual/group/partitive classifiers on the other, echoing the standardized vs. non-standardized distinction discussed above:

(76) *Standardized interval unit*

a. Lisi chi le chabuduo yi jin mangguo
Lisi eat Asp almost one catty-Cl mango
'Lisi ate almost a catty of mangos.'

b. Lisi he le chabuduo yi ping hongjiu
Lisi drink Asp almost one bottle-Cl wine

'Lisi drank almost a bottle of wine.'

(77) *Non-standardized interval unit*

a. */??Lisi chi le chabuduo yi ge mangguo

Lisi eat Asp almost one Cl mango

'*/??Lisi ate almost a mango.'

b. *niu chi-diao le chabuduo yi dui cao

cow eat-up Asp almost one stack-Cl grass

'*The cow ate up almost a stack of grass.'

c. *gongren xiu-hao le chabuduo yi duan lu

worker repair-well Asp almost one section-Cl road

'*The worker repaired almost a section of road.'

Besides, the requirement (ii) on the use of *chabuduo* predicts that *chabuduo* would always exclude a following ['one'-Cl-N] containing an ATOM-classifier, as this type of ['one'-Cl-N] represents the minimum quantity of tokens of the associated entity domain. This is borne out by the examples below:

(78) a. *Lisi mai le chabuduo yi ben shu

Lisi buy Asp almost one Cl book

'*Lisi bought almost a book.'

b. *Lisi da-po le chabuduo yi ping hongjiu

Lisi break-broken Asp almost one bottle-Cl wine

'*Lisi broke almost a bottle of wine.'

c. *Lisi ba chabuduo yi kun cao bang de hen jin

Lisi BA almost one bunch-Cl grass bind DE very tight

'*Lisi bound almost a bunch of grass very tightly.'

d. *Lisi na le chabuduo yi jie ganzhe

Lisi take Asp almost one section-Cl sugarcane

dang gunzi yong

as stick use

'*Lisi used almost a section of sugarcane as a stick.'

Crucial to the present discussion is the phenomenon that all the bad [*chabuduo*-'one'-Cl-N] expressions in (77) can be saved when *zheng* occurs before the classifier:

(79) a. Lisi chi le chabuduo yi zheng-ge mangguo

Lisi eat Asp almost one whole-Cl mango

'Lisi ate almost a whole mango.'

b. niu chi-diao le chabuduo yi zheng-dui cao

cow eat-up Asp almost one whole-stack$_{Cl}$ grass

'The cow ate up almost a whole stack of grass.'

c. gongren xiu-hao le chabuduo yi zheng-duan lu

worker repair-well Asp almost one whole-section$_{Cl}$ road

'The worker repaired almost a whole section of road.'

To explain this, first notice that in terms of lexical semantics, *zheng* expresses a meaning that every component of an integrated object has been exhaustively included. This determines that the semantic requirements for properly using *zheng* include the following two basic aspects: (i) the existence of parts/components, based on which an integrated entity is constituted; (ii) a well-defined criterion for determining integrity. Take the examples below for illustration:

(80) a. *Lisi da-sui le yi zheng-ping hongjiu

Lisi break-broken Asp one whole-bottle$_{Cl}$ wine

'*Lisi broke a whole bottle of wine.'

b. Lisi he le yi zheng-ping hongjiu
Lisi drink Asp one whole-bottle$_{Cl}$ wine
'Lisi drank a whole bottle of wine'

In (a), the requirement (i) on the use of *zheng* is violated in that *ping* serves to denote an atomic unit and brings about minimal tokens available in a "breaking" event, where no part-whole relation is held. As expected, *ping* is not compatible with *zheng*. As for (b), on the one hand, the counting token brought about by *ping* is semantically divisible, fulfilling the requirement (i); on the other, the criterion for defining an integrated interval unit associated with *ping* is always well-determined (with the scalar interval being well-bounded by the upper limit that represents the capacity of a bottle), thereby satisfying the requirement (ii). Bearing out expectation, in (b) *chabuduo* can legitimately modify ['one'-*ping* -N].

The semantic requirements on the use of the pre-classifier *zheng* can be particularly well manifested by examples involving INT-group/partitive classifiers. Inherently denoting unbounded interval units and encoding an arbitrary quantity specification, this type of classifiers specify no well-defined criterion for determining what quantity of entities counts as an integrated group/part. As expected, generally they cannot accommodate *zheng*:

(81) a. *zuotian lai le yi zheng-qun ren
yesterday come Asp one whole-crowd$_{Cl}$ person
'*Yesterday a whole crowd of persons came.'
b. *Lisi zou le yi zheng-duan hen qiqu de lu
Lisi walk Asp one whole-section$_{Cl}$ very rugged DE road
'*Lisi walked on a whole section of very rugged road.'

Nevertheless, a group/partitive classifier can be well compatible with *zheng* when the corresponding [Num-Group/Partitive Cl-N] is intended to refer to a definite referent, as illustrated by the following examples:

(82) a. zuotian xuexiao lai le yi qun ren;
yesterday school come Asp one crowd-Cl person
yi zheng-qun ren li mei you yi ge zhongguoren
one whole-crowd$_{Cl}$ person in not have one Cl Chinese
'Yesterday a crowd of people came to the school; there is no Chinese among the whole crowd of people.'

b. Lisi zou le yi duan hen qiqu de lu;
Lisi walk Asp one section-Cl very rugged DE road
yi zheng-duan lu dou shi kengkengwawa de
one whole-section$_{Cl}$ road DOU be bumpy DE
'Lisi walked on a section of very rugged road; the whole section of road was bumpy.'

This fact can be accounted for in that once the referent of [Num-Group/Partitive Cl-N] has been contextually identified, the quantity specification of the classifier would be temporarily associated with a specific value. For example, *qun* in (a) could be understood as referring to a specific cardinality, say, 20; *duan* in (b) could be associated with a specific distance, say, 2 miles. By means of this, a specific contextual criterion could be obtained for determining what headcount counts as an integrated crowd of people (e.g., necessarily 20 in total) and what distance of road counts as an integrated section of road (e.g., necessarily of 2 miles), whereby the licensing conditions on the use of *zheng* can be respected.

In view of all this, the present study considers the occurrence of the pre-classifier *zheng* in [Num-Cl-N] as an indication that the quantity specification encoded in the classifier is interpreted a specific value. This is corroborated by the fact that, parallel to [Num-Cl-*de*-N], it is also

infelicitous for [Num-*zheng*Cl-N] to be followed by a continuation which expresses uncertainty about the quantity denoted by the whole numeral classifier phrase:

(83) a. Lisi du-wan le yi (#zheng-)ben shu,
Lisi read-finish Asp one whole-Cl book
dan wo bu zhidao neirong zonggong you duoshao
but I not know content in.total have how.much
'Lisi has finished reading a (#whole) book, but I do not know how much the content is in total.'

b. Lisi he-diao le yi (#zheng-)ping jiu,
Lisi drink.up Asp one whole-bottle$_{Cl}$ wine
dan wo bu zhidao ta zonggong he le duoshao
but I not know he in.total drink Asp how.much
'Lisi drank up a (#whole) bottle of wine, but I do not know how much he drank in total.'

Given this, the contrast in terms of (in-)felicity between [*chabuduo*-'one'-Individual/Group/Partitive Cl-N] on the one hand and [*chabuduo*-'one'-*zheng*Individual/Group/Partitive Cl-N] on the other (see (77) and (79)) straightforwardly follows: since the presence of *zheng* before a classifier coerces a standardized-interval-unit reading for the classifier, the quantity expressed by the numeral classifier construction is always a specific, non-minimum one and thus perfectly compatible with *chabuduo*.

2.2.4.3 Syntactic evidence for standardization devices

In this section syntactic evidence will be presented in favor of the analysis that fractions and the pre-classifier modifier *zheng* can serve as devices for coercing a standardized-interval-unit understanding for classifiers. The test adopted here concerns modification of classifiers by gradable adjectives.

Anticipating the discussion in Chapter 4, the present study treats the combination of a pre-classifier adjective and a classifier as an X^0 element and claims that at the semantic level a gradable pre-classifier adjective serves to provide an evaluation of the extent of the partition unit according to some contextual standard of comparison. Given this, a classifier associated with a stipulated extent that does not vary with contexts, namely one encoding a rigidly fixed quantity specification, is expected to be consistently incompatible with a gradable adjective. This is borne out by the ungrammatical expressions below involving measure classifiers:

(84) a. *yi da-jin rou
one big-catty$_{Cl}$ *meat*

b. *yi xiao-mi bu
one small-meter$_{Cl}$ *cloth*

That a classifier modified by a gradable adjective has to be one associated with a non-specific quantity specification determines that the numeral classifier construction containing a "gradable adjective+Cl" compound classifier would always express a non-specific quantity. This can be demonstrated by the fact that this type of [Num-Cl-N] always excludes modification by *chabuduo* 'almost', an adverb semantically requiring the following number expression to denote a specific (non-minimum) value:

(85) a. Lisi he le chabuduo yi (*xiao-)ping hongjiu
Lisi drink Asp almost one small-bottle$_{Cl}$ wine
'Lisi drank almost a (*small) bottle of wine.'

b. Lisi chi-diao le chabuduo yi (*da-)dai pingguo
Lisi eat.up Asp almost one big-bag$_{Cl}$ apple
'Lisi ate up almost a (*big) bag of apples.'

Of relevance to the discussion here is the observation that the use of a fraction could make *chabuduo* 'almost' perfectly compatible with [Num-"gradable adjective+Cl"-N], as shown below. This indicates that a compound classifier "gradable adjective+Cl" accompanied by a fraction should be interpreted as encoding a well-determined quantity specification, supporting the claim that fractions are able to coerce a standardized-interval-unit meaning of classifiers.

(86) a. Lisi he le chabuduo 1/3 xiao-ping hongjiu
Lisi drink Asp almost small-bottle$_{Cl}$ wine
'Lisi drank almost 1/3 small bottle of wine.'

b. Lisi chi-diao le chabuduo 3/4 da-dai pingguo
Lisi eat.up Asp almost big-bag$_{Cl}$ apple
'Lisi ate up almost 3/4 big bag of apples.'

Now consider the pre-classifier *zheng* 'whole'. Notice that Mandarin Chinese allows for stacking of pre-classifier modifiers. As will be shown in Chapter 4 (cf. Section 4.2.2), *da* 'big' and *xiao* 'small' can combine with an "adjectival+Cl" compound classifier to form a larger compound classifier, as illustrated below:

(87) a. yi xiao-bao-pian binggan
one small-thin-Cl cookie
b. yi da-hou-da'er wenjian
one big-thick-pile$_{Cl}$ file

Interestingly, once a classifier has been modified by *zheng*, further modification by 'big'/'small' would be prohibited:

(88) a. *yi xiao-zheng-pian binggan
one small-whole-Cl cookie
b. *yi da-zheng-da'er wenjian
one big-whole-pile$_{Cl}$ file

Recall that a gradable adjective cannot modify a classifier associated with a specifically determined quantity specification. The incompatibility between 'big'/'small' and "*zheng*+Cl" corroborates the analysis that the occurrence of the pre-classifier *zheng* necessarily brings about a standardized-interval-unit interpretation for the associated classifier.

2.3 Summary

This chapter started with a unified semantic treatment for Chinese classifiers. Under the assumption that (i) numerical quantification is necessarily based on a one-to-one correlation between the number progression and the quantifying target(s) (cf. Wiese 2003) and that (ii) Chinese bare nouns are kind-denoting, singular-/plural-neutral elements (cf. Krifka 1995; Chierchia 1998a, 1998b; Yang 2001; Borer 2005; X.-P. Li 2011), it was proposed that Chinese classifiers, irrespective of their subcategory, uniformly denote partition units that serve to define divisions

on a quantity scale in entity quantification. More specifically, an interval- vs. atomic-unit dichotomy was proposed with respect to the denotation of Chinese classifiers involved in entity quantification. It was shown that there is no rigid, predetermined one-to-one correlation between the lexical-semantics-based subcategorization of classifiers on the one hand and the type(s) of partition unit they may denote on the other. Finally, a new generalization was made that the syntactically relevant semantic factor in regard to the Chinese classifier system lies in whether the classifier denotes a standardized interval unit.

Chapter 3 Syntax of classifier phrases

This chapter will develop a theory on the syntax of the numeral classifier construction in Mandarin Chinese. Section 3.1 will develop a dichotomous syntactic analysis for [Num-Cl-N] in Mandarin Chinese. Section 3.2 centers on the measurement construction in Mandarin Chinese, where two main types of measurement will be semantically and syntactically distinguished and the long-lasting issue concerning the generation of [Num-Cl-*de*-N] will be discussed.

3.1 A dichotomous analysis of classifier phrases

3.1.1 (Non-)transitivity of classifiers

A dichotomous theory regarding the syntax of [Num-Cl-N] to be developed here is mainly grounded on the following empirical evidence. From the perspective of semantics, the crucial observation is that while a classifier denoting a standardized interval unit exhibits an "intransitive" nature with respect to an entity domain, a classifier without such denotation displays an obligatory selectional relation with respect to a noun. This is first manifested by the fact that, as has been shown in Chapter 2, while a [Num-Cl] expression containing the former type of classifier can felicitously stand on its own to denote a quantity without presupposing the noun denotation with which the measure value is associated, a [Num-Cl] expression containing the latter type of classifier necessarily requires the existence of an (either overtly or covertly specified) entity domain to which [Num-Cl] applies numerical quantification, as exemplified below (repeated (59)-(62) in Chapter 2):

(1) a. yi jin bu suan zhong

one catty-Cl not count.as heavy

'One catty does not count as heavy.'

b. yi xiang *(yingtao) bu suan zhong

one box-Cl cherry not count.as heavy

'One box *(of cherries) does not count as heavy.'

(2) a. shi dun shi yi ge hen da de liang

ten ton-Cl be one Cl very big DE amount

'Ten tons is a very big amount.'

b. shi tiao *(yu) shi yi ge hen da de liang

ten Cl fish be one Cl very big DE amount

'Ten *(fishes) is a very big amount.'

(3) a. yi limi hen duan

one centimeter-Cl very short

'One centimeter is very short.'

b. yi jie *(xiangyan) hen duan

one section-Cl cigarette very short

'One section *(of cigarette) is very short.'

(4) a. liang lifangmi de tiji bu da

two cubic meter-Cl DE volume not big

'The volume of two cubic meters is not big.'

b. liang kun *(daocao) de tiji bu da

two bunch-Cl straw DE volume not big

'The volume of two bunches *(of straws) is not big.'

Another fact demonstrating a distinction in terms of the presence vs. lack of a selectional relation between a classifier and a noun is that, while a classifier having nothing to do with a standardized-interval-unit meaning necessarily serves to perform a discretizing function to the noun

denotation it is associated with (namely, semantically bringing about discrete tokens of the entity domain), this semantic correlation is not obligatorily required for a standardized INT-classifier and its following noun (if any). This point could be tested out by classifier reduplication in Mandarin Chinese, an operation associated with a distributive reading (cf. Cheng 2009). With the idea that distributivity necessarily takes as its semantic ground individualized, discrete entities, observe that while a standardized INT-classifier may or may not allow for classifier reduplication – depending on the (un-)availability of a "discrete" understanding of the sum tokens it is associated with – a classifier irrelevant to a standardized interval unit usage can always be reduplicated, as illustrated below:

(5) *Measure classifier*

a. <u>With a salient discrete understanding</u>

Lisi mai le san jin tudou,

Lisi buy Asp three catty-Cl potato

jin-jin dou hen xinxian

catty$_{Cl}$-catty$_{Cl}$ DOU very fresh

'Lisi bought three catties of potatoes, each of which are very fresh.'

b. <u>No salient discrete understanding</u>

Lisi qie le san jin tudousi,

Lisi cut Asp three catty-Cl shredded-potatoes

#jin-jin dou hen xi

catty$_{Cl}$-catty$_{Cl}$ DOU very thin

'Lisi cut the potatoes into three catties of shreds, #each of which are very thin.'

(6) *Container classifier intended as a standardized interval unit*

a. With a salient discrete understanding

women he-wan le wu ping niunai;

we drink-finish Asp five bottle-Cl milk

ping-ping dou hen xinxian

bottle$_{Cl}$-bottle$_{Cl}$ DOU very fresh

'We drank up five bottles of milk, each of which is very fresh.'

b. No salient "discrete" understanding

guo-li hai sheng wu ping niunai;

pot-in still leave.over five bottle-Cl milk

#ping-ping dou hen xinxian

bottle$_{Cl}$-bottle$_{Cl}$ DOU very fresh

Intended: 'There is still an amount of milk that can fill five bottles left over in the pot, #each of which is very fresh.'

(7) *Classifiers lacking a standardized-interval-unit reading*

a. Lisi chi le san tiao yu; tiao-tiao dou hen da

Lisi eat Asp three Cl fish Cl-Cl DOU very big

'Lisi ate three fishes, each of which is very big.'

b. niu chi-diao le wu kun cao

cow eat-up Asp five bunch-Cl grass

kun-kun dou you shi jin zhong

bunch$_{Cl}$-bunch$_{Cl}$ DOU have ten catty-Cl heavy

'The cows ate up five bunches of grass, each of which weighs ten catties.'

c. Lisi chi-diao le san jie ganzhe,

Lisi eat-up Asp three section-Cl sugarcane

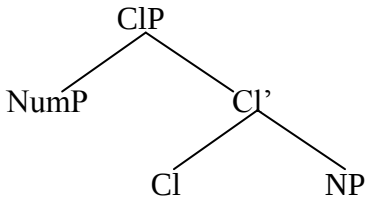
jie-jie dou hen chang

section$_{Cl}$-section$_{Cl}$ DOU very long

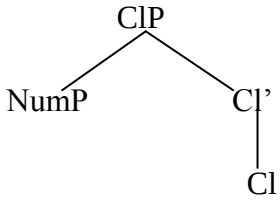
‘Lisi ate up three sections of sugarcane, each of which is very long.’

To syntactically represent the above shown selectional requirement imposed by the classifier that does not denote a standardized interval unit, the present study intends to assign a transitive configuration as depicted in (8) to this type of classifier. To be concrete, it is assumed that structurally this type of classifier is base-generated under Cl and selects as its complement an NP. In terms of semantics, a transitive Cl performs a discretizing function to the entity domain provided by the associated NP (which is organized in a part-of shape and semantically incompatible with numerical counting, cf. Chapter 2), by means of which discrete, non-overlapped entity tokens are properly created for numerical quantification. Whereas for the classifier denoting a standardized interval unit, in view of its “auto-semantic” nature, an intransitive structure as visualized in (9) will be assigned. In both cases, a numeral element is analyzed as projecting into a maximal projection NumP and occupying [Spec, ClP] (cf. also N. Zhang 2009; Pan & An 2012), semantically serving to specify the cardinality of the tokens under numerical counting.

(8)



(9)



Crucially, to syntactically capture the strict adjacency between classifiers and numerals as illustrated in Chapter 1, the present analysis follows the spirit of the feature checking within the Minimalist framework (cf. Chomsky 1995, 2000, 2001; Hornstein *et al.* 2005) and hypothesizes that Cl, irrespective of being structurally transitive or intransitive, is born with an uninterpretable [+Number] feature (given the fact that classifiers are closely tied to numerical counting). It is further assumed that numerals (including e.g. integers, fractions, approximate numbers such as *ji* 'several' or *henduo* 'many') are elements inherently specified for an interpretable [+Number]. Under the assumption that during the syntactic derivation all uninterpretable features have to be appropriately checked before Spell-Out (cf. Chomsky 1995, 2000, 2001), it is postulated that Cl obligatorily requires a numeral specifier, against which the former checks its uninterpretable [+Number] feature via a local Spec-Head configuration.

While a detailed discussion on the syntax of a number expression containing a standardized INT-classifier (define it as a measurement construction) will be suspended till Section 3.2, briefly anticipating, it is assumed that the particular underlying configuration a measurement construction correlates with is essentially determined by the semantic relationship between the value denoted by [Num-Cl] on the one hand and the entity domain denoted by the head noun on the other. Specifically, with respect to the underlying structure of a quantificational measurement expression in the form of [Num-Cl-N], a functional-projection analysis will be presented, under which the numeral classifier combination and the following noun are assumed to be semantically interacted with each other via a monotonic measurement relation, structurally represented by a functional head Mon.

3.1.2 Some alternatives

This section will review three main approaches within the generative framework concerning the [Num-Cl-N] construction in Mandarin Chinese and consider whether they are possible alternatives of the syntactic analysis presented in the present study.

Approach (I): Numerals/classifiers as heads

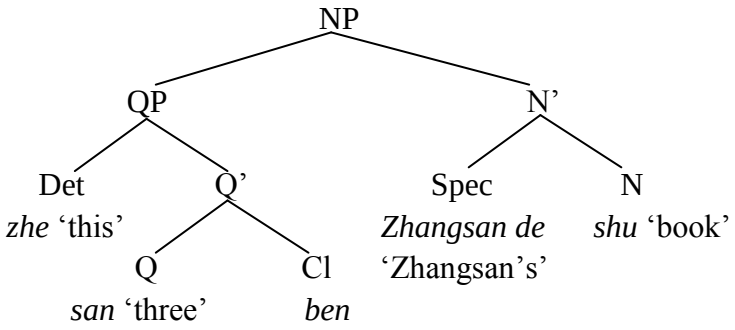
Along the first approach, Chinese numerals and classifiers were assumed as zero-level elements. This is a line extensively pursed in previous studies, among which Huang (1982), Cheng & Sybesma (1998, 1999, 2005), Pan & Hu (2000), Sio (2006), X.-P. Li (2011), among many others.

The proposals under this approach can be further divided into three lines. Along the first line, a [Num-Cl] sequence and a noun are treated as standing in a modifier-modifiee semantic relation (cf. Huang 1982; for a non-generative discussion, see Zhu 1982; Lu 1988, 2007, 2008; Liu 2008). At the syntactic level, Huang (1982), for example, assumes that a [(Dem)-Num-Cl] sequence underlyingly constitutes a Quantifier Phrase (QP) headed by a numeral, and that a QP, as a modifier, may combine with N, N', or N'' etc. within a nominal phrase, depending on the relative word order the QP exhibits with respect to other prenominal modifier(s). Take the example below for illustration (based on Huang 1982: Ch. 2, (67b), with slight modification)[16]:

[16] Huang (1982) meanwhile points out that there is another possible structure for the [(Det)-Num-Cl] sequence, in which the classifier is assumed to be the head of the whole phrase while the numeral is a modifier generated under Cl', as schematized below. Under this view, [(Det)-Num-Cl] as a whole is still treated as a modifier of the head noun.

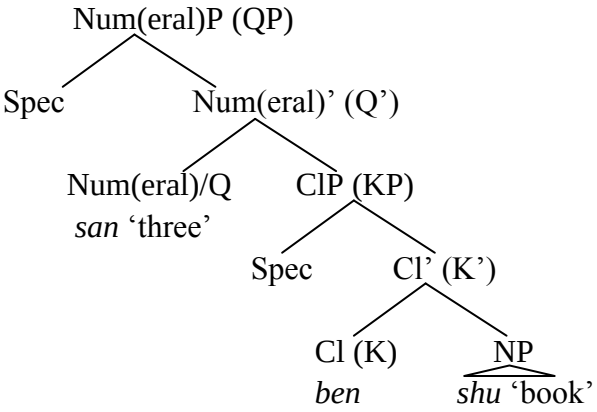
(i) $[_{ClP}$ (Det) $[_{Cl'}$ Q Cl]]

(10) zhe san ben Zhangsan de shu ‘these three Zhangsan’s books’



Along the second line, the numeral and the classifier are treated as functional heads which project into two maximal projections that stand in a dominating relation. This is an approach much widely adopted in later works (e.g. Y.-H. Li 1998; Cheng & Sybesma 1998, 1999, 2005; Pan & Hu 2000; Sio 2006). The projection headed by the numeral has been labeled as Number Phase, Numeral Phrase, or QP by different authors and the phrase headed by the classifier was generally called Classifier Phrase (abbreviated as ClP or KP). Along this line, a strict head-complement relation is postulated between Num(eral)/Q and ClP/KP on the one hand *and* between Cl/K and NP on the other, as shown below:

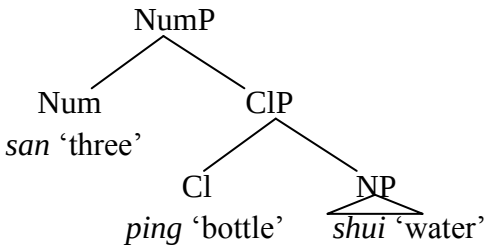
(11)



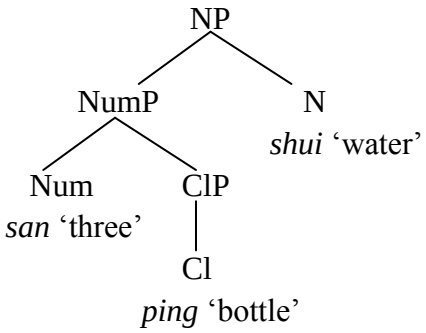
A third line can be found in X.-P. Li’s (2011). His analysis incorporates the basic spirit of both the first line and the second line. Technically, the classifier is assumed as the head of a ClP and the numeral

as the head of a NumP; ClP is taken by Num as complement. Crucial to X.-P. Li's theory is that, upon the claim that within the Chinese classifier system [+Counting] and [+Measure] classifiers should be syntactically differentiated (cf. Section 2.2.1 above for a brief review), it is postulated that the [Num-Cl-N] sequence containing a [+Counting] classifier and that containing a [+Measure] classifier should correlate with structure (a) and structure (b) as shown below, respectively:

(12) a. *[+Counting] classifier*



b. *[+Measure] classifier*



Notwithstanding tremendous efforts made in previous studies under Approach (I), it seems that neither of the above lines is without problems. To be concrete, as for the structure proposed by Huang (1982), in addition to the technical problems it may encounter in the later X-bar era, assuming a modificational relation between [Num-Cl] and N fails to capture the relational, syn-semantic nature exhibited by classifiers that are irrelevant to a standardized-interval-unit denotation (Section 3.1.1).[17]

[17] The alternative structure proposed by Huang (cf. Fn. 1) also cannot be free from this problem.

Whereas for the widely adopted double-functional layer hypothesis as depicted in (11), its first problem concerns the advocated "functional" nature of numerals. Under the standard view on functional categories, functional categories have been essentially distinguished from lexical ones in that in terms of semantics they lack substantive, descriptive content while merely contributing a second-order semantics by means of specifying grammatical or relational features (Abney 1987; Cann 2000; Talmy 2000; Alexiadou *et al*. 2007; Muysken 2008). According to this criterion, numerals evidently do not qualify as functional categories. The most straightforward argument comes from the very existence of complex numerals (such as 'one thousand three hundred and fifty two'): the compositional semantics exhibited by complex numerals necessitates that each simplex numeral should have its own substantive meaning (cf. Ionin & Matushansky 2006), which strongly argues for a lexical rather than functional status of numerals. Second, if [Cl-N] indeed underlyingly correlates with a maximal nominal projection (i.e. ClP/KP), it would be expected, for example, that [Cl-N] can undergo movement and that [Cl-N] can accept *de*-marked modifiers (*de*-marked modifiers target nominal phrases in Chinese; cf. Zhu 1982, Lü 1984, Shi 2002, 2003a, 2003b). Nevertheless, neither of the expectations is fulfilled:

(13) a. *Movement of [Cl-N]*

*ge pingguo$_i$ wo chi le [$_{NumP}$ yi [$_{ClP}$ t_i]

ge apple I eat Asp one

Intended: 'As for (individual) apples, I ate one.'

b. *Modification of [Cl-N] by* de*-marked modifiers*

* yi hen da de ge pingguo

one very big DE Cl apple

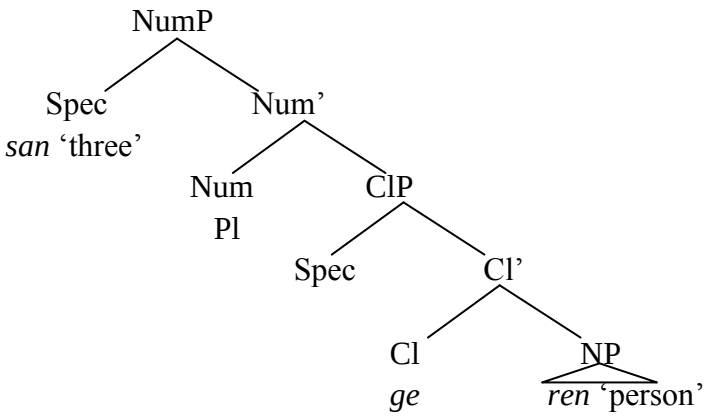
Intended: 'one very big apple'

Last, as for the analysis proposed by X.-P. Li (2011), though shedding new light on the research on Chinese classifiers, it is problematic in the following two respects. On the one hand, the empirical ground presented in favor of a syntactic distinction between [+Counting] and [+Measure] classifiers is not fully justified (cf. Section 2.2.1); on the other, as a "hybrid" of both the first and the second line along Approach (I), this account would be faced with not only the technical problems raised by the former but also those encountered by the later.

Approach (II): Classifiers as heads while numerals as specifiers/adjuncts

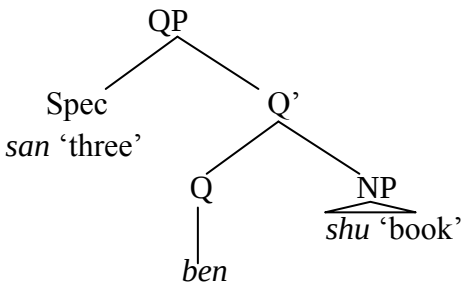
Now consider a second alternative concerning the underlying structure of [Num-Cl-N]. Along this approach, only classifiers are assumed as heads whereas numerals are treated as either specifiers or adjuncts. A numeral-as-specifier analysis can be found in e.g. Y.-H. Li (1999), N. Zhang (2009), and Pan & An (2012). According to Y.-H. Li (1999), the classifier heads a ClP, and the numeral is contained in a functional projection Number Phrase (NumP), which immediately dominates ClP (Num is postulated as the locus of the singular (Sg)/plural (Pl) feature of the noun), as depicted below:

(14)



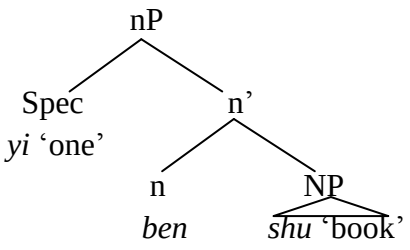
N. Zhang (2009) assumes that the classifier[18] is a functional category which heads a QP, and the numeral is a nominal element base-generated under [Spec, QP]:

(15)



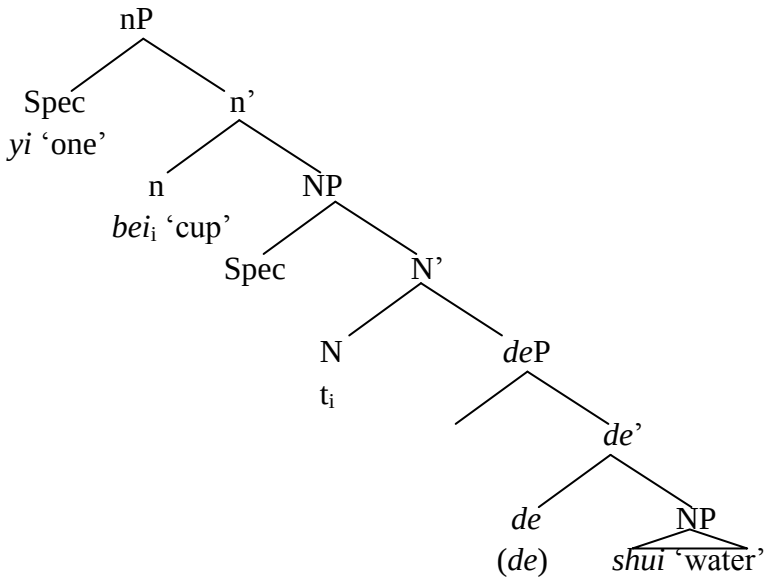
Pan & An (2012) syntactically distinguish the classifier proper from the measure word. They hypothesize that the classifier proper heads a functional projection nP, with n assumed as a "light noun" responsible for the countability of its complement NP; while the measure word is a noun in nature and projects into an NP, which is in turn taken by n as the complement. It is further assumed that the measure word N needs to take another NP as its complement via *de*P (the head of *de*P could be phonetically overt or covert), and that the measure word N acts as a classifier by means of moving to n. In both cases, the numeral is treated as occupying [Spec, nP].

(16) a.



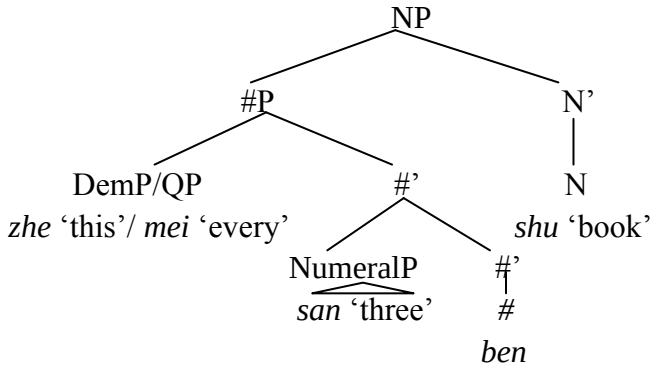
[18] N. Zhang sticks to a general definition of classifiers and does not syntactically distinguish count-classifiers from massifiers.

b.



A numeral-as-adjunct line has been pursued in Hsieh (2008). Upon treating classifiers[19] as elements expressing number, Hsieh proposes that the classifier heads a #P (Number Phrase), and the numeral projects into a NumeralP which in turn adjoins to #’. #P, analyzed as the modifier of the head noun (following Huang (1982)), is originated at [Spec, NP][20], as visualized below:

(17)



[19] Hsieh also does not draw a syntactic distinction between count-classifiers and massifiers.

[20] At this point, Hsieh further hypothesizes that a #P originated at [Spec, NP] could move up to [Spec, DP] or even higher to [Spec, KP], with the three positions corresponding to a pure quantity interpretation, a referential interpretation (definite/indefinite), and a totality/partitivity interpretation, respectively.

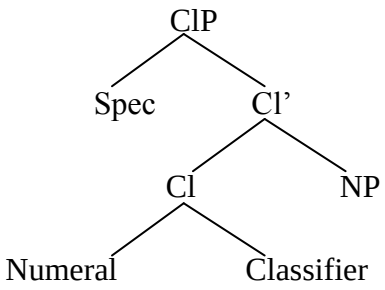
Nevertheless, the above attempts are not problem-free, either. To be concrete, for Y.-H. Li's (1999) hypothesis, as the numeral and the classifier are assumed to be under distinct maximal projections, on the one hand, an external stipulation would be in order to explain why there is a strict adjacency between the numeral and the classifier; on the other, an incorrect prediction would be brought about that [Cl-N] should be able to move and to accommodate *de*-marked modifiers, which is nevertheless contrary to the fact as already shown in (13). As for the theories developed by Hsieh (2008) and N. Zhang (2009), their uniform syntactic treatment for classifiers would leave the observed semantic/syntactic discrepancies between standardized INT-classifiers versus other classifiers unexpected (cf. Section 2.2.4). As for Pan & An's (2012) analysis, it is just unclear why a *de*P layer, which can be either phonetically overt or covert, is necessary at the syntactic level for a measure word to take an NP as its complement.

Approach (III): Numeral-classifier as a compound

A third representative approach to the syntax of [Num-Cl-N] hypothesizes that a numeral and a classifier form a zero-level element, a viewpoint held by Tang (1990), Yang (2001), and Shi (to appear). To be concrete, Tang posits a structure as shown in (a), where the Cl head is claimed to obligatorily contain both a numeral (Num) and a classifier (Cla) and takes an NP as its complement. Yang presents a structure as depicted in (b), where the combination of a numeral and a classifier is considered as a morphological complex base-generated under D, and D takes an NP as its complement.[21] Shi puts forth a configuration as visualized in (c), assuming the "Num+Cl" combination as a compound head which takes an NP complement:

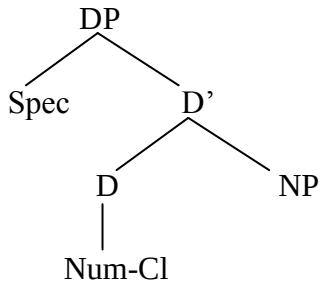
[21] The reason for Yang to assign a DP rather than a ClP structure to [Num-Cl-N] is that the author considers that there is a lack of independent evidence for the existence of "non-standard" nodes such as ClP and MP for languages.

(18) a.



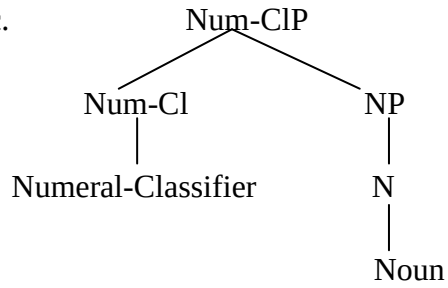
(Tang 1990)

b.



(Yang 2001)

c.



(Shi to appear)

Admittedly, this approach well accommodates the fact that a numeral and a classifier always exhibit a strict adjacency. However, it is not clear why the non-licensing of an intervening element between a numeral and a classifier necessarily indicates a compound nature of a [Num-Cl] combination. In fact, empirical evidence could be found in favor of a phrase-level status of numerals. Consider the examples below:

(19) a. san huo si ge yuezhang[22]
three or four Cl movement
'3 or 4 movements'

[22] This example is from the online corpus of the Center for Chinese Linguistics (CLL) PKU (http://ccl.pku.edu.cn:8080/ccl_corpus/index.jsp?dir=xiandai).

b. mingtian hui you 20 haishi 30 ge xuesheng guolai?
tomorrow will have or Cl student come
'Will 30 or 40 students come tomorrow?'

c. xuexiao mingnian hui pai
school next.year will send
zuishao 15, zuiduo 35 ge xuesheng chuguo
at.least at.most Cl student go.abroad
'Next year the school will send at least 15, at most 35 students to go abroad.'

In (a), the numeral 'three' and 'four' are conjoined by the connective *huo* 'or'. Notice that in Mandarin Chinese *huo* is generally used to connect two phrase-level elements but not proper subparts of a word. To illustrate this point, with the idea that a *de*-less modifier and a noun constitute a compound noun whereas a *de*-marked modifier and a noun form a nominal phrase (Zhu 1982; Lü 1984; Shi 2002, 2003a, 2003b), observe that there is a discrepancy between *de*-marked modifiers on the one hand and *de*-less modifiers on the other in terms of licensing conjunction by *huo*, as shown below. Given this, if the numeral and the classifier in [Num-Cl-N] indeed form a zero-level element, it would be expected that conjunction by *huo* cannot apply to two numerals, which is nevertheless contrary to the fact.

(20) a. *hong- huo lü-pinguo (*A-N compound*)
red- or green-apple
Intended: 'red-apples or green-apples'

b. hong de huo lü de pinguo
red DE or green DE apple
'red or green apples'

(21) a. *men- huo chao-mian (*V-N compound*)
boiled- or fried-noodle
Intended: 'boiled-noodles or fried-noodles'

b. men de huo chao de mian
boil DE or fry DE noodle
'boiled or fried noodles'

(22) a. *mian- huo ma-waitao (*N-N compound*)
cotton- or linen-coat
Intended: 'cotton-coat or linen-coat'

b. mian de huo ma de waitao
cotton DE or line DE coat
'cotton or linen coat'

(19b) involves a *haishi*-question. According to Huang *et al.* (2009), *haishi*-questions uniformly start out as conjoining full-size, bi-clausal elements, while different reduced forms are derived via a syntactic operation of deletion, as illustrated below (examples from Huang *el al*. 2009: 250, (43)):

(23) a. Zhangsan mai shu haishi Zhangsan bu mai shu?
Zhangsan buy book or Zhangsan not buy book
'Does Zhangsan buy books or doesn't he buy books?'

b. Zhangsan mai shu haishi ~~Zhangsan~~ bu mai shu?
Zhangsan buy book or Zhangsan not buy book
'Does Zhangsan buy books or not buy books?'

c. Zhangsan mai ~~shu~~ haishi ~~Zhangsan~~ bu mai shu?
Zhangsan buy book or Zhangsan not buy book
'Does Zhangsan buy or not buy books?'

d. Zhangsan mai shu haishi ~~Zhangsan~~ bu mai ~~shu~~?
Zhangsan buy book or Zhangsan not buy book
'Does Zhangsan buy books or not buy?'

If it is indeed the case that "Num+Cl" forms a compound, then according to the Principle of Lexical Integrity (PLI), "Num+Cl" should always be immune from phrase-level syntactic processes such as deleting. As for the well-formedness of a *haishi*-question, concomitantly, it would be expected that a single numeral without a following classifier can never appear as being directly conjoined with another numeral by *haishi* as this results in a scenario necessitating the deletion of a classifier (cf. Huang *et al*. 2009), a violation to PLI. This expectation, nevertheless, is failed by (19b), which shows that [Num-*haishi*-Num-Cl-N] can be perfectly allowed in Mandarin Chinese. Notice that in this respect "Num+Cl" evidently behaves differently from the true compound, which in general does not license its proper parts to participate in forming *haishi*-questions, as illustrated below:

(24) a. *Compound*
* ni yao putong- haishi supi-chashaobao?
you want ordinary or fluffy-cha siu bun
Intended: 'Do you want ordinary-cha siu buns or fluffy-cha siu buns?'

b. *Phrase*
ni xiangyao putong de haishi supi de chashaobao?
you want ordinary DE or fluffy DE cha siu-bun
'Would you like ordinary or fluffy cha siu-buns?'

(25) a. *Compound*

* ni xiang zhao gaoxiao-laoshi haishi -xuesheng?

you want look.for college-teacher or student

Intended: 'Do you want to look for college-teachers or college-students?'

b. *Phrase*

ni xiang zhao gaoxiao de laoshi haishi xuesheng?

you want find college DE teacher or student

'Do you want to find college teachers or college students?'

(19c) demonstrates that numerals can be modified by adverbs like 'at least' or 'at most'; moreover, it shows that before a classifier it is fine to have a complex numeral expression which is composed by two modified numerals that are separated by a pause. At this point, notice that "Num+Cl" exhibits totally different behaviors from the genuine compound in Mandarin Chinese, whose component part on the one hand consistently prohibits modification by an adverb and on the other cannot be parallel elements separated by a pause. Consider the contrasts below between a compound noun (consisting of a *de*-less modifier) and a nominal phrase (consisting of a *de*-marked modifier):

(26) a. *hen hong-pingguo

very red-apple

b. hen hong de pinguo

very red DE apple

'very red apples'

(27) a. *bu gou hong-, youdian lü-pingguo

not enough red a.little green-apple

b. bu gou hong , youdian lü de pingguo
not enough red a.little green DE apple
'apples that are not red enough but are a little green'

Given this, if it is correct in analyzing "Num+Cl" as a compound, the puzzle will need to be solved as to why "Num+Cl" exhibits syntactic behaviors that do not pattern with typical compounds. This again weakens the assumption that a numeral and a classifier form a zero-level element in Chinese.

In sum, upon a careful review on three main approaches pursed in previous studies on the syntax of [Num-Cl-N] in Mandarin Chinese – the first treated both the numeral and the classifier as functional heads, the second analyzed only classifiers as functional heads while numerals as specifiers or adjuncts, and the third advocated a compound status of "Num+Cl" – it has been showed that none of them is problem free. In view of this, the present work will stick to the structural analysis given in Section 3.1.1.

3.1.3 Consequences

This section will show how relevant data in Chinese can receive an explanation within the present analysis.

Firstly, notice that along the present line the [Cl-N] combination either has no full-fledged phrase status (corresponding to an intermediate-level projection Cl' for cases involving "transitive" ClPs), or does not count as a constituent at all (for cases involving "intransitive" ClPs). This desirably predicts that [Cl-N] in Mandarin Chinese cannot undergo movement, nor can it accommodate *de*-marked modifiers (see Section 3.2.4.3 below for a proposal that the modifiee of a *de*-marked

modificational constructions should be a maximal projection). Given this, the problems faced by analyses assuming a two-layer underlying structure for [Num-Cl-N] (e.g. a Num(eral)P/QP immediately dominating a ClP/KP) can be well exempted.

Secondly, as within the present analysis the numeral occurring in [Num-Cl-N] is a phrasal element rather than a head or proper part of a head, it well accommodates the fact that the numeral part of [Num-Cl-N] exhibits syntactic behaviors of phrases, such as allowing for coordination by the connective *huo* 'or' or by pauses, licensing adverbial modification, being compatible with *haishi*-questions, as illustrated in (19).

Lastly, a dichotomous treatment on the syntax of Chinese classifier phrases as proposed above can help to derive the aforementioned discrepancy between standardized INT-classifiers and other classifiers in terms of felicitously constituting a quantificational nominal phrase in the form of [Num-Cl-*de*-N], as repeated below (from (66), (67), and (69), Section 2.2.4.1):

(28) *Classifiers denoting a standardized interval unit*

a. Lisi chi le liang jin (de) pingguo
   Lisi eat Asp two catty-Cl DE apple
   'Lisi ate up two catties of apples.'

b. Lisi he le liang bei (de) hongjiu
   Lisi drink Asp two cup-Cl DE wine
   'Lisi drank up two cups of wine.'

(29) *Classifiers denoting a non-standardized interval unit*

a. Lisi chi le liang ge (*de) pingguo
   Lisi eat Asp two Cl DE apple
   'Lisi ate up two apples.'

b. niu chi le liang kun (*de) cao
cow eat Asp two bunch-Cl DE grass
'The cow ate up two bunches of grass.'

c. Lisi chi le liang jie (*de) ganzhe
Lisi eat Asp two section-Cl DE sugarcane
'Lisi ate up two sections of sugarcane.'

(30) *Classifiers denoting an atomic unit*

a. Lisi dian le yi bei (*de) cha
Lisi order Asp one cup-Cl DE tea
'Lisi ordered a cup of tea.'

b. Lisi zhuo le liang zhi (*de) ji
Lisi catch Asp two Cl DE chicken
'Lisi caught two chickens.'

c. Lisi ba yi kun (*de) cao bang de hen jin
Lisi BA one bunch-Cl DE grass bind DE very tight
'Lisi bound a bunch of grass very tightly.'

d. Lisi ba liang jie (*de) ganzhe dang gunzi yong
Lisi BA two section-Cl DE sugarcane as stick use
'Lisi used two sections of sugarcanes as sticks.'

Notice that according to the present theory, Num and Cl in (28) should underlyingly constitute a phrase, whereas Num and Cl in (29-30) do not entertain constituency (instead, Cl stands in a head-complement relation with N). Given this, the non-licensing of *de* in between Cl and N in (29-30) can be straightforwardly attributed to a strict sisterhood required between a head and its complement (cf. Radford 1988; Carnie 2007) without resorting to external stipulations. Since such a constraint is irrelevant to (28), a sandwiched *de* between Cl and N is always *structurally possible*

(see Section 3.2 for a detailed discussion on the usage of *de* in numerical quantificational phrases).

3.2 Measurement constructions in Mandarin Chinese

3.2.1 Introduction

This section will be devoted to Chinese measurement constructions composed by measure classifiers. For convenience of illustration, the measure phrase [Num-Measure Cl] will be called MeaClP henceforth. With respect to the syntactic status of MeaClPs, a long-held viewpoint among Chinese linguists is that they are prenominal modifiers (Zhu 1982; Lu 1988, 2007, 2008; Liu 2008; among many others). This claim is mainly based on the parallelism between (31) and (32), which shows that a MeaClP is able to enter into a [MeaClP-N]/[MeaClP-*de*-N] alternation, akin to ordinary prenominal modifiers:

(31) a. san bang (de) rou
three pound-Cl DE meat
'three pounds of meat'

b. wu mi (de) bu
five meter-Cl DE cloth
'five meters of cloth'

(32) a. mutou (de) zhuozi
wooden DE table
'a/the wooden table'

b. piaoliang (de) guniang
pretty DE lady
'a/the pretty lady'

The (non-)licensing of *de* between a classifier and a noun in Mandarin Chinese has attracted scholars' interests since an early time. An influential viewpoint that has been widely held by many authors is that only the so-called measure words/massifiers/mensural classifiers (i.e. those creating a temporary countable unit or providing a measure unit for entities) but not classifiers proper/count-classifiers/sortal classifiers (i.e. those relating to inherent, built-in individualhood of entities) permit *de* to co-occur, as illustrated by the examples below (cf. Tai & Wang 1990; Ahrens 1994; Tai 1994; Cheng & Sybesma 1998; Borer 2005; see Tang 2005, Hsieh 2008, N. Zhang 2009, Her & Hsieh 2010, X.-P. Li 2011 for a critical discussion):

(33) a. liang ben (*de) shu
two Cl DE book
'two books'

b. liang ping/jin (de) jiu
two bottle-Cl/catty-Cl DE wine
'two bottles/catties of wine'

On such analysis, given that measure classifiers constitute a typical subtype of measure words/massifiers/mensural classifiers, a prediction is entailed that a measure classifier should always allow a following *de* to accompany. Such a predication, however, seems to be too weak when it comes to examples as below, where it is not merely that the measure classifier *can* accommodate *de*, but that it *must* co-occur with *de*. This contrast poses a challenge to (i) the stance that MeaClPs are prenominal modifiers to which the modificational marker *de* can *optionally* apply, and (ii) the treatment that *de* is simply a test to identify measure

words/massifiers/mensural classifiers while *de* itself has no syntactic significance.

(34) a. 90 du *(de) shui
degree-Cl DE water
'90 degree water'

b. liang mi *(de) qiuyuan
two meter-Cl DE ballplayer
'a/the two meter ballplayer'

Taking this phenomenon as a point of departure, in what follows I will probe into the correlation between measurement types on the one hand and syntactic formations of measurement constructions in Mandarin Chinese on the other. Particularly, I will examine the distribution of MeaClPs associated with different ways of measuring and provide an explanation for their distributional properties. It will be shown that it is necessary to divide measurement into two sub-types, with each type exhibiting a particular semantic characteristic and corresponding to a particular syntactic structure in Mandarin Chinese.

3.2.2 The basic generalization

3.2.2.1 Feature analysis for describing ways of measuring

To account for the observed syntactic heterogeneity with respect to the syntactic formation of measurement constructions in Mandarin Chinese, a comprehensive description concerning the distribution of MeaClPs under various measure contexts is first called for.

In this section a feature analysis will be adopted to characterize different ways of measuring. To be specific, the nature of a given measurement will be described via a feature bundle [±S, ±E]. The main motivation for adopting these two features is that they represent two essential aspects for capturing the basic nature of measurement, namely, (i) the status of the measure target, which is associated with [±S], and (ii) the (arithmetical) property of the measure result, as concerned by [±E]. To be concrete, "S" stands for "singularity". What [±S] says is whether the measurement in question empirically or conceptually targets a single entity or a set of entities/substance in the real world, with [+S] corresponding to the former while [-S] to the latter. "E" stands for "extensive", a notion based on Krifka (1998). The [+E] measurement is one which satisfies both commensurability and additivity, namely, (i) the measure result of the whole is commensurate with the sum of the measure results of the parts (*commensurability condition*), and (ii) the measure result is able to enter into arithmetical addition with another measure result when the two are drawn along the same dimension (*additivity condition*); [-E] refers to cases where neither or only one of the two conditions is fulfilled.

3.2.2.2 Ways of measuring: A categorization

Based on different feature bundle combinations, the ways of measuring can be categorized into the following four types.

(I) [+S, +E]

Consider examples in (35):

(35) a. san bang *(de) niurou[23]

three pound-Cl DE beef

'the beef that weighs three pounds per piece'

b. liang gongfen *(de) shu

two centimeter-Cl DE book

'a/the two centimeter (thick) book'

See how the feature bundle is determined here. Firstly, the measurement is intended to apply to a singular entity, i.e., a piece of beef/a book, hence [+S]. Secondly, the measurement fulfills both commensurability and additivity. For commensurability, for example, the weight of one piece of beef is commensurate with the summing weight of each half-piece of the beef, and the thickness of one book can be obtained by summing the thickness of each half-volume of the book. For additivity, it is always allowed to add up the weight of each piece of beef or the thickness of each book for the total weight of e.g. a bag of beef or the total thickness of e.g. a pile of books. Accordingly, the measurement is of [+E]. As shown by the asterisks, [MeaClP-*de*-N] is the only licit construction for the [+S, +E] measurement.

(II) [+S, -E]

Consider the examples below for the [+S, -E] measurement:

(36) a. shi an *(de) chazuo

ten ampere-Cl DE outlet

'a/the ten ampere outlet'

[23] The *de*-less expression can only be felicitous under a [-S, +E]-measurement reading (meaning 'three pounds of beef in total'), where the beef targeted by the measurement is understood as *a set of beef flesh* rather than *a single piece of beef*. See discussion below on the [-S, +E] measurement.

b. liang mi *(de) qiuyuan
two meter-Cl DE ballplayer
'a/the two meter tall ballplayer'

In these cases, the measurement is also associated with a singular entity, i.e. an outlet/a ballplayer, hence [+S]. However, the conditions for [+E] are not fully respected. In (a), both commensurability and additivity are failed: for commensurability, given that the measurement of current strength can only apply to an integrate outlet rather than parts of an outlet, a part-whole commensurability cannot hold; for additivity, since generally the current strength of an outlet would not enter into arithmetical addition with that of another outlet for a "total current strength", additivity is irrelevant. As for (b), commensurability is respected in that the height of a ballplayer could be taken as the vertical distance from the head to the waist plus the vertical distance from the waist to the feet; whereas additivity is absent here as commonly the height of a person does not enter into arithmetical addition with that of others for a "total height". Accordingly, [-E] is assigned to both (a) and (b). As shown in (36), the [+S, -E] measurement can only be expressed by [MeaClP-*de*-N].

(III) [-S], [+E]

Consider the following examples:

(37) a. shi gongjin (de) pingguo
ten kilo-Cl DE apple
'ten kilos of apples'
b. liang sheng (de) guzi
two liter-Cl DE grain
'two liters of grains'

Unlike both (35) and (36), measurement exemplified in (37) targets a set of entities, i.e. a set of apples in (a) and a set of grains in (b), hence [-S]. Commensurability is perfectly fulfilled: the weight of a given set of apples weighing 10 kilos is commensurate with the sum of the weight of e.g. a subset of apples that weigh 2 kilo plus another subset of apples that weigh 8 kilos; a set of grains that is 2 liters in total can be viewed as being composed by a subset of grains weighing 1 kilo plus another subset of grains weighing 1 kilo. The additivity test also passes: it is always fine to add up the weight/volume of several sets of apples/grains to obtain the total weight/volume of a larger aggregation of apples/grains. Accordingly, the measurement is of [+E]. As shown above, both [MeaClP-N] and [MeaClP-*de*-N] are grammatical syntactic formations for the [-S, +E] measurement.

(IV) [-S], [-E]

This type of measurement is exemplified as below:

(38) a. 100 sheshidu *(de) guo
degree Celsius-Cl DE pot
'a/the 100 degree Celsius pot.'

b. 50 du *(de) baijiu
degree-Cl DE liqueur
'50 degree liqueur.'

At first glance the measurement represented by (a) applies to a singular entity ('a pot') while that in (b) targets a set of substance (a quantity of liqueur). However, a closer scrutiny suggests that in terms of the [±S] feature there should be no difference between the two. Notice that both (a)

and (b) are different from the above mentioned cases in that here the measure result is associated with some physical property that is normally considered as homogeneously distributed over the measure target. Therefore, the most natural understanding of (a) and (b) would be: every part of the pot's inner surface is 100 degree Celsius; every drop/milliliter/portion of the liqueur is 50 degree. This characteristic fundamentally distinguishes the seemingly [+S]-featured (38a) from the true [+S] examples discussed above: unlike measuring the temperature of a pot which is irrelevant to the (non-)integrity of the pot, measuring e.g. either the thickness of a book (of Type-[+S, +E]) or the current strength of an outlet (of Type-[+S, -E]) necessarily requires an *integrate* book/outlet. This motivates me to claim that the temperature measurement in (38a) is in fact concerned with a set rather than a singleton, with the "set" here being understood as an aggregation of smaller parts which just "coincidentally" compose a pot in the given context. Accordingly, both (a) and (b) are assigned [-S]. As for the feature [±E], since neither commensurability nor additivity is satisfied, [-E] is assigned here. As shown by the asterisks, the [-S, -E] measurement can only be expressed by [MeaClP-*de*-N].

To end this subsection, the syntactic configuration(s) each way of measurement may correlate with in Mandarin Chinese can be summed up as below:

(39) *Syntactic Construction(s) Associated with Each Type of Measurement*

	MeaClP-N	MeaClP-*de*-N
[+S, +E]	✖	✓
[+S, -E]		
[-S, -E]		
[-S, +E]	✓	✓

3.2.3 Subcategorization of measurement

*3.2.3.1 Two types of [MP-*de*-N] in Mandarin Chinese*

Given the categorization as in (39), one may quickly notice that the [-S, +E] measurement on the one hand and the non-[-S, +E] measurement on the other constitute a dichotomy: while the former may correlate with both [MeaClP-*de*-N] and [MeaClP-N], the latter can only be expressed by [MeaClP-*de*-N]. A more intriguing observation is that, albeit identical in terms of the linear ordering of constituents, [MeaClP-*de*-N] associated with the [-S, +E] measurement and that associated with the non-[-S, +E] measurement exhibit a series of syntactic discrepancies, as illustrated below:

(I) *(Non-)co-occurrence with a preceding quantifier*

While non-[-S, +E] [MeaClP-*de*-N] permits a preceding quantifier, [-S, +E]-type [MeaClP-*de*-N] cannot:

(40) a. shaoliang 60 du de baijiu
a.small.amount.of degree-Cl DE liqueur
'a small amount of 60 degree liqueur'

b. * shaoliang san bang de niurou
a.small.amount.of three pound-Cl DE beef
'*a small amount of three pounds of beef'

(II) *(Non-)licensing of free ordering with respect to* de*-marked modifiers*

While [MeaClP-*de*] associated with the non-[-S, +E] measurement may involve in a free permutation with respect to other *de*-marked modifiers,

[MeaClP-*de*] associated with the [-S, +E] measurement does not allow for this usage:

(41) a. [qi bang de], [lan-yanjing de], [tebie ke'ai de] ying'er
seven pound-Cl DE blue-eyed DE very cute DE infant
'a/the seven pound, blue-eyed, very cute infant'
b. [lan yanjing de], [qi bang de], [tebie ke'ai de] ying'er
c. [tebie ke'ai de], [lan yanjing de], [qi bang de] ying'er

(42) a. [qi bang de], [meiguo chan de], [youji de] chengzi
seven pound-Cl DE USA origin DE organic DE orange
'seven pounds of organic oranges originated in the USA.'
b. * [meiguo chan de], [qi bang de], [youji de] chengzi
c. * [youji de], [meiguo chan de], [qi bang de] chengzi

(III) *(Non-)licensing of stacking*

[MeaClP-*de*] under the non-[-S, +E] measurement perfectly allow stacking. In contrast, stacking of multiple [MeaClP-*de*] associated with the [-S, +E] measurement is illicit:

(43) a. [liang mi de], [28 sheshidu de] youyongchi
two meter-Cl DE degree Celsius-Cl DE swimming pool
'a/the two meter (deep), 28 degree Celsius swimming pool'
b. *[yi sheng de], [liang jin de] shui
one liter-Cl DE two catty-Cl DE water
Intended: 'a liter of water which weighs two catties in total'

(IV) *(Non-)licensing of nominal topicalization*

While non-[-S, +E] [MeaClP-*de*] can appear in a topicalization context, [-S, +E]-type [MeaClP-*de*] cannot:

(44) a. baijiu$_i$ wo mai le 40 du de e_i

liqueur I buy Asp degree-Cl DE

'As for liqueur, I bought that of 40 degree.'

b. *niurou$_i$ wo mai le 5 bang de e_i

beef I buy Asp pound-Cl DE

Intended: 'As for beef, I bought 5 pounds (in total).'

(V) *(Non-)licensing of nominal ellipsis*

[MeaClP-*de*] associated with the non-[-S, +E] measurement permits nominal ellipsis, whereas [-S, +E]-type [MeaClP-*de*] always requires an overt head noun:

(45) a. [40 sheshidu de shui$_i$] tai tang le,

degree Celsius-Cl DE water too hot SFP

[20 sheshidu de e_i] ganggang hao.

degree Celsius-Cl DE just fine

'40 degree Celsius water is too hot; 20 degree Celsius water is just fine.'

b. wo yigong mai le [wu bang de niurou$_i$],

I altogether buy Asp five pound-Cl DE beef

*ta yigong mai le [liu bang de e_i].

he altogether buy Asp six pound-Cl DE

'I bought five pounds of beef altogether, while he bought six pounds altogether.'

The paradigm shown above strongly suggests that there should be an underlying asymmetry between the [-S, +E]-type [MeaClP-*de*-N] on the one hand and the non-[-S, +E] [MeaClP-*de*-N] on the other.

3.2.3.2 Quantificational vs. attributive measurement

In this section I will approach the above shown syntactic discrepancies in terms of the quantificational vs. attributive distinction with respect to the semantic function of MeaClPs. To spell out this idea, first I will digress briefly into a *monotonic* vs. *non-monotonic* dichotomy regarding the dimension adopted for measurement.

The notion of monotonicity is used in the sense of Schwarzschild (2006). That is, given a dimension D where *x* is measured along D, if each proper part of *x* has a smaller measure result than *x* with respect to D, D is monotonic; while if each proper part of *x* has the same measure result as *x* with respect to D, D is non-monotonic. The main motivation for Schwarzschild to draw a monotonic vs. non-monotonic distinction is the observation that such dichotomy seems to be syntactically sensitive across languages (e.g. English, Spanish, German, Russian, etc.). For instance, in English the measurement construction relevant to the monotonic dimension employs a proposition *of* in between the measure expression and the head noun, and the measure noun has to be inflected for number, whereas in the construction associated with a non-monotonic dimension, the measure expression and the head noun are directly juxtaposed and the measure noun cannot bear a plural marker. For Dutch, while in the monotonic construction the measure expression and the head noun are directly juxtaposed, the non-monotonic construction has a preposition following the NP (Examples (47a) and (47b) are from Schwarzschild 2006: (54) and (56)).

(46) English

a. 6 pounds of cherries (*monotonic dimension: weight*)

b. 20 degree water (*non-monotonic dimension: temperature*)

(47) Dutch

a. een centimeter staaldraad

one centimeter wire

'1 centimeter of wire' (*monotonic dimension: length*)

b. staaldraad van een centimeter

wire VAN one centimeter

'1 centimeter wire' (*non-monotonic dimension: diameter*[24])

Notice that the [-S, +E] vs. non-[-S, +E] distinction in Mandarin Chinese could also be understood in terms of the monotonic vs. non-monotonic dichotomy (cf. also Jiang 2008). To be concrete, the [-S, +E] measurement satisfies the criterion for monotonicity in that the measure result is positively dependent on the total extent of the entity domain being measured (the larger the set is, the greater the measure value would be). By contrast, the dimension involved in the non-[-S, +E] measurement is non-monotonic in that the measure result either (i) tracks no part-whole relation on the extent of the measure target, as represented by [-S, -E] cases like measuring temperature or alcohol strength, or (ii) holds of singletons distributively while being irrelevant to the total quantity of singletons involved in the given context, including [+S, -E] cases like measuring the current strength of a outlet and [+S, +E] cases like measuring the thickness of a book (the measure result is by nature singleton-oriented and indifferent to the quantity of outlets/books contained in the given entity domain).

A crucial claim to be made here is that such a monotonic vs. non-monotonic dichotomy in terms of dimensions would derive a quantificational vs. attributive distinction with respect to the semantic function performed by MeaClPs. Specifically, if a measurement is based on

[24] To understand the difference between (47a) and (47b): "length" is monotonic because length increases when linear segments are added, while "diameter" is non-monotonic because diameter is consistent across linear segments.

a monotonic dimension, the measure value denoted by the MeaClP would isomorphically represent the extent of the associated entity domain, whereby the MeaClP exhibits a typical semantics of quantifying a noun denotation. Whereas if a given measurement is based on a non-monotonic dimension, the value designated by the MeaClP would hold consistently across the whole entity domain it is related to, whereby the MeaClP in essence serves as an attributive element in assigning a property distributively over a noun denotation. More precisely, a non-monotonic MeaClP qualifies as a restrictive modifier in that it semantically subcategorizes the head noun's denotation. Taking *liang gongfen de shu* (2 centimeter-Cl *de* book) '2 centimeter books', the MeaClP helps to create a subset of the set denoted by 'book' via restricting the thickness of each book.

The modifier status of non-monotonic MeaClPs receives strong empirical support in terms of syntax cross-linguistically. Taking Mandarin Chinese, notice that non-monotonic MeaClPs syntactically pattern with *de*-marked modifiers in a very neat fashion:

(I) *Licensing of a preceding quantifier*

(48) a. yixie congming de haizi
some smart DE child
'some smart children'

b. yixie 60 du de baijiu
some degree-Cl DE liqueur
'some 60 degree liqueur'

(II) *Licensing of free ordering and stacking*

(49) a. [congming de], [yingjun de] nanhaizi
smart DE handsome DE boy
'a/the smart, handsome boy'

a'. [yingjun de], [congming de] nanhaizi

b. [liang mi de], [28 sheshidu de] youyongchi

two meter-Cl DE degree Celsius-Cl DE swimming-pool

'a/the two meter (deep), 28 degree Celsius swimming pool'

b'. [28 sheshidu de], [liang mi de] youyongchi

(III) *Licensing of nominal topicalization*

(50) a. nüsheng$_i$, Lisi xihuan wenjing de e_i

girl Lisi like quiet DE

'As for girls, Lisi like those who are quiet.'

b. baijiu$_i$ wo mai le 40 du de e_i

liqueur I buy Asp degree-Cl DE

'As for liqueur, I bought that of 40 degree.'

(IV) *Licensing of nominal ellipsis*

(51) a. Lisi xihuan [wenjing de nüsheng$_i$],

Lisi like quiet DE girl

bu xihuan [tai huopo de e_i].

not like too vivacious DE

'Lisi likes quiet girls but not those who are too vivacious.'

b. [40 sheshidu de shui$_i$] tai tang le,

degree Celsius-Cl DE water too hot SFP

[20 sheshidu de e_i] ganggang hao.

degree Celsius-Cl DE just fine

'40 degree Celsius water is too hot; 20 degree Celsius water is just fine.'

Schwarzschild also observes that in many languages non-monotonic measure expressions exhibit a syntax of attributive adjectives. For instance, in Swiss German and Russian an adjectival affix is required to attach to the non-monotonic measure expression:

(52) a. foif-gred-**igs** wasser

5-degree-Adj water

‘5 degree water’

(Swiss German; from Schwarzschild 2006: (59))

b. desiati-gradus-**naja** voda

10-degree-Adj water

’10 degree water’

(Russian; from Schwarzschild 2006: (60))

Pursing this line of consideration, the present study treats the [-S, +E] vs. non-[-S. +E] measurement distinction as a *quantificational measurement* (henceforth Q-measurement) vs. *attributive measurement* (henceforth A-measurement) dichotomy, with the former quantifying an entity domain while the latter modifying an entity domain. For the convenience of discussion, MeaClPs associated with these two types of measurement will be marked as MeaClP_{Q} and MeaClP_{A} hereafter.

3.2.4 Syntax of measurement constructions

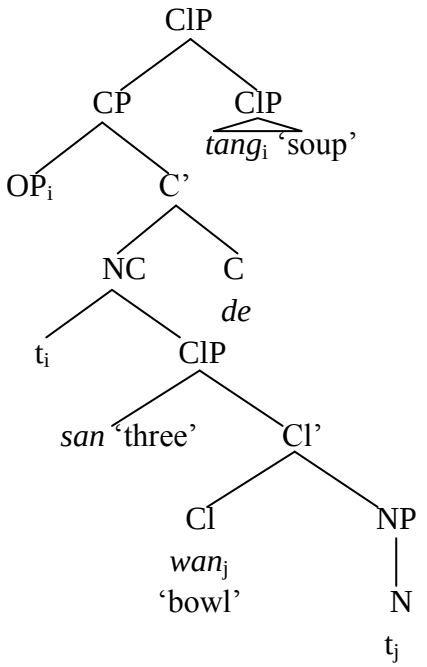
3.2.4.1 Previous approaches

Before getting down to a syntactic proposal, this subsection will review two generative approaches concerning the derivation of Chinese *de*-marked measurement constructions.

Cheng & Sybesma (1998, henceforth C&S) proposes a relativization analysis to account for [Num-Cl-*de*-N] in Mandarin, arguing that [Num-Cl-*de*-N] is relativized from a nominal small clause [N-[Num-Cl]] (labeled as “NC” in the tree). Semantically, they distinguish massifiers from

count-classifiers in that while the former create units of measure, the latter name units of the built-in semantic partition of entities. Categorically, they assume that a massifier is a noun by nature and base-generated under N, with the usage as a classifier resulting from the N-to-Cl movement. To derive a [Num-Cl-*de*-N] sequence, they assume a subject relativization as below:

(53) san wan de tang 'three bowls of soup'

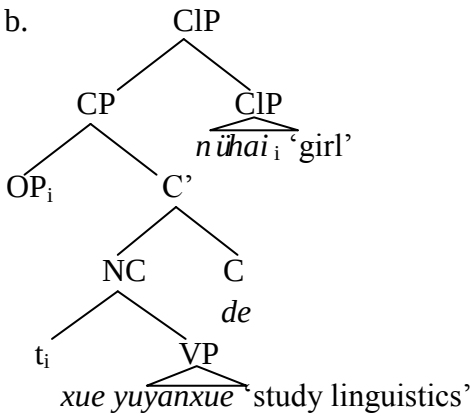


According to C&S, measure classifiers constitute a typical subtype of massifiers. Nevertheless, it seems that applying their analysis to measure classifiers may raise some unexpected problems. To address some, first, if [MeaClP$_Q$-*de*-N] is derived from [N-MeaClP$_Q$], it would be expected that [MeaClP$_Q$-*de*-N] syntactically parallels to other [X-*de*-N] expressions that are also derived from [N-X] by relativization, such as (54):

(54) a. xue yuyanxue de nühai
study linguistics DE girl

'the girl who studies linguistics/girls who study linguistics'

b.



(adopting C&S's approach)

Contrary to expectation, a sharp contrast is found between [MeaClP$_Q$-*de*-N] and the above [X-*de*-N] in terms of syntactic behaviors such as e.g. (non-)licensing of nominal topicalization and ellipsis:

(55) *Nominal topicalization*

a. *pingguo$_i$, Lisi mai le san jin de e_i
apple Lisi buy Asp three catty-Cl DE
Intended: 'As for apples, Lisi bought three catties (in total).'

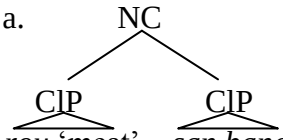
b. nühai$_i$, Lisi zhi xihuan xue yuyanxue de e_i
girl Lisi only like study linguistics DE
'As for girls, Lisi only likes those who study linguistics.'

(56) *Nominal ellipsis*

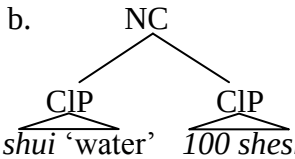
a. Lisi mai le san jin de pingguo$_i$,
Lisi buy Asp three catty-Cl DE apple
*Zhangsan mai le si jin de e_i
Zhangsan buy Asp four catty-Cl DE
Intended: 'Lisi bought three catties of apples while Zhangsan bought four catties (in total).'

b. Lisi bu renshi xue yuyanxue de nühai$_i$,
Lisi not know study linguistics DE girl
ta zhi renshi xue wuli de e_i.
he one know study physics DE
'Lisi does not know girls who study linguistics but only those who study physics.'

For another, a relativization analysis may raise the risk of blurring the distinction between [MeaClP$_Q$-*de*-N] and [MeaClP$_A$-*de*-N]. Given that both MeaClP$_Q$ and MeaClP$_A$ are capable of serving as a predicate of a small clause, as illustrated in (57), if [MeaClP$_Q$-*de*-N] is derived from [N-MeaClP$_Q$] by relativization in the spirit of C&S, nothing would prevent one from analyzing [MeaClP$_A$-*de*-N] as derived from [N-MeaClP$_A$] in the same fashion, as illustrated in (58). This would, however, leave the forthmentioned syntactic and semantic distinctions between [MeaClP$_Q$-*de*-N] and [MeaClP$_A$-*de*-N] unexpected.[25]

(57) a.


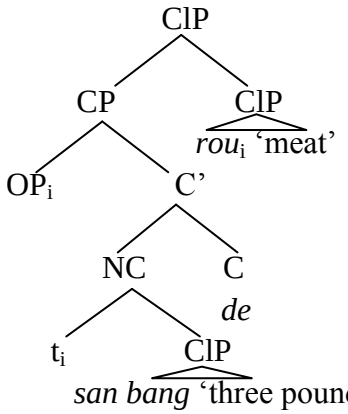
rou 'meat' *san bang* 'three pounds'

b.


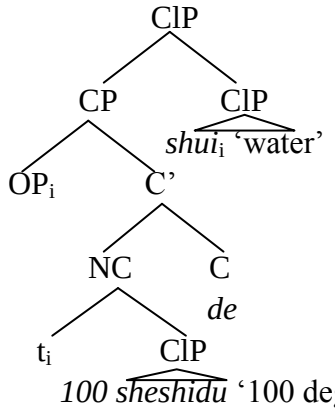
shui 'water' *100 sheshidu* '100 degree Celsius'

[25] As a matter of fact, the [MeaClP$_Q$-*de*-N] vs. [MeaClP$_A$-*de*-N] distinction poses a great challenge to many previous analyses which have intended to propose a unified account for [X-*de*-N] expressions in Mandarin Chinese, such as e.g. Simpson 2002; den Dikken & Singhapreecha 2004; Sio 2006; Shi 2008; among many others)

(58) a. san bang de rou ‘three pounds of meat’

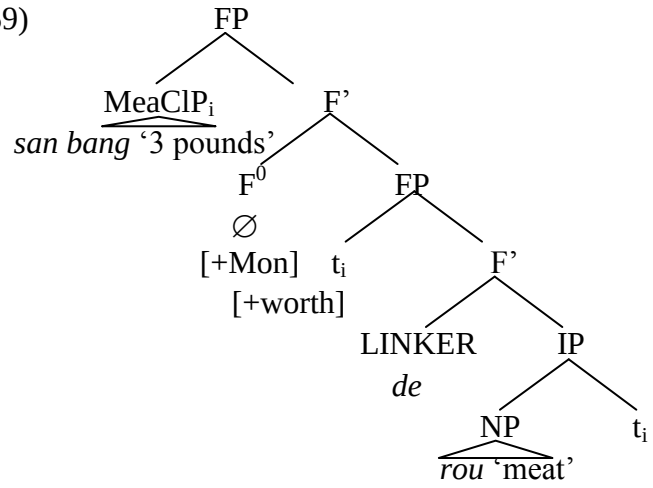


b. 100 sheshidu de shui ‘100 degree Celsius water’



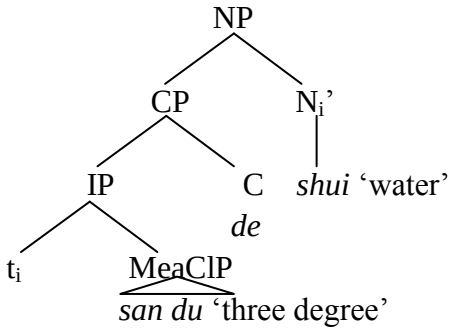
Jiang (2008) notices the monotonic vs. non-monotonic distinction with respect to Chinese [MeaClP-*de*-N] expressions. At the syntactic level, she proposes a phrasal movement analysis for monotonic cases while a relativization analysis for the non-monotonic ones. For monotonic cases, it is assumed that the head noun and the MeaClP underlyingly entertain a predication relation and form an IP. The linear order of [MeaClP-*de*-N] is derived from moving the MeaClP to the Spec of a Linker phrase whose head is phonetically realized as *de*, an operation taken as predicate inversion in the sense of den Dikken (2006). It is further hypothesized that the Linker phrase needs to further merge with a null functional head F which encodes [+Mon] and [+worth] features and attracts the lower MeaClP to end up in its Spec position, as visualized below:

(59)



While for the non-monotonic [MeaClP-*de*-N], assuming that the head noun and the MeaClP also start out as constituting an IP, Jiang postulates that the surface word order is derived from relativizing the head noun and that *de* is a complementizer, as illustrated below:

(60)



Albeit avoiding the problems of a uniform analysis for [MeaClP-*de*-N], Jiang's analysis raises new troubles. Especially for her phrasal movement strategy, on the one hand, it is not clear why the Linker phrase necessarily merges with a functional head with [+Mon] and [+worth]. A concomitant question at this point is that how to interpret the [MeaClP-*de*-N] phrase correlating with the lower FP layer (i.e. the Linker phrase). Moreover, if Jiang is on the right track in treating the non-monotonic [MeaClP-*de*-N] as involving predicate inversion, it would

be expected that the head noun cannot undergo *wh*-extraction, as the subject of all predicate inversion constructions is not allowed to be A'-extracted (cf. Moro 1997; den Dikken 2006). Consider the English examples below:

(61) *No predicate inversion applies*:

a. I consider [John$_{subject}$ the best candidate$_{predicate}$].

b. Who$_i$ do you consider [e$_i$ the best candidate]?

(62) *Predicate inversion applies*:

a. I consider [the best candidate$_{predicate}$ to be John$_{subject}$].

b. *Who$_i$ do you consider [the best candidate to be e$_i$]?

Contrary to expectation, notice that the head noun of the monotonic [MeaClP-*de*-N] can be grammatically *wh*-extracted by *shenme* 'what' (assuming with Huang (1982) that this kind of A'-movement is conducted at LF in Chinese). This further weakens the plausibility of Jiang's account.

(63) a. Lisi yigong mai le qi bang de putao
Lisi altogether buy Asp seven pound-Cl DE grape
'Lisi bought seven pounds of grapes altogether.'

→ <u>*Wh*-extracting 'grape'</u>:

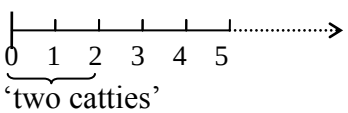
b. Lisi yigong mai le qi bang de shenme?
Lisi altogether buy Asp seven pound-Cl DE what
'What did Lisi buy, the weight of which is seven pounds altogether?'

To get around the problems stated above, in what follows a novel dichotomous syntactic analysis will be developed for [MeaClP-*de*-N].

3.2.4.2 A unified syntactic analysis for MeaClP

Recall from Chapter 1 that measure classifiers can be further divided into two subgroups, one semantically capable of serving as a measure unit for numerical quantification over an entity domain whereas the other only able to correlate with numeral quantification over a quality. To be concrete, the former includes classifiers like *gongjin* 'kilo', *mi* 'meter', and *sheng* 'liter', with the corresponding [Num-Cl] expressing a measure value concerning some *quantitative* property of entities (e.g. weight, length, volume, etc.); while classifiers like *sheshidu* 'degree-Celsius' and *fu* 'volt' fall under the latter category, whose corresponding [Num-Cl] designates a measure value pertaining to some *qualitative* property of entities (e.g. temperature, voltage, etc.). In the above discussion, quantity-oriented measure classifiers have been analyzed as serving to denote standardized interval units for creating non-overlapped interval divisions on the quantity scale. Along the same line of consideration, the present study treats quality-oriented measure classifiers as also denoting standardized interval units for partitioning a scale, with this group of measure classifiers merely differing from the quantity-oriented ones in that they partition a quantifiable quality scale rather than a quantity scale. See the parallelism below:

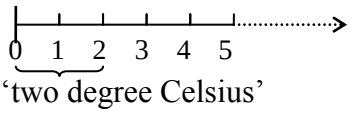
(64) a. Interval unit: *jin* 'catty'



quantity scale (of weight)

'two catties'

b. Interval unit: *sheshidu* 'degree Celsius'



quality scale (of temperature)

'two degree Celsius'

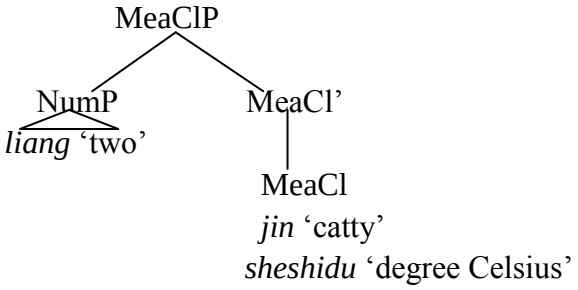
It has been shown in Section 3.1.1 that measure classifiers relevant to entity quantification can independently combine with numerals without presupposing the existence of noun denotations. Notice that such a semantic intransitive nature is also true of quality-oriented measure classifiers, as illustrated below:

(65) a. 100 sheshidu shi hen tang de
degree Celsius-Cl be very hot DE
'100 degree Celsius is very hot.'

b. 220 fu shi biaozhun dianya
volt-Cl be standard voltage
'220 is the standard voltage.'

In view of this, it will be assumed that quality-oriented measure classifiers are underlyingly associated with an identical structure as quantity-oriented measure classifiers, as visualized below:

(66)



Based on this, the following sections will assign two different structures to A- and Q-measurement constructions.

3.2.4.3 The syntax of the A-measurement construction

For the A-measurement construction [MeaClP$_A$-*de*-N], based on the semantic and syntactic discussions in Section 3.2.3.1, it is proposed that [MeaClP$_A$-*de*] is a *de*-marked modifier. Configurationally, with Sio (2006) and Shi (2008), it is assumed that the Chinese modifier marker *de* is a functional category which heads its own projection *de*P. *De* may combine with various kinds of phrases, among which AP, NP, IP, MeaClP, etc., to form a modifying phrase.[26] However, the present analysis departs from Sio and Shi in hypothesizing that *de*P occupies the Spec position of another functional projection rather than adjoining to the nominal phrase. To be specific, basically following the spirit ventured in Tsai (2011), it is assumed that the Chinese *de*-marked modificational construction underlyingly correlates with a Modifier Phrase (ModP). Mod encodes a modifier-modifiee relation between its specifier and complement, and *de*P is base-generated at [Spec, ModP], as visualized below.[27] The treatment

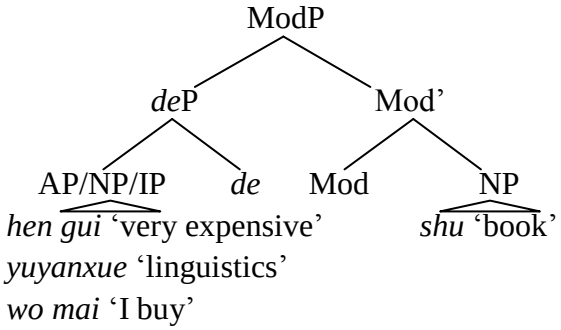
[26] Assuming an underlying head-complement relation between *de* and the modifier and a head-initial configuration for *de*P, Sio (2006) suggests that the liner order of [modifier-*de*] be a result of moving the modifier from the complement position to the specifier position for phonological reasons. Since the derivation of the word order of *de*-marked modificational constructions does not concern us much here, the present study will simply assume a configuration like (67) while leaving irrelevant technical details open to debate.

[27] The present analysis slightly differs from Tsai (2011) in that while the former assumes the modifier marker *de* as forming a constituent with the modifying element, the latter hypothesizes *de* as located under Mod and standing in the Head-Complement relation with the modified noun. This treatment is mainly motivated by the attempt to formally incorporate the nominal modification constraint proposed by S.-Z. Huang (2006, 2008) and S.-Z. Huang & Li (2009), which states that the prenominal modifier and the modified noun in Chinese must be of the same semantic type (cf. Section 5.3.2 below). Specifically, S.-Z. Huang (2006, 2008) advocates that the prenominal modifier marker *de* in Chinese is a type-shifter. Upon combining with a predictive element (of the semantic type <e, t>), *de* gives rise to an expression of type <e >, which is eligible for modifying a bare noun (assuming Chinese bare nouns are born of the semantic type <e>; see also Section 2.1.2). Adopting S.-Z. Huang's analysis on *de*, I tentatively represent the constraint on Chinese nominal modification at the syntax-semantics interface by speculating that Mod is a functional category which imposes an identicality requirement on its specifier (i.e. the modifier) and the complement (i.e. the modifiee) in terms of semantic type. It is this consideration that motivates the treatment

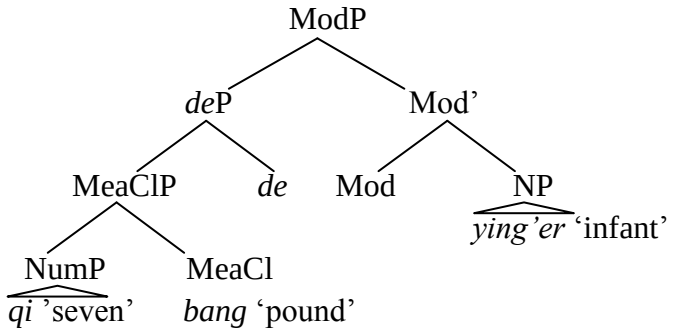
of the *de*-marked modifier as the specifier rather than the adjunct of an extended projection of NP is motivated by a (speculative) analysis of nominal ellipsis to be attempted in Section 3.3, where it will be proposed that at the syntactic level an elided noun always needs to be properly head-governed.

(67) a. hen gui de/yuyanxue de/wo mai de shu

'very expensive books/books on linguistics/books that I bought'



b. qi bang de ying'er '7 pound infant'



Along this line, given that Chinese prenominal phrasal modifiers always have to be accompanied by *de* (as illustrated by (a-b) below; cf. Zhu 1982; Lü 1984; Shi 2002, 2003a, 2003b) and that $MeaClP_A$ is a phrase-level element, the obligatoriness of *de* in [$MeaClP_A$-*de*-N] naturally follows.

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that it is [Modifier-*de*] rather than the modifier alone that appears at [Spec, ModP]. As a detailed discussion on this issue is far beyond the scope of the present dissertation, I will leave an in-depth investigation for future research.

(68) a. [$_{N^0}$ [$_{A^0}$ piaoliang][$_{N^0}$ nühai]]

pretty *girl*

b. [$_{ModP}$ [$_{AP}$ hen piaoliang] *(de) [$_{Mod'}$ Mod [$_{NP}$ nühai]]]]

very pretty *DE* *girl*

c. [$_{ModP}$ [$_{MeaClP}$ 100 du] *(de) [$_{Mod'}$ Mod [$_{NP}$ shui]]]]

degree *DE* *water*

At this point, what is worthnoticing is that when a <Num-MeaCl>$_A$ combination is somehow analyzed as an X^0 element, it would be possible to form a "<Num-MeaCl>$_A$+N" compound. To be specific, when a measure result denoted by <Num-MeaCl>$_A$ can be viewed as a standard, conventionalized criterion for sorting out a basic entity type denoted by the head noun, it would be fine to interpret <Num-MeaCl>$_A$ as being semantically "fossilized" as an X^0 element, and the corresponding "<Num-MeaCl>$_A$+N" formation can be concomitantly allowed. For instance, the Chinese *Maotai* liqueur is categorized into four basic types according to a classification of alcohol strength like $33^o/38^o/43^o/53^o$. This makes it felicitous to interpret the <Num-MeaCl>$_A$ expression *33/38/43/53 du* as representing a conventionalized standard to determine basic types of the *Maotao* liqueur, due to which *33/38/43/53 du* in this context is semantically highly compositional and thus could be used as a compound. In this case, it is fine to combine <Num-MeaCl>$_A$ directly with the N-stem to form a larger compound:

(69) [$_{N^0}$ [$_{X^0}$ 38-du][$_{N^0}$ *Maotai*]]

'38-degree *Maotai*'

While notice that the (im-)possibility for <Num-MeaCl>$_A$ to obtain a compound status is highly context-dependent. For example, the "<Num-MeaCl>$_A$+N" expressions below are infelicitous because normally '40 degree (hot)'/'2 meter (tall)' would not be taken as a conventionalized criterion for determining a natural classification of streets/ballplayers, hence the unavailability of an X^0-level interpretation of <Num-MeaCl>$_A$:

(70) a. *40-du-malu
degree-street
b. *2-mi-qiuyuan
meter-ballplayer

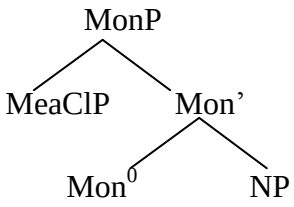
3.2.4.4 The syntax of the Q-measurement construction

3.2.4.4.1 The Q-measurement [MeaClP-N] construction

Following the spirit of Schwarzschild (2006), in this section an extended projection MonP will be assigned to the Q-measurement construction [MeaClP-N]. Concretely, Mon is a functional category with no phonetic content. It bears an uninterpretable [+Mon] feature and is responsible for establishing a mapping relation from noun denotations to measure values along a monotonic dimension, whereby a quantifying measure reading is brought about. Configurationally, on the one hand, Mon takes as its complement an NP, with the resulting projection meaning that the entity domain provided by the noun is measured along a monotonic dimension. On the other, in accordance with the feature checking theory under the Minimalist Program (cf. Chomsky 1995, 2000, 2001; Hornstein *et al.* 2005), [Spec, MonP] has to be occupied by a MeaClP with an

interpretable [+Mon] feature, against which Mon can check off its [+Mon] feature.

(71)



At this point, one may quickly notice a dichotomous divergence that while some MeaClPs are consistently associated with non-monotonic dimensions, others could be compatible with either monotonic or non-monotonic dimensions:

(72) *Non-monotonic only*

a. 100 du de shui
degree-Cl DE water

b. 150 mali de qiche
horsepower-Cl DE car

(73) *Either non-monotonic or monotonic*

a. 7 bang de ying'er (non-monotonic)
pound-Cl DE infant
'a/the 7 pound infant'

b. 7 bang niurou (monotonic)
pound-Cl beef
'7 pounds of beef'

To deal with this fact, it is proposed in the present study that some MeaClPs are intrinsically with a [-Mon] feature (such as '100 degree' and '150 horsepower') while others have an unspecified [âMon] feature (such as '7 pounds'). As for the MeaClP intrinsically with [-Mon], it is always

prohibited from occupying [Spec, MonP] because its [-Mon] feature contradicts with the [+Mon] feature of Mon. As for the MeaClP with [âMon], adopting the idea of Doetjes & Rooryck (2003) that the value of an unspecified feature of the specifier will be determined by the associated head, it is postulated that upon merging at [Spec, MonP], [αMon] is determined by Mon as [+Mon] in order to satisfy the Spec-Head feature agreement. Whereas when the [αMon]-featured MeaClP co-occurs with the modifier marker *de*, since *de* features a modificational rather than quantificational meaning, the monotonic interpretation is prohibited, and [âMon] can only be determined as [-Mon].[28]

3.2.4.4.2 The Q-measurement [MeaClP-de-N] construction

Recall that both [MeaClP-N] and [MeaClP-*de*-N] are possible formations for Q-measurement in Mandarin Chinese. With respect to the difference between the two, what has been advocated in the literature is that

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[28] At this point an immediate question might be asked as to how to determine the value of an unspecified [αMon] if the associated MeaClP occurs in syntactic environments other than MonP and *de*P. I claim that in this case the value of α would be determined by contextual semantic/pragmatic factors. Take the examples below to illustrate this point:

(i) a. Lisi mai de pingguo you qi bang zhong
Lisi buy DE apple have seven pound-Cl heavy
'The apples bought by Lisi are seven pounds heavy.'
b. Lisi mai de pingguo dou you qi bang zhong
Lisi buy DE apple all have seven pound-Cl heavy
'Each of the apples bought by Lisi is seven pounds heavy.'

Albeit appearing in similar syntactic environments, *qi bang* in (a) acquires a quantifying reading whereas that in (b) acquires a modifying reading. My explanation concerning this is that, for (a), that only the monotonic reading of '7 pounds' is felicitous is mainly due to the world knowledge that normally no individual apple can be as heavy as 7 pounds; while in (b), the non-monotonic reading is coerced by *dou*, as *dou* indicates the distribution of a predicate over a plural subject (Lee 1986; Liu 1990; Lin 1998), and thus '7 pounds' needs to be interpreted as holding of each individual apple.

the existence of *de* features a modificational relation between the MeaClP and the head noun (e.g. Cheng & Sybesma 1998; X.-P. Li 2011). However, as has been demonstrated previously, the semantic relation between the MeaClP and the head noun in a Q-type [MeaClP-*de*-N], unlike that involved in an A-type [MeaClP-*de*-N], should not be treated as a modificational one. In what follows it will be shown that the (non-)occurrence of *de* in the Q-measurement construction is associated with the lack/existence of a contrastive focus on MeaClP.

This claim is grounded in the following observations. Firstly, according to the intuition of most Mandarin speakers that I have consulted, in the context where the amount expressed by MeaClP is most naturally interpreted as irrelevant to any contrastive meaning, the occurrence of *de* in between MeaClP and N sounds highly redundant.

(74) a. Zhangsan mai le wu jin putao,
Zhangsan buy Asp five catty-Cl grape
Lisi ye mai le wu jin putao
Lisi also buy Asp five catty-Cl grape
'Zhangsan bought five catties of grapes; Lisi also bought five catties of grapes.'

b. # Zhangsan mai le wu jin de putao,
Zhangsan buy Asp five catty-Cl DE grape
Lisi ye mai le wu jin de putao
Lisi also buy Asp five catty-Cl DE grape
'Zhangsan bought five catties of grapes; Lisi also bought five catties of grapes.'

Due to the identicality of the amount expressed by MeaClPs (i.e. five catties) and the existence of *ye* 'also' (which further reinforces a

"sameness" meaning), here no contrastive relation is triggered between MeaClPs. As shown above, in this context only the *de*-less construction would be natural. To improve the awkward *de*-marked expression, one needs to establish a contextual contrast in terms of measure value. The most straightforward way to do this is to provide two different quantities and delete *ye* 'also', as exemplified below.

(75) Zhangsan mai le wu jin de putao,
Zhangsan buy Asp five catty-Cl DE grape
Lisi mai le ba jin de putao,
Lisi buy Asp eight catty-Cl DE grape
'Zhangsan bought five catties of grapes, while Lisi bought eight catties of grapes.'

That a quantificational MeaClP with *de* has to receive a contrastive focus can be further demonstrated by the examples below:

(76) a. Zhangsan mai le wu jin putao,
Zhangsan buy Asp five catty-Cl grape
er bu shi pingguo
but not be apple
'Zhangsan bought five catties of grapes rather than apples.'

b. # Zhangsan mai le wu jin de putao,
Zhangsan buy Asp five catty-Cl DE grape
er bu shi pingguo
but not be apple
Intended: 'Zhangsan bought five catties of grapes rather than apples.'

Given that what follows *er bu shi* – an expression associated with a "but not", "rather than" reading – is an entity noun, here a contrast is established between 'apple' and 'grape'. As shown by (b), in this case a [MeaClP-*de*-N] expression brings about oddness. Interestingly, contrasting with (76b), (77) is perfectly felicitous.

(77) Zhangsan mai le wu jin de putao,
Zhangsan buy Asp five catty-Cl DE grape
er bu shi liang jin
but not be two catty-Cl
'Zhangsan bought five catties of grapes rather than two catties.'

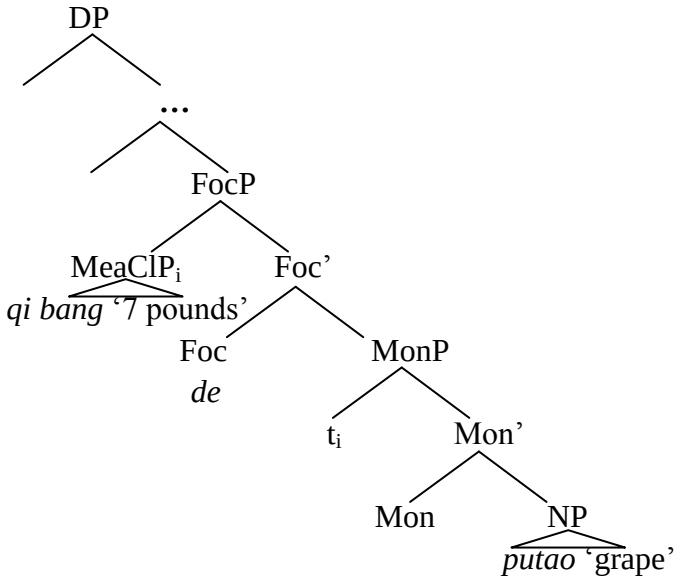
(77) is minimally different from (76b) in that the element following *er bu shi* is the MeaClP 'two catties', whereby a semantic contrast is coerced between two MeaClPs (i.e. 'five catties' vs. 'two catties') rather than between two entity nouns. That (77) is natural whereas (76b) is not indicates that the use of the Q-measurement [MeaClP-*de*-N] is subject to a semantic requirement that the MeaClP contained obtains a focal interpretation.[29]

To capture such an interpretive effect of the Q-measurement [MeaClP-*de*-N] construction in terms of syntax, following the spirit of Giusti (1996), Aboh (2004), Ntelitheos (2004), and Corver & van Koppen (2009), I adopt a DP-periphery analysis and assume that there is a focus

[29] Prof. N. Zhang (p.c.) told me that both (74b) and (76b) are fine with her. Concerning this intuition my explanation is, in cases where one finds expressions like (74b) and (76b) well acceptable, an *implicit* contrast is in fact intended between MeaClPs. That is to say, for (74) and (76), when one adopts the formation *wu jin* ***de*** *putao* instead of *wu jin putao*, s/he always intends to emphasize that the weight of the grapes is exactly five catties rather than any other possible value(s). A core idea behind this consideration is that it is impossible that *wu jin de putao* is simply a semantic equivalent of *wu jin putao*. If so, *de* would turn out to be semantically null, which violates the economy principle of language design that "no expressions occur idly in grammatical representations" (Hornstein *et al*., 2005: 8).

projection FocP within the extended nominal domain. To be specific, it is assumed that Foc carries an illocutionary feature [+Foc] which has to be checked before Spell-Out. In the spirit of Rizzi (1997, 2004), it is considered that [Spec, FocP] is a position dedicated to a focal interpretation. For a DP-internal constituent to receive a contrastive focus, it needs to move to [Spec, FocP] to check the [+Foc] feature of Foc via a local Spec-Head relationship.[30] According to this, as for cases involving a focalized MeaClP within a Q-measurement nominal phrase, the MeaClP, which is originated at [Spec, MonP], has to move to [Spec, FocP] as schematized below. Such movement is signaled by a linking morpheme *de*, a focus marker which spells out the head of FocP and features specifier movement in the nominal domain.

(78)



The treatment of *de* as a focus marker is largely inspired by Corver (2004) and Corver & van Koppen (2009)'s insightful discussion on

[30] Corver & van Koppen (2009) argue that unlike the information packaging applied to the clausal domain, where both information focus (which is associated with new, non-presupposed information) and contrastive focus (which implies presupposed, contextually available alternatives) could be relevant, DP-internal focus is typically a contrastive focus. The present study will adopt this view and consider the DP-internal FocP as being associated with a contrastive focus.

DP-internal focus in variants of Dutch. To give a brief review on their main point, first, consider the following pairs of pseudopartitive constructions in the dialect of Katwijk (from Corver 2004: (1) and (1')):

(79) a. 'n kist törref
a box peat
'a box with peat'
b. 'n kist**e** törref
a box-**e** *peat*
'a box with peat'

(80) a. 'n hóóp wáeter
a heap water
'a lot of water'
b. 'n hóóp**e** wáeter
a heap-**e** *water*
'a lot of water'

With respect to the difference between the above (a)- and (b)-expressions, it has been long noted that the existence of the suffix *-e* features a strong emphasis on the amount expressed by the quantity-designating nouns like *kist* and *hoop*, while in cases without *-e* the amount is neutrally described (Overdiep 1936, 1937, 1940). In view of this, Corver (2004) advocates that *-e* under this case is a focus marker. This claim receives empirical support from the test of nominal ellipsis. As illustrated by the following examples in colloquial Dutch, the absence/presence of *-e* directly bears on the (im-)possibility of eliding the head noun 'rabbit' (data from Corver & van Koppen 2009: (24) and (44)). Since in Dutch focus plays a crucial role in licensing nominal ellipsis (cf. Corver 2004; Corver & van Koppen

2009), the contrast below suggests that there should be an association between *-e* on the one hand and the introduction of focus on the other.

(81) Over konijnen gesproken…(Talking about rabbits…)

a. * Ik heb gisteren een wit ___ zien lopen.
I have yesterday a white see walk
Intended: 'I have seen a white one yesterday.'

b. Ik heb gisteren een zwart-**e** ___ zien lopen.
I have yesterday a black-**e** *see walk*
'I have seen a black one yesterday.

Interestingly, in Dutch the morpheme *-e* is also found to follow an attributive adjective and enter into an agreement relationship with a modified noun. Specifically, an attributive adjective in Dutch is accompanied by a suffix *-e* except when the adjective modifies a singular neuter noun that is preceded by an (overt or covert) indefinite article, as summed in the following chart (from Corver & van Koppen 2009: (13)):

(82) *Inflection on Attributive Adjectives in Dutch*

	Definite	**Indefinite**
non-neuter – SG	de klein-**e** goochelaar *the small*-**e** *magician*	een klein-**e** goochelaar *a small*-**e** *magician*
non-neuter – PL	de klein-**e** goochelaars *the small*-**e** *magicians*	klein-**e** goochelaars *small*-**e** *magicians*
neuter – SG	het witt-**e** konijn *the white*-**e** *rabbit*	een wit konijn *a white*-∅ *rabbit*
neuter – PL	de witt-**e** konijn *the white*-**e** *rabbit*	witt-**e** konijnen *white*-**e** *rabbits*

Given such an identical morphological appearance, one may wonder whether the *e*-affix as a focus marker and the *e*-affix as an adjectival inflection are the same thing. A closer scrutiny suggests that the answer

should be negative. Address some key empirical arguments provided by Corver (2004) and Corver & van Kopper (2009). Firstly, while the adjectival inflection *-e* in colloquial Dutch does not apply to an indefinite, neuter and single noun, for a noun of this type to be legitimately elided, the presence of *-e* is required:

(83) a. Ik heb gisteren een zwart(*-**e**) konijn zien lopen
I have yesterday a black-**e** *rabbit see walk*
'I have seen a black rabbit yesterday.'
(from Corver & van Kopper 2009: (16))

b. Over konijnen gesproken…(Talking about rabbits…)
Ik heb gisteren een zwart-**e** ___ zien lopen.
I have yesterday a black-**e** *see walk*
'I have seen a black one yesterday.

Secondly, while in Dutch an attributive adjective derived from the past participle cannot exhibit inflection, as shown by the prohibition of *-e* in (a) below, in the nominal ellipsis context this type of adjective always requires *-e*, as shown by the obligatoriness of *-e* in (b) (from Cover & van Koppen 2009: (19)):

(84) a. het doorbakken(*-**e**) konijn
the well.baked-**e** *rabbit*

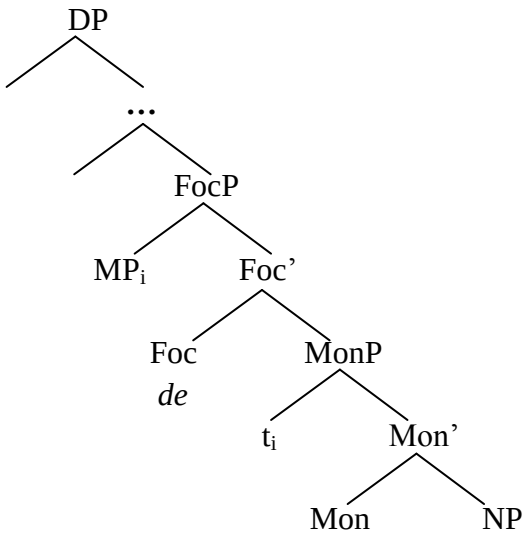
b. het doorbakken*(-**e**) ___
the well.baked-**e**

Given this, Corver (2004) and Corver & van Koppen (2009) advocate that the focus marker and the adjectival inflection in Dutch – though both are surfaced as an affix *-e* – are merely similar in a very superficial sense and

should be distinguished. Specifically, they claim that (i) the *-e* associated with a focal interpretation lexicalizes the head of the DP-internal FocP while (ii) the *-e* that exhibits agreement with a noun is the true inflectional element.

The investigation into Dutch manifests that the existence of a marker which features the DP-internal focus is not something unexpected for human languages. It is this observation that motivates me to propose that *de* in the Q-measurement [MP-*de*-N], which has been revealed to be linked to a (contrastive) focus on MP, is a DP-internal focus marker lexicalizing Foc, with [MP-*de*-N] correlating with an underlying structure like (85). This means that the *de* appearing in the Q-measurement construction is fundamentally different from the *de* occurring in the A-measurement construction, echoing the above mentioned semantic and syntactic discrepancies between [MeaClP$_Q$-*de*-N] and [MeaClP$_A$-*de*-N]. *De* in Chinese is an element that can be used to represent two different grammatical markers (i.e. a focus marker or a modifier marker), just like *-e* in Dutch.

(85)



Now, some notes are in order concerning means of focalizing MeaClPs. Note that to focalize the MeaClP in a Q-measurement [MeaClP-N] phrase, one does not necessarily adopt the marker *de* but may directly put a stress on MeaClP. Regarding this, I would like to emphasize that focalizing a MeaClP simply via stress without employing *de* does not involve a FocP projection. This idea is mainly grounded on two considerations. In the first place, focal stress is a supersegmental element that applies at a clausal level. This determines that one would not be able to tell whether an element is focally stressed without taking into consideration the stress properties of other co-occurring elements in the discourse. As illustrated by the following examples, *Beijing* can be determined as a focally stressed element only if it exhibits a stronger stress with respect to other co-occurring syntactic components, while the DP *Beijing* in isolation has nothing to do with determining the lack/presence of the focus stress. In other words, the focus featured by stress is always *relatively* determined.

(86) a. [$_{CP}$ Lisi yao qu **Beijing**$_{stress}$ lüyou] (, er bu shi Shanghai)
Lisi will go Beijing travel but not be Shangahi
'Lisi will go travelling in Beijing (rather than Shanghai).' (Focus: *Beijing*)
b. [$_{DP}$ Beijing] (Focus: undefined)

By contrast, when a DP-internal FocP is involved, the focus status of a constituent is determined by the syntactic position it occupies (i.e. [Spec, FocP]) while irrelevant to other co-occurring elements. As such, this type of focus is *absolutely* determined. Taking [MeaClP-*de*-N], the focus status of MeaClP is independently determined by the Spec-Head configuration held between MeaClP and Foc:

(87) [$_{DP}$[$_{FocP}$liang jin$_i$ [$_{Foc'}$de[$_{MonP}$ t$_i$ [$_{Mon'}$Mon[$_{NP}$putao]]]]]] (Focus: *liang jin*)
two catty-Cl DE grape

In the second place, notice that focal stress may apply to various kinds of syntactic categories, among which VPs, AdvPs, APs, etc., as shown below:

(88) a. Lisi cong Hafo **zou**$_{stress}$ dao le MIT,
Lisi from Harvard walk to Asp MIT
women yiwei ta hui zuo ditie qu ne
we think he will take subway go SFP
'Lisi went to MIT from Harvard by foot, while we thought he would go there by subway.'

b. Lisi [**hen kuai**]$_{stress}$ jiu xie-wan le lunwen,
Lisi very quick then write-finish Asp paper
qita tongxue hai mei kaishi xie
other student still not.have start write
'Lisi finished writing his paper very quickly, while other students have not yet started to write.'

c. Lisi bu xihuan **neixiang**$_{stress}$ de nühai,
Lisi not like introversive DE girl
ta xihuan huopo de nühai
he like vivacious DE girl
'Lisi does not like introversive girls; he likes vivacious girls.'

Given this, if focal stress is indeed an indication of the existence of a FocP projection in the nominal domain, in the same logic nothing would prevent one from analyzing stressed categories like e.g. VPs, AdvPs, and APs as

also involving FocPs. This line of analysis, nevertheless, undesirably makes the projecting of FocP highly unconstrained in the grammar and concomitantly weakens the FocP theory. Given this, Therefore, the present study assumes that only [MeaClP-*de*-N] but not [$\text{MeaClP}_{\text{stress}}$-N] underlyingly correlates with a DP-internal FocP projection.

A last word needs to be said about the very nature of the focus marker *de*. Within the present account, the focus marker *de* is treated as simply a signal which "visibilizes" movement from the lower [Spec, MonP] to the higher [Spec, FocP]. I suggest that the employment of *de* here be best understood as being associated with a communication principle which requires the way of information packaging to be represented at the linguistic level as explicitly as possible. To illustrate, imagine a situation where the MeaClP originated at [Spec, MonP] raises to [Spec, FocP] in a "quiet" manner, namely, without being accompanied by any markers. Then upon hearing a [MeaClP-N] sequence like *yi jin pingguo* (without stress), the addressee would be clueless to tell whether *yi jin* is intended as being contrastively focused or not (see the ambiguity shown below), hence a difficulty of precisely grasping the speaker's intension.

(89) yi jin pingguo

one catty-Cl apple

'a catty of apples'

a. [$_{\text{FocP}}$ yi jin$_{\text{i}}$ [$_{\text{Foc'}}$ Foc [$_{\text{MonP}}$ t$_{\text{i}}$ [$_{\text{Mon'}}$ Mon [$_{\text{NP}}$ pingguo]]]]]

b. [$_{\text{MonP}}$ yi jin [$_{\text{Mon'}}$ Mon [$_{\text{NP}}$ pingguo]]]

Whereas when *de* is surfaced, that MeaClP and N are linearly discontinuated offers an explicit indication that some DP-internal

movement has taken place, which cues the addressee that the MP involved needs be interpreted as a focused element[31].

3.2.4.4.3 Consequences

The analysis presented above has the following consequences. Firstly, it allows us to well explain the contrast between [MeaClP$_Q$-*de*-N] and [MeaClP$_Q$-N] in terms of accommodating a contrastive demonstrative (cf. Tsai 2003):

(90) a. **zhe**$_{stress}$ san bang niurou bi
this three pound-Cl beef than
na$_{stress}$ liang pang niurou xinxian
that two pound-Cl beef fresh
'This three pounds of beef is fresher than that two pounds of beef.'

b. #**zhe**$_{stress}$ san bang de niurou bi
this three pound-Cl DE beef than
na$_{stress}$ liang pang de niurou xinxian
that two pound-Cl DE beef fresh
'This three pounds of beef is fresher than that two pounds of beef.'

Within the present account, this phenomenon can be explained by assuming that the demonstrative *zhe* 'this'/*that* 'that' with a contrastive force is

[31] Such a "visibility" effect can also be observed in the information packaging applied to the clausal domain. For example, a clause-level topic can always be explicitly marked by a particle *a* followed by a pause (cf. Li & Thompson 1981):

(i) na zhi mao a, wo tiantian dou neng zai xuexiao menkou kanjian
that Cl cat Par I every.day DOU can at school doorway see
'That cat, I can see it every day at the doorway of the school.'

originated under Foc (which presumably later moves up to D to give rise to a definite interpretation for the whole nominal expression). In this case, since the [+Foc] feature of Foc has been checked in-situ by lexical insertion, no specifier movement would be triggered. Consequently, the co-occurrence of the contrastive demonstrative and [MeaClP$_Q$-*de*-N], which results from specifier movement from [Spec, MonP] to [Spec, FocP], is impossible.[32]

Second, the present analysis is able to capture the intuition that it is not so natural for [MeaClP$_Q$-*de*-N] to be used in isolation. As pointed out to me by Prof. D.-X. Shi (p.c.), a [MP$_Q$-*de*-N] expression is not perfectly fine in Mandarin Chinese in the absence of other co-occurring (or implicity presupposed) measure expression(s):

(91) a. ? Lisi mai le san bang de pingguo
Lisi buy Asp three pound-Cl DE apple
'Lisi bought three pounds of apples.'
b. Lisi mai le san bang de pingguo,
Lisi buy Asp three pound-Cl DE apple

[32] As noted by Tsai (2003), although being incompatible with a contrastive demonstrative, [MeaClP$_Q$-*de*-N] can co-occur with an appositive demonstrative, as exemplified below (from Tsai 2003: (35) with slight modification):

(i) wo yao na san bang de rou
I want that three pound-Cl DE meat
a. 'I want that meat, the amount of which is three pounds.'
b. '*I want **that** three pounds of meat (,not **this** three pounds of meat).'

To account for the fact that [MeaClP$_Q$-*de*-N] perfectly accommodates an appositive demonstrative, I tentatively suggest that the appositive demonstrative be based-generated under D (associated with a deictic interpretation), the highest level within the DP projection. Accordingly, the occurrence of an appositive demonstrative does not constitute a block for MeaClP to move from [Spec, MonP] to [Spec, FocP], and thus [Appositive demonstrative-MeaClP$_Q$-*de*-N] is always licit.

liang bang de chengzi, wu bang de xiangjiao
two pound-Cl DE orange five pound-Cl DE banana
'Lisi bought three pounds of apples, two pounds of oranges, and five pounds of bananas.'

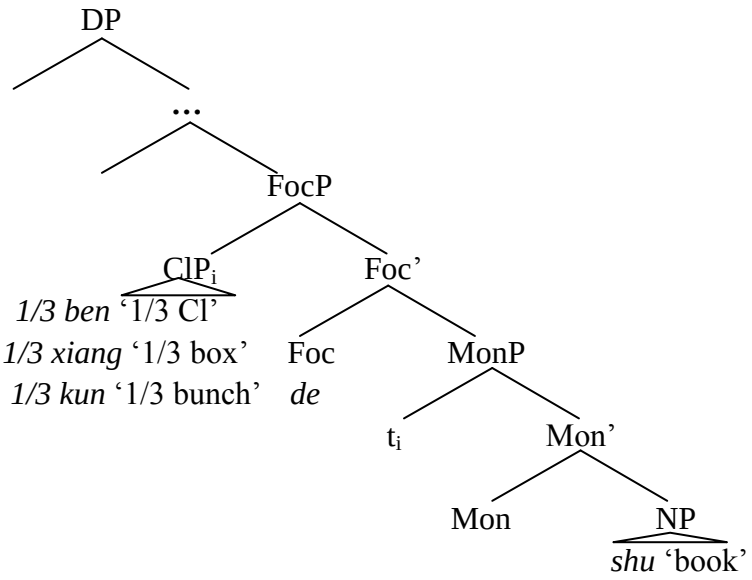
This fact is not surprising under the present analysis. Given that the generation of [MeaClP$_Q$-*de*-N] is associated with a contrastive focus interpretation of MeaClP$_Q$, it naturally follows that [MeaClP$_Q$-*de*-N] would be used only in the context where a contrast in terms of measure value can be felicitously established, such as in (91b), whereas the [MeaClP$_Q$-*de*-N] expression which lacks contrastive counterparts (either explicitly specified or implicitly intended) would give rise to unnaturalness, as shown in (91a).

A third consequence concerns the long-lasting issue with respect to the licensing of [Num-Cl-*de*-N] in Mandarin Chinese. It has been long advocated that in Mandarin Chinese while measure words/massifiers can perfectly enter into a [Num-Cl-N]/[Num-Cl-*de*-N] alternation (under a quantificational reading), ill-formedness arises when *de* intervenes between individual classifiers/count-classifiers and nouns (e.g. Tai 1994; Cheng & Sybesma 1998; Lu 2007, 2008; Liu 2008; Wang 2008). Challenging this generalization, the discussion in Chapter 2 has made it clear that a key factor in determining whether a quantificational [Num-Cl-*de*-N] sequence can be legitimately formed lies in whether the classifier denotes a standardized interval unit, namely representing a well-determined measure value.

Now consider how the treatment of *de* as a focus marker coupled with the present dichotomous syntactic analysis for Chinese ClPs can straightforwardly derive the discrepancy among classifiers with respect to the (non-)licensing of *de*. Given that a standardized INT-container/individual/group/partitive classifier is in essence akin to a

measure classifier in that both of them encode a well-determined measure value (with the only difference in whether the measure value is contextually set or is lexically fixed), it is suggested that [Num-Cl-N] phrases containing this kind of classifiers should be uniformly treated as Q-measurement constructions and underlyingly correlating with MonPs. Namely, in this case Num and Cl constitute an "intransitive" ClP structure (cf. Section 3.1.1) which occupies [Spec, MonP]. According to this, it naturally follows that it is always structurally possible for this type of [Num-Cl-N] to licitly have a [Num-Cl-*de*-N] counterpart as long as the [Num-Cl] part is intended to be focused, as visualized below (here fractions are adopted to guarantee the classifies under discussion to denote standardized interval units, cf. Section 2.2.4.2):

(92)



By contrast, since classifiers irrelevant to standardized interval units correlate with a ClP scheme like [$_{ClP}$ NumP[$_{Cl'}$ Cl NP]], the ungrammaticality of the [Num-Cl-*de*-N] counterpart can be accounted for in that here Num and Cl do not form a constituent, as a result of which it is

impossible for [Num-Cl] to undergo movement and consequently [Num-Cl-*de*-N] cannot be legitimately generated.[33]

Lastly, with the aid of the account presented here, a series of syntactic discrepancies between [MeaClP$_Q$-*de*-N] and [MeaClP$_A$-*de*-N] as shown in Section 3.2.3.1 turn out to be unsurprising. To be specific, with respect to the apparent optionalness of *de* in [MeaClP$_Q$-*de*-N] (in contrast with the obligatoriness of *de* in [MeaClP$_A$-*de*-N]), it can be explained in that *de* as a focus maker would only occur as a consequence of movement from [Spec,

---

[33] At this point, a related question might be quickly raised as to why movement from [Spec, ClP] to [Spec, FocP] is also prohibited in Chinese. See the ungrammatical [Num-*de*-Cl-N] below:

(i) *Lisi mai le san de ge pingguo (er bu shi si ge)
Lisi buy Asp three DE Cl apple but not be four Cl
'Lisi bought three apples rather than four.'

To account for this, it is first worth noticing that in Chinese quantities can only be legitimately expressed by means of employing *both* a numeral *and* a classifier. Specifically, a Chinese numeral in its own right is defective in expressing numeral quantification over entities even if the associated classifier has been contextually specified and semantically highly recoverable, as illustrated below:

(ii) A: Lisi mai le ji ge pingguo?
Lisi buy Asp how.many Cl apple
'How many apples did Lisi buy?'
B: san *(ge).
three Cl
'Three.'

Furthermore, notice that in the context of quantifying entities, a numeral cannot independently stand as a focused element without an accompanying classifier:

(iii) Lisi mai le san ge pingguo er bu shi si *(ge)
Lisi buy Asp three Cl apple but not be four Cl
'Lisi bought three apples rather than four.'

In view of this, I intend to attribute the ungrammaticality of [Num-*de*-Cl-N] as shown in (i) to the fact that the Chinese numeral alone cannot serve as a quantity-denoting element concerning entities, which concomitantly determines that a quantity-concerned focus would not target Num alone to the exclusion of Cl. Accordingly, movement of NumP to [Spec, FocP] would not be available, hence the ungrammaticality of [Num-*de*-Cl-N].

MonP] to [Spec, FocP] rather than intrinsically bearing a syntactic relation with $MeaClP_Q$. As for the non-licensing of a quantifier preceding [$MeaClP_Q$-*de*-N] and the impossibility of stacking [$MeaClP_Q$-*de*], upon the analysis that such kind of *de*-marked expression is a FocP dominating a MonP, it can be attributed to ageneral semantic constraint that there cannot be more than one quantificational element within one nominal phrase (cf. Chomsky 1981; Huang 1982).

3.3 A note on nominal topicalization/ellipsis

Before closing this chapter, this section will speculate on the reason for the discrepancy between [$MeaClP_Q$-*de*-N] and [$MeaClP_A$-*de*-N] in terms of licensing nominal topicalizing/ellipsis. As this is a rather more complicated and puzzling phenomenon which is still in the midst of a heated discussion, the proposal to be presented below will be of a highly speculative character and await more research in the future.

To begin with, notice that given a [MeaClP-*de*-N] sequence, there is a corresponding relation between the (im-)possibility of topicalizing N on the one hand and the (non-)licensing of N-ellipsis on the other: if N is allowed to be topicalized, it is also able to undergo ellipsis; whereas if N cannot be topicalized, N-ellipsis would be impossible, too; and vice versa. See the examples below:

(93) a. *N-topicalization*

baijiu_i wo mai le 40 du de e_i

liqueur I buy Asp degree-Cl DE

'As for liqueur, I bought that of 40 degree.'

b. *N-ellipsis*

ta mai le 60 du de baijiu$_i$, wo mai le 40 du de e_i

he buy Asp degree-Cl DE liqueur I buy Asp degree-Cl DE

'He bought 60 degree liqueur; I bought 40 degree liqueur.'

(94) a. *N-topicalization*

*niurou$_i$ wo yigong mai le 6 bang de e_i

beef I altogether buy Asp pound-Cl DE

'As for beef, I altogether bought 6 pounds.'

b. *N-ellipsis*

*ta yigong mai le 6 bang de niurou$_i$,

he altogether buy Asp pound-Cl DE beef

wo mai le 4 bang de e_i

I buy Asp pound-Cl DE

'He altogether bought 6 pounds of beef; I bought 4 pounds.'

The close correlation between N-topicalization on the one hand and N-ellipsis on the other is not Chinese-specific. As a matter of fact, similar phenomena have been observed in many languages such as Dutch, English, Greek, German, and Hungarian (Fanselow 1988; McNay 2005, 2007, 2009; van Hoof 2005a, 2005b; Ntelitheos 2004). Taking Hungarian for example, it has been noted that N-topicalization and N-ellipsis are subject to the same morphological constraint. To be specific, whereas in Hungarian prenominal attributive modifiers do not exhibit inflection, for a noun to be grammatically elided or topicalized, its preceding attributive adjective is obligatorily inflected for number and case, as illustrated below (data from Ntelitheos 2004: (44) and (62)):

(95) látam nag bicikliket

saw big bike-PL-Acc

'I saw big bikes.'

(96) *N-ellipsis*

a. látam nagyokat

saw *big-**PL-Acc***

'I saw big ones.'

b. * látam nagy

saw *big*

Intended: 'I saw big ones.'

(97) *N-topicalization*

a. bicikliket látam nagyokat

bikes-PL-Acc saw *big-**PL-Acc***

'I was big bikes.'

b. * bicikliket látam nagy

bikes-PL-Acc *saw* *big*

'I saw big bikes.'

To capture such a cross-linguistic parallelism between N-topicalization and N-ellipsis, I first suggest that the two syntactic contexts involve the same type of empty category and thus are subject to the same licensing condition. Specifically, in dealing with the formal licensing condition on covert head nouns in Chinese, I subsume N-topicalization under the notion of ellipsis and follow a standard assumption on ellipsis that an elided element must be properly head-governed (e.g. Lobeck 1995; Saito & Murasugi 1990; Saito *et al*. 2008; Sleeman 2006; Tsai 2011). Crucial to the present theory is the proposal that, the notion of proper head-government here should be understood in terms of a [+Part] feature on the head, which is in turn motivated by the observation that a "partitivity" meaning in the sense of Sleeman (2006) seems to play a key role in licensing eliding the head noun of a complex nominal phrase in Chinese.

To illustrate, notice that given a complex nominal phrase, the (in-)felicity of generating a noun-less counterpart expression (either an N-topicalization or N-ellipsis construction in the traditional sense) depends on the (un-)availability of an interpretation that the referent/referents of the complex nominal expressions is/are included within some superset (either conceptually or empirically) established in the domain of discourse. As exemplified by the contrasts below, in cases where an alternative set of books in addition to the books on the shelf are semantically available, as in (a), an empty head noun meaning 'book' is fine. Whereas in (b), where a continuation makes it impossible for the books on the shelf to be understood as being included in a superset which contains other alternative set(s) of books, a covert head noun 'book' gives rise to infelicity:

(98) a. shu_i, Lisi du-wan le shujia-shang de e_i;
book Lisi read-finish Asp bookshelf-on DE
ta dasuan mingtian kaishi du zhuo-shang de shu.
he plan tomorrow begin read table-on DE book
'As for books, Lisi has finished reading those on the bookshelf.
He planned to start to read the books on the table tomorrow.'

b. #shu_i, Lisi du-wan le shujia-shang de e_i;
book *Lisi read-finish Asp bookshelf-on DE*
ta suoyou de shu dou zai nali le.
he all DE book DOU at there SFP
'As for books, Lisi has finished reading those on the bookshelf.
All of his books are there.'

(99) A: wo tingshuo Lisi zuijin du le henduo shu_i, zhende ma?
I hear Lisi recently read Asp a.lot.of book true SFP
'I heard that Lisi has read a lot of books recently. Is it true?'

B(a): shi de, ta yijing du-wan le shujia-shang de e_i.
yes DE he already read-finish Asp bookshelf-on DE
zhuo-shang de shu ye kuai du-wan le.
table-on DE book also almost read-finish SFP
'Yes, he has already finished reading those on the bookshelf. He also almost finished reading the books on the table.'

B(b): # shi de, ta yijing du-wan le shujia-shang de e_i.
yes DE he already read-finish Asp bookshelf-on DE
ta suoyou de shu dou zai nali le
he all DE book DOU at there SFP
'Yes, he has already finished reading those on the bookshelf. All of his books are there.'

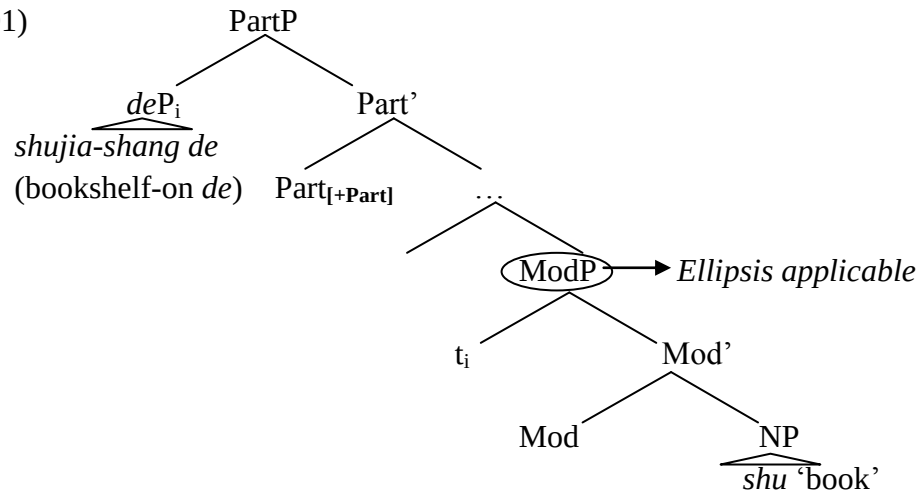
Adopting the hypothesis that ellipsis is a PF deletion phenomenon (cf. Saito & Murasugi 1990; Merchant 2001; Saito *et al.* 2008; Corver & van Koppen 2009), the above shown semantic requirement coupled with the aforementioned formal licensing condition on ellipsis (i.e. the proper head-government condition) leads me to formulate a constraint on Chinese nominal ellipsis as below:

(100) *Licensing Condition on Chinese nominal ellipsis*
In Chinese, the head noun or the constituent containing the head noun can be elided from a complex nominal phrase at PF only if it is governed by a head with a [+Part] feature.

With this in mind, it is further speculated that in Chinese neither Mod nor the DP-internal Foc is born with [+Part]. As for cases involving ModPs as in (98) and (99), a hypothesis to be attempted here is that the

DP-periphery system here includes a Partitive Phrase (PartP) dominating ModP. Part is a functional head encoding a [+Part] feature, which occurs in the DP left periphery and gives rise to a referential property of partitivity.[34] It is assumed that for a DP-internal constituent to obtain a partitivity interpretation (namely, being interpreted as specifying a property for determining a subset of the set denoted by the head noun or by a nominal phrase containing the head noun), at LF it needs to end up in a Spec-Head configuration with Part, by means of which the [+Part] feature on Part can be appropriately checked. Take (98-99). Along the present line, the noun-less expression *shujia-shang de* [e] in (b)-examples should correlate with a structure as depicted below, where the *de*-marked modifier moves from [Spec, ModP] to [Spec, PartP] to acquire a partitive interpretation. In this structure, ModP, which is under government by the [+Part]-featured head Part, can always be grammatically elided in accordance with the licensing condition (100).

(101)

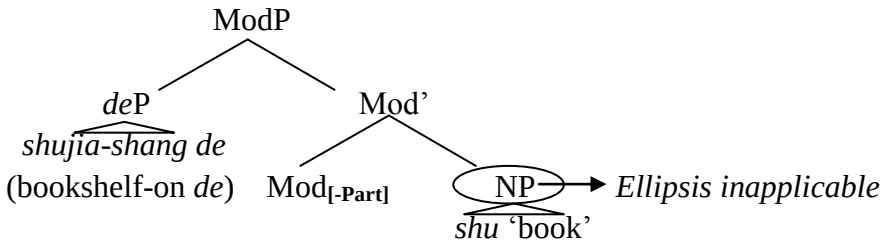


Whereas for (98a) and (99a), by contrast, given that (i) a partitive reading is irrelevant in the given context and thus no PartP layer would project, and

[34] See Vangsnes (2001), Bašić (2004), and Hsieh (2008) for empirical evidence from English, Serbian, and Chinese that motivates a (higher) DP-internal functional layer dedicated to a partitive interpretation.

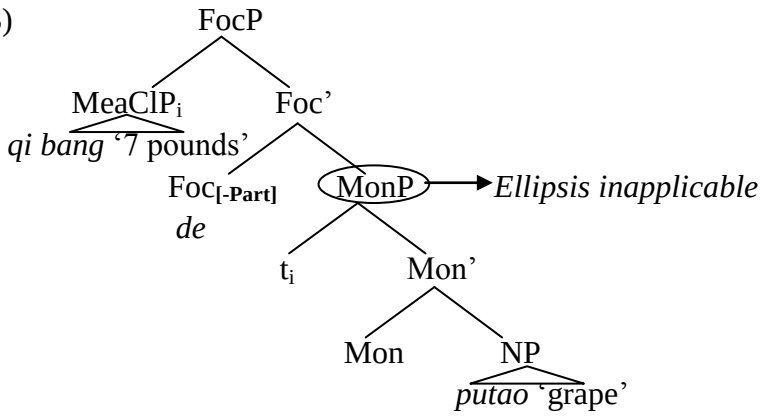
that (ii) Mod itself carries no [+Part] feature, the licensing condition (99) cannot be fulfilled, hence the impossibility of nominal ellipsis.

(102)



In the same vein, since under the present assumption the DP-internal Foc bears no [+Part] feature, according to (100), Foc does not qualify as a licensor of nominal ellipsis, from which the ungrammaticality of [MeaClP_{Q}-*de*-∅] straightly follows.

(103)



Now one may ask why in Dutch the DP-internal Foc can allow a covert noun to follow (cf. Corver & van Koppen 2009) whereas this is prohibited in Chinese. A suggestive answer is that this be due to the fact that nominal ellipsis in different languages may involve different licensing requirements, as already argued by Sleeman (2006). For example, it has been noted that while French only allows nominal ellipsis to apply to a specific/definite DP, English permits the head noun of a non-specific nominal expression to be elided, as illustrated below. In view of this, Sleeman has advocated that

while specificity is required for noun ellipsis in French, it is irrelevant to the licensing of noun ellipsis in English.

(104) *French*

a. trois [e] arriveront demain

'Three will arrive tomorrow.' (from Sleeman 2006: Ch. 2, (98))

b. J'ai lu trois [e] de ses livres

'I have read three of his books.'(from Sleeman 2006: Ch.2, (100))

c. Je préfère le troisième [e]

'I prefer the third.' (from Sleeman 2006: Ch.2, (108))

d. *J'ai lu trois *e*

Intended: 'I have read three.' (from Sleeman 2006: Ch. 2, (137))

(105) *English*

I have read three [*e*].

Following this spirit, it is suggested in the present study that the discrepancy between Chinese and Dutch in licensing the complement of the DP-internal Foc to be elided should be best thought of in terms of the distinction between the two languages in the licensing requirement on nominal ellipsis: while Dutch nominal ellipsis is licensed by a [+Foc] head, Chinese nominal ellipsis needs to be licensed by a [+Part] head. Due to the limitation on space, I will leave an in-depth pursuit of this approach for further research.[35]

[35] This line of consideration can also be applied to the Chinese noun-less [Num-Cl-*e*] construction. Notice that in Chinese no matter the classifier involved denotes a standard interval unit or not, a [Num-Cl-*e*] expression can always be felicitously formed as long as the semantic content of [*e*] can be recovered, so is a [Num-ModCl-*e*] expression ("ModCl" refers to the compound classifier composed by an adjectival modifier and a classifier stem; cf. Chapter 4). See the following topicalization constructions for example:

(i) a. pingguo$_i$, Lisi mai le liang jin e_i

apple Lisi buy Asp two catty-Cl

'As for apples, Lisi bought two catties.'

b. fangzi$_i$, tamen chai le liang dong e_i
house they tear-down Asp two Cl
'As for houses, they tore down two.'

c. pijiu$_i$ ta he le yi xiao-ping e_i
beer he drink Asp one small-bottle$_{Cl}$
'As for beer, he drank a small bottle.'

Within the present framework I suggest that this can be explained by assuming that Mon, the discretizing-functioned Cl (i.e. the transitive Cl), and Eval (cf. Chapter 4 for an EvalP analysis for [Num-ModCl-N]) all carry a [+Part] feature. To be concrete, Mon expresses [+Part] as it is relevant to measuring out a specific quantity of entities from a wider reference set that is denoted by the head noun; the [+Part] nature of a transitive Cl could be thought of in that this type of Cl helps to determine a set comprised of discrete, countable members out of a larger, originally singular-/plural-neutral set denoted by the head noun; and the [+Part] property of Eval is best understood in that the subjective evaluation encoded in Eval is grounded in comparison concerning some property between a target set of entities on the one hand and a reference set of entities on the other (with the two being included in the same superset denoted by the head noun; cf. Chapter 4). Therefore, it perfectly accords with (100) that these three heads can formally license their complement to be elided. Schematically:

(ii) a. [$_{MonP}$ [$_{ClP}$ *liang jin*] [$_{Mon'}$ Mon$_{\textbf{[+Part]}}$ [$_{NP}$ ~~*pingguo*~~]]]
b. [$_{ClP}$ *liang* [$_{Cl'}$ *dong*$_{\textbf{[+Part]}}$ [$_{NP}$ ~~*fangzi*~~]]]
c. [$_{EvalP}$ [$_{ClP}$ *yi xiao-ping*] [$_{Eval'}$ Eval$_{\textbf{[+part]}}$ [$_{NP}$ ~~*pijiu*~~]]]

At the semantic level, the consideration of associating the licensing of nominal topicalization/ellipsis in Mandarin Chinese to [+Part] rather than to focus (contra Pan & Hu 2000) is largely motivated by the fact that the following nominal topicalization/ellipsis constructions could hardly be thought of in terms of the existence of focus whereas they could be well accounted for in terms of [+Part]. I thank Prof. D.-X. Shi for bringing this issue into my attention.

(iii) a. pingguo$_i$, Lisi mai le san ge e_i
apple Lisi buy Asp three Cl
'As for apples, Lisi bought three.'

b. A: Lisi mai le duoshao pingguo$_i$?
Lisi buy Asp how.many apple
'How many apples did Lisi bought?'

B: san ge e_i
three Cl
'Three.'

3.4 Summary

This chapter started with a dichotomous theory for Chinese classifier phrases involved in numerical entity quantification. At the syntactic level, Chinese classifiers were divided into two types, with those denoting standardized interval units correlating with an intransitive configuration, where Cl takes no complement, while those irrelevant to a standardized-interval-unit meaning associated with a transitive syntactic structure, where Cl takes an NP as its complement.

With respect to measurement constructions in Mandarin Chinese, it was shown that the particular syntactic formation adopted is decisively determined by the semantic relation between the measure value denoted by [Num-Measure Cl] on the one hand and the measure target expressed by the head noun on the other. A distinction was drawn between quantificational measurement and attributive measurement. With respect to the [MeaClP-*de*-N] formation in Mandarin Chinese, it was assumed that [MeaClP_{A}-*de*-N] is underlyingly a ModP containing a functional projection *de*P in its Spec position, whereas [MeaClP_{Q}-*de*-N] correlates with a DP-internal FocP and the surface linear order is derived via DP-internal movement of MeaClP_{Q} from [Spec, MonP] to [Spec, FocP], a process signaled by the focus marker *de*.

Chapter 4 Adjectival modification of classifiers

4.1 Syntactic status of pre-classifier adjectives

It has been long discovered that in Mandarin Chinese a classifier may be preceded by an adjective (cf. Lu 1987; Tang 1990). A pre-classifier adjective could be either semantically gradable, which allows for modification in terms of degree, such as e.g. *da* 'big' and *xiao* 'small' , or semantically non-gradable, which is never compatible with degree modification, such as *zheng* 'whole', as illustrated below:

(1) *Gradable adjectives*

a. hen da/xiao
very big/small
'very big/small'

b. yi da-xiang shu
one big-box$_{Cl}$ book
'two big boxes of books'

c. yi xiao-jie xiangyan
one small-section$_{Cl}$ cigarette
'a small section of cigarette'

(2) *Non-gradable adjectives*

a. *hen zheng
very whole
'*very whole'

b. yi zheng-xiang shu
one whole-box$_{Cl}$ book
'a whole box of books'

With respect to the syntactic status of pre-classifier adjectives, the stance taken here is that they are not phrasal elements but combine with classifiers to form zero-level elements (see also Tang 1990). It has been well-established in the literature that, (i) the modificational marker *de* in Mandarin Chinese can only accommodate phrasal modifiers (cf. Zhu 1982; Lü 1984; Shi 2002, 2003a, 2003b), (ii) the adverbial element adjoins only to the phrasal category (cf. Radford 1988; Carnie 2007), and that (iii) only the phrasal constituent can undergo preposing (cf. Radford 1988; Carnie 2007). Notice that in these three respects pre-classifier adjectives behaves totally differently from adjective phrases (APs). Firstly, pre-classifier adjectives can never be accompanied by *de*, in contrast with APs:

(3) AP-*de*: ✓

a. da/xiao de pingguo
   big/small DE apple
   'a big/small apple'

b. zheng de xigua
   whole DE watermelon
   'a whole watermelon'

(4) A-*de*-Cl: ✗

a. *liang da/xiao de xiang shu
   two big/small DE box-Cl book
   Intended: 'two big/small boxes of books'

b. *yi zheng de ge xigua
   one whole DE Cl watermelon
   Intended: 'a whole watermelon'

Secondly, unlike gradable APs, pre-classifier adjectives – even though the gradable ones – cannot be modified by degree adverbs:

(5) Adv-AP: ✓

Lisi de shubao hen da/xiao

Lisi DE bag very big/small

'Lisi's bag is very big/small.'

(6) Adv-A-Cl: ×

a. *liang hen da xiang shu

two very big box-Cl book

Intended: 'two very big boxes of books'

b. *yi hen xiao pian shuye

one very small Cl leaf

Intended: 'a very small leaf'

Thirdly, while prenominal phrasal modifiers such as *de*-marked modifiers could be preposed, say, in front of [Dem-Num-Cl], this is impossible for pre-classifier adjectives:

(7) [*de*P_i-Dem-Num-Cl-e_i-N]: ✓

a. na yi ben **xin** **de** shu

that one Cl new DE book

'that new book'

b. **xin** **de** na yi ben shu

new DE that one Cl book

(8) [A_i-Dem-Num-e_i-Cl-N]: ×

a. na liang **da-/xiao**-xiang shu

that two big-/small-box$_{Cl}$ book

'those two big/small boxes of books'

b. ***da/xiao** na liang xiang shu

big/small that two box-Cl book

Based on these facts, the present study will treat the combination of an adjective modifier and a classifier as a compound classifier. For simplicity, in what follows such kind of compound classifier will be labeled as ModCl (modified classifier)[36].

4.2 Semantic target of pre-classifier adjectives

4.2.1 A classifier-oriented analysis

This section will deal with the issue concerning the modifying target of pre-classifier adjectives. A first intuition might be that, given a [Num-ModCl-N] expression, if the classifier is a container/group/partitive classifier, what the adjective modifies is the classifier; whereas if the classifier is an individual classifier, the adjective "gets through" the classifier to modify the noun (cf. Yan 2003; Zong 2009). Take (9). It is seemingly the case that while 'big' in (a-c) is semantically associated with the classifier, which specifies the size of a box (containing apples)/a flock (composed by birds)/a section (of stick), 'big' in (d) is concerned with the noun 'leaf' rather than the classifier *pian*.

(9) a. yi da-xiang pinguo (*container classifier*)
one big-box$_{Cl}$ apple
'a big box of apples'

b. yi da-qun niao (*group classifier*)
one big-flock$_{Cl}$ bird
'a big flock of birds'

[36] Throughout the dissertation "ModCl" will be used to exclusively refer to compound classifiers consisting of adjectival modifiers, while cases involving other types of modifiers (such as the pre-classifier nominal *mu* 'wood' in *yi mu-xiang shu* 'a wooden box of books') will be set aside.

c. yi da-duan taijie (*partitive classifier*)
one big-section$_{Cl}$ step
'a big section of steps'

d. yi da-pian shuye (*individual classifier*)
one big-Cl leaf
'a big leaf'

As for cases involving a container/group/partitive classifier, it is not difficult to manifest that the pre-classifier adjective takes the classifier rather than the noun as its modifying target. This can be straightforwardly verified by the fact that [Num-ModCl-N] is not semantically equivalent to [Num-Cl-Mod-N], as exemplified below:

(10) a. yi da-xiang pingguo ≠ yi xiang da pingguo
one big-box$_{Cl}$ apple *one box-Cl big apple*
'a big box of apples' 'a box of big apples'

b. yi da-qun niao ≠ yi qun da niao
one big-flock$_{Cl}$ bird *one flock-Cl big bird*
'a big flock of birds' 'a flock of big birds'

c. yi xiao-duan taijie ≠ yi duan xiao taijie
one small-section$_{Cl}$ step *one section-Cl small step*
'a small section of steps' 'a section of small steps'

A classifier-oriented rather than noun-oriented nature of pre-classifier adjectives in these examples can be further manifested by the fact that, even the head noun is modified by an adjective that semantically contradicts the pre-classifier adjective, no infelicity would arise, as shown below:

(11) a. yi **da**-xiang hen **xiao** de pingguo

one big-box$_{Cl}$ very small DE apple

'a big boxes of very small apples'

b. yi **da**-qun hen **xiao** de niao

one big-flock$_{Cl}$ very small DE bird

'a big flock of very small birds'

c. yi **da**-duan **xiaoxiao** de taijie

one big-section$_{Cl}$ small DE step

'a big section of very small steps'

In the same vein, one may come to a hasty conclusion that the adjectival modifier preceding an individual classifier should semantically target the head noun, upon the observation that when the classifier in question is an individual classifier, the head noun never allows for modification by an adjective that semantically contradicts the pre-classifier adjective, as illustrated below:

(12) * yi **da**-pian hen **xiao** de shuye

one big-Cl very small DE leaf

Such a viewpoint, nevertheless, turns out to be untenable when more empirical facts are taken into consideration. The first challenge comes from the fact that in some cases, it is just impossible to modify a noun with the adjective that could perfectly precede the individual classifier co-occurring with this noun. Notice that if an adjective preceding an individual classifier indeed serves to modify the head noun and the linear order of "Num+A+Individual Cl+N" is a case of syntax-semantics mismatching, it would be expected that an adjective in front of an individual classifier could always be "put back" to the position

immediately before the noun, which is nevertheless failed by the examples below:

(13) a. yi xiao-zhang zhi
one small-Cl paper
'a small piece of paper'
b. *yi zhang xiao zhi
one Cl small paper

(14) a. yi bao-pian jirou
one thin-Cl chicken
'a thin piece of chicken'
b. *yi pian bao jirou
one Cl thin chicken

(15) a. yi chang-tiao ba
one long-Cl scar
'a long scar'
b. *yi tiao chang ba
one Cl long scar

Another piece of evidence against a noun-oriented nature of pre-individual classifier adjectives comes from the discrepancy in the types of adjectives allowed to occur in front of individual classifiers on the one hand and those compatible with head nouns on the other. Notice that treating the adjective preceding the individual classifier as modifying the co-occurring head noun entails an expectation that any adjectives semantically associated with the head noun may occur at the pre-classifier position. Contrary to such expectation, it is observed that adjectives compatible with individual classifiers are much more restricted than those compatible with nouns, as illustrated in (16-18).

(16) a. yi pian hong fengye
one Cl red maple leaf
'a red maple leaf'

b. *yi hong-pian fengye
one red-Cl maple leaf

(17) a. yi ben xin shu
one Cl new book
'a new book'

b. *yi xin-ben shu
one new-Cl book

(18) a. yi kuai zang mabu
one Cl dirty rag
'a dirty rag'

b. *yi zang-kuai mabu
one dirty-Cl rag

To be more specific, it is observed that pre-classifier adjectives are strictly confined to those that concern extension-related properties. The frequently used ones include e.g. the size adjective *da* 'big'/*xiao* 'small', the length adjective *chang* 'long', the thickness adjective *hou* 'thick'/*bao* 'thin', the composition-related adjective *zheng* 'whole', etc., as shown in (19) [37]:

[37] At this point it is worth clarifying that in the present study the extension-related meaning is treated as merely a *necessary* yet not *sufficient* condition for determining whether an adjective can legitimately modify a classifier. In fact, in addition to such condition, the (non-)licensing of a pre-classifier adjective, as to be shown in (20), could be subject to other factors such as e.g. the semantic interaction between the modified classifier on the one hand and the associated noun on the other. Since what concerns me here is the lexical semantic type of the adjectives that are *capable* of

(19) a. yi da-ben shu
one large-Cl book
'a large book'

b. yi xiao-pian shuye
one small-Cl leaf
'a small leaf'

c. yi chang-tiao shengzi
one long-Cl rope
'a long rope'

d. yi hou-da'er zhi
one thick-pile$_{Cl}$ paper
'a thick pile of paper'

e. yi bao-pian mianbao
one thin-Cl bread
'a thin piece of bread'

f. yi zheng-ping jiu
one whole-bottle$_{Cl}$ wine
'a whole bottle of wine'

To get around the problems raised by a "dichotomous" treatment on the modifying target of pre-classifier adjectives (which claims that pre-classifier adjectives could be either classifier-oriented or noun-oriented, depending on the classifier involved), it is instead advocated in the present study that pre-classifier adjectives, irrespective of the type of classifiers they combine with, uniformly target classifiers at the semantic level. Crucially, given (i) the theory that Chinese classifiers introduce partition units (cf. Chapter 2) and (ii) the observation that

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modifying classifiers, I will set aside a comprehensive discussion on non-lexical factors for a separate study.

adjectives that could legitimately participate in forming compound classifiers are necessarily extension-related, it is claimed in this dissertation that the motivation for using pre-classifier adjectives is to provide further specifying information concerning the extent of the partition unit represented by the classifier. To illustrate, *da* 'big' in (19a) means that the extent of the partition unit denoted by *ben* is evaluated as large when compared with the built-in division of books in common cases; *hou* 'thick' in (19d) specifies that the extent of the partition unit *da'er* 'pile' is great in comparison with the extent that is normally considered as represented by *da'er*; *zheng* 'whole' in (19f) manifests that the extent of the partition unit in question is captured in terms of a part-whole structure exhibited by *ping* 'bottle' and necessarily associated with a well-determined quantity specification(cf. Section 2.2.4.2).

A further claim to be made here is that the particular choice of a pre-classifier adjective should depend on the particular extension chosen by the speaker concerning which the extent of the partition unit is modified. To illustrate, for example, *da* 'big' and *xiao* 'small' would only be used when "size" is treated as a distinctive property in specifying the extent of the partition unit; *hou* 'thick' and *bao* 'thin' would be chosen when "thickness" is semantically relevant to evaluating the extent of the partition unit; *zheng* 'whole' is employed only when a well-determined part-whole compositional nature of the partition unit is taken as crucial for capturing the extent of the unit in question. This point can be best illustrated by the examples below. Notice that since most naturally 'leaf' associated with the classifier *pian* would be treated as a two-dimensional entity, in this case "thickness" is hardly taken as relevant to evaluating the extent of the partition unit denoted by *pian*; whereas 'bread' partitioned by *pian* is commonly understood as a three-dimensional entity, therefore thickness appropriately qualifies as a relevant property in specifying the

extent of the partition unit denoted by *pian*. As predicted by the present analysis, while the individual classifier *pian* would exclude modification by 'thick'/'thin' when the associated noun is 'leaf', it is perfectly compatible with 'thick'/'thin' when the associated noun is 'bread', as shown below:

(20) a. *yi bao-/hou-pian shuye
one thin-/thick-Cl leaf
b. yi bao-/hou-pian mianbao
one thin-/thick-Cl bread

With this in mind, now turn back to the earlier mentioned intuition that an adjective preceding an individual classifier is semantically associated with the head noun, as (apparently) supported by the fact that such pre-classifier adjective cannot contradict with the pre-nominal modifier in terms of semantics (see (12)). To deal with this phenomenon, notice that individual classifiers by definition represent a built-in semantic division of entities. This determines that they would by nature exhibit a close semantic relation with the associated noun. In this respect, individual classifiers significantly differ from container/group/partitive classifiers, as evidenced by the fact that while there is generally no restriction imposed on the semantic compatibility between a container/group/partitive classifier and its following noun, some kind of "agreement" relationship is always required between an individual classifier and its associated noun (cf. Tang 1990; Sio, 2006; Zhang 2007). For instance, while *shuye* 'leaf' can co-occur with the individual classifier *pian*, which is semantically compatible with flat, thin entities, it cannot accommodate the individual classifier like *ke*, which seeks for entities of a kernel-like shape.

(21) a. yi pian shuye
one Cl leaf
'a leaf'
b. *yi ke shuye
one Cl leaf

In view of such an "agreement" relationship between the individual classifier and the head noun, it is considered that the unacceptable (12) could be explained in the following way. Given that the semantic partition brought about by the individual classifier *pian* corresponds to the built-in division of the denotation of 'leaf', specifying the extent of the partition unit represented by *pian* as great would necessarily entail that the size of each naturally minimal token of 'leaf' is great. It is this semantic entailment that determines that a semantic contradiction between the pre-*pian* adjective and the pre-*shuye* modifier would lead to infelicity.[38] Therefore, (12) is not a true counterexample to the classifier-oriented analysis on pre-classifier adjectives presented here.

4.2.2 Consequences

The above analysis brings about the following welcome consequences. First of all, it can help to explain the observed restriction on the types of adjectives allowed to precede classifiers. Upon the assumption that pre-classifier adjectives semantically serve to specify/evaluate the extent

[38] Alternatively, one may treat the attribute denoted by an adjective preceding an individual classifier as capable of percolating to the noun as a result of the inherent agreement between the individual classifier on the one hand and the head noun on the other. Along this line, the ungrammaticality of (12) can be accounted for in that modifying *shuye* with "very small" undesirably contradicts with the "big" property which is percolated from the pre-classifier modifier downward to the noun.

of the partition unit denoted by the classifier, the ungrammatical expressions as shown in (16-18) naturally follow as the adjectives such as *hong* 'red', *xin* 'new', and *zang* 'dirty' express attributes irrelevant to the partitioning function of classifiers.

Secondly, given that evaluation expressed by a gradable adjective always needs to be based on a contextually determined standard of comparison (for example, whether or not an entity can be defined as "big" crucially depends on the standard contextually adopted for determining bigness; cf. Kennedy & McNally 2005), the present account predicts that if a classifier denotes a standardized interval unit, further specifying the classifier with a gradable adjective would be ruled out as this classifier is associated with a rigidly stipulated extent that does not vary with contexts. This is borne out by the fact that measure classifiers, which denote interval units with a fixed extent, can never be preceded by gradable adjectives:

(22) a. *yi da-jin rou[39]
one big-catty$_{Cl}$ meat

b. *yi xiao-mi bu
one small-meter$_{Cl}$ cloth

Another argument illustrating this point comes from the stacking of pre-classifier modifiers. Notice that in Mandarin Chinese the adjective *da* 'big' and *xiao* 'small' are allowed to further combine with a ModCl to form a larger compound classifier only if the ModCl is not in the form of "*zheng*+Cl", as exhibited below. Recalling from Section 2.2.4.2 that the

[39] As pointed out to me by Prof. D.-X. Shi (p.c.), in the old days of Hong Kong there were two measure classifiers called *da-jin* 'big-catty' and *xiao-jin* 'small-catty'. But in this case the modifier *da* and *xiao* do not serve to provide a comparative evaluation concerning the extent of the partition unit associated with *jin*. Rather, *da-jin* and *xiao-jin* are compounds with fixed denotations, with *da-jin* denoting 600 grams and *xiao-jin* equivalent to 500 grams.

pre-classifier *zheng* can only accommodate a standardized INT-classifier, the ungrammaticality of "gradable adjective+*zheng*+Cl" well corroborates the prediction that it is impossible for a partition unit with a fixed extent to be modified by a gradable adjective.

(23) a. yi xiao-bao-pian/*xiao-zheng-pian binggan
one small-thin-Cl/small-whole-Cl cookie
b. yi da-hou-da'er/*da-zheng-da'er wenjian
*one big-thick-pile$_{Cl}$/*big-whole-pile$_{Cl}$ file*

Thirdly, given the analysis that pre-classifier adjectives serve to specify the extent of partition units in terms of extensional properties (e.g. size, thickness, a part-whole composition, etc.), it is expected that if a classifier itself is semantically irrelevant to these properties, the classifier would be incompatible with adjectival modification. This is well corroborated by the following ungrammatical examples:

(24) a. *yi da-wei laoshi
one big-Cl teacher
b. *liang xiao-suo xuexiao
two small-Cl school
c. *yi da-jia jigou
one big-Cl institute
d. *yi xiao-men ke
one small-Cl course
e. *yi da-ge piqiu
one big-Cl ball

To account for the ungrammaticality of (24), notice that while the classifier like *ben* (e.g. "one *ben* book") semantically requires the associated noun to denote three-dimensional objects that has a flat surface and a measurable thickness, the classifiers like *wei, suo, jia*, and *ge*[40] are comparatively "abstract" and present no indications concerning concrete extensive physical properties. That only the former but not the latter can be modified by adjectives (cf. (19a)) fulfills the expectation that classifiers lacking an extension-related semantics do not allow for adjectival modification.

The crucial role played by an extension-related interpretation of classifiers in licensing pre-classifier adjectives can be further manifested by the fact that, for classifiers which may be used under an extension-related meaning in some contexts whereas under an extension-irrelevant meaning in other contexts, only in the former case can they accept adjectival modification. Consider the contrasts below:

(25) a. yi chang-tiao daiyu
one long-Cl hairtail

b. yi (*chang-)tiao xinwen
one long-Cl news

[40] *Ge* is widely treated as a generic classifier in Mandarin Chinese which has a highly "bleached" semantics and lexically does not entail any indications concerning the attributes of the partition unit it denotes (cf. Chao 1968; Lyons 1977; Li & Thompson 1981; Myers 2000; N. Zhang 2009). Such a semantic property of *ge* can be manifested by the fact that *ge* exhibits a considerably high compatibility with different types of noun denotations:

(i) yi ge piqiu/xiangzi/wangzhan/haoma/xiangfa/jiekou
one Cl ball/suit /website /number/idea/excuse

As shown here, *ge* could be associated with either a spherical ('ball') or cubic ('box') substantively exiting object, an entity without a shape in a physical sense ('website', 'number'), or even an abstract concept that cannot substantively represent themselves in the empirical world ('idea', 'excuse').

(26) a. yi da-kuai shitou

one big-Cl stone

b. yi (*da-)kuai xinbing

one big-Cl anxiety

(27) a. yi da-pian caodi

one big-mass$_{Cl}$ grassland

b. yi (*da-)pian huangwu

one big-mass$_{Cl}$ desolation

Note that the classifiers in (a)-examples are all contextually associated with substantively existing entities, where their extension-related interpretation is highly salient. To be concrete, *tiao* in (25a) specifies a rope-like property of the hairtail, *kuai* in (26a) features a lump-like characteristic of the stone, and *pian* in (27a) indicates a flat-surfaced shape of the grassland. Whereas in (b)-examples, with the classifiers being associated with entity types which do not represent their tokens in the empirical world as substantive objects, the extensive physical characteristics the classifiers exhibit in (a)-examples are significantly blurred: *tiao* in (25b) does not impose a rope-like requirement on each piece of news; *kuai* in (26b) does not aim to assign a lump-like state to 'anxiety'; and *pian* accompanied by 'desolation' in (27b) is hardly interpreted as a partition unit bringing about flat-surfaced objects. Conforming to the present analysis, only in cases where the extensional meaning of the partition unit is available can the classifier in question be modified by an adjective.

To sum up, pre-classifier adjectives in Chinese semantically target classifiers rather than head nouns. The motivation for using pre-classifier adjectives is to provide specifying information concerning the extent of

the partition unit denoted by the classifier in terms of certain extensive physical property.

4.3 Syntax of [Num-ModCl-N]

4.3.1 Non-transitivity of ModCls

Before getting down to a syntactic proposal, a closer examination concerning the semantic property of ModCls is in need. A basic claim to be made here is that ModCls are semantically "intransitive" elements, mainly motivated by the observation that the [Num-ModCl] sequence can stand on its own as a property-denoting element without either explicitly or implicitly presupposing the existence of a following noun. To illustrate this point, notice that in Mandarin Chinese [Num-ModCl] is able to be used as an answer to a *zengmeyang* 'how' question and allows for coordination with APs by *erqie*. What's more, in this case the presence of a noun following [Num-ModCl] would give rise to ungrammaticality. Given that a *zenmeyang* 'how' question asks for a predicative rather than argumental element (Zhu 1982) and that *erqie* is a connective exclusively used to coordinate property-denoting constituents in Mandarin Chinese (cf. Aoun & Li 2003: 143), the data below indicate that [Num-ModCl] can independently serve as a property-denoting element:

(28) A: ni zuotian mai de yu zenmeyang?
you yesterday buy DE fish how
'How is the fish you bought yesterday?'
B: yi da-tiao (*yu), erqie hai hen pianyi!
one big-Cl fish and even very cheap
'(It is) big and very cheap!'

(29) A: Lisi song-gei ni de shu zenmeyang?
Lisi send-to you DE book how
'How are the books Lisi sent to you?'
B: liang da-xiang (*shu), erqie dou shi quanxin de.
two big-box$_{Cl}$ book and DOU be brand-new DE
'(They are as many as) two big boxes and brand new.'

To accommodate this fact, Section 4.3.3 will propose an intransitive configuration for the classifier phrase headed by ModCl. Before getting down to a syntactic proposal, an investigation concerning the semantic property of [Num-ModCl-N] will be first provided in the following section.

4.3.2 Subjectivity of [Num-ModCl-N]

With respect to the interpretational property of [Num-ModCl-N], it will be shown in this section that it necessarily conveys a subjective evaluation meaning (see also X.-P. Li 2011).

The first claim to be made here is that, the lexical semantics of pre-classifier adjectives determines that the use of pre-classifier adjectives is necessarily associated with subjective judgment. Consider gradable adjectives first. Notice that evaluation of a gradable property (e.g. size, thickness, length, etc.) is by nature context-dependent. That is, as the standard of comparison varies from context to context, the speaker's judgment concerning the gradable property would concomitantly alter (Kennedy & McNally 2005 and the references therein). For instance, while one may consider an apple as big when comparing the apple with a cherry in terms of size, the same apple could be judged as small when the size comparison is conducted with respect to a watermelon. Given this, for

gradable pre-classifier adjectives, it is not difficult to understand that their gradable nature would determine that their usage is always determined by the standard of comparison the speaker subjectively presumes in the context. Take *yi da-wan fan* 'one big-bowl$_{Cl}$ rice'. The use of 'big' here implies that according to a particular standard of comparison adopted at the utterance time, the extent of the partition unit introduced by *wan* is evaluated as large with respect to what the speaker presupposes or expects it should be. Such a subjective meaning can be well verified by the fact that a speaker's evaluation of a *given* partition unit may vary in different contexts. See the illustration below (from X.-P. Li 2011: Ch.2, (15)):

(30) *The stewardess in the airplane handed each passenger a bowl of rice:*

a. na ge san sui de xiaohai gangcai chi le yi da-wan fan
that Cl three years DE kid just.now eat Asp one big-bowl$_{Cl}$ rice
'That three-year old kid ate a big bowl of rice.'

b. na ge lanqiu yundongyuan zhi chi le yi xiao-wan fan.
that Cl basketball player only eat Asp one small-bowl$_{Cl}$ rice
'That basketball player only ate a small bowl of rice.'

Given that commonly the bowl-packed rice served in the airplane is of a standard, uniform size, from an objective perspective, there should be no diversity in terms of evaluation concerning the extent of the partition unit represented by *wan* here. However, both (a) and (b), where the antonyms *da* 'big' and *xiao* 'small' are adopted to modify the same classifier, are completely felicitous. This shows that gradable pre-classifier adjectives, owing to their "relative" semantic nature, are closely associated with a subjective evaluation reading.

The subjective interpretation brought about by a gradable pre-classifier adjective can be further manifested by the fact that, in the

context where [Num-Cl-N] is irrelevant to any subjective flavor, modifying the classifier with a gradable adjective would be prohibited. Consider the following examples:

(31) a. Xinhuazidian shi yi (*xiao-)ben gongjushu
Xinhua-Dictionary be one small-Cl reference-book
'*Xinhua Dictionary* is a (*small) reference book.'

b. Dawei shi yi (*da-)zuo zhuming diaosu
David be one big-Cl famous statue
'*David* is a (*big) famous statue.'

c. Xiehou shi yi (*xiao-)ping xiangshui de mingzi
Chance be one small-bottle$_{Cl}$ perfume DE name
'*Chance* is the name of a bottle of perfume.'

In each of the above examples, the numeral classifier construction appears to the right of a predicational copular *shi* 'be' ([Num-Cl-N] stands as either a predicate, as in (a) and (b), or as part of a predicate, as in (c)). Crucially, these copular sentences are all definition statements, where [Num-Cl-N] serves to ascribe some defining property to the subject. Given that such kind of statement provides core objective, defining characteristics of an entity and is by nature context-independent, as expected, the use of pre-classifier adjectives is disallowed here.

Now let's consider how the non-gradable pre-classifier adjective *zheng* 'whole' conveys a subjectiveness effect. Recall from Section 2.2.4.2 that *zheng* can only be used to modify a classifier encoding a specific quantity specification (either inherently encoded or temporarily determined) but not a classifier which denotes an atomic unit or an interval unit with an arbitrary extent, as illustrated below:

(32) *INT-classifiers with an well-bounded extent*

a. Lisi he le yi zheng-ping hongjiu

Lisi drink Asp one whole-bottle$_{Cl}$ wine

'Lisi drank a whole bottle of wine'

b. Lisi du-wan le yi zheng-ben shu

Lisi read Asp one whole-Cl book

'Lisi finished reading a whole book.'

(33) *ATOM-classifiers*

a. Lisi da-sui le yi (*zheng-)ping hongjiu

Lisi break-broken Asp one whole-bottle$_{Cl}$ wine

'Lisi broke a (*whole) bottle of wine.'

b. Lisi mai le yi (*zheng-)ben shu

Lisi buy Asp one whole-Cl book

'Lisi bought a (*whole) book.'

(34) *INT-classifiers with an indeterminate extent*

a. zuotian lai le yi (*zheng-)qun ren

yesterday come Asp one whole-crowd$_{Cl}$ person

'Yesterday a (*whole) crowd of people came.'

b. Lisi zou le yi (*zheng-)duan hen qiqu de lu

Lisi walk Asp one whole-section$_{Cl}$ very rugged DE road

'Lisi walked on a (*whole) section of very rugged road.'

This leads me to suggest that the subjective evaluation conveyed by the pre-classifier *zheng* be best thought of in terms of the semantic interaction between *zheng* on the one hand and the associated classifier on the other. To be concrete, based on the discussion in Section 2.2.4.2, it is considered that the pre-classifier *zheng*, which provides a linguistic cue that the classifier in question denotes a standardized interval unit, serves to specify the extent of the partition unit via explicitly indicating a

part-whole structure of the partition unit. The use of the pre-classifier *zheng* reflects the speaker's intension to emphasize the part-whole interpretation of an INT-classifier as significant for an effective communication. That is to say, adopting [Num-*zheng*Cl-N] rather than [Num-Cl-N], the speaker intends to emphasize to the hearer that the classifier involved is necessarily interpreted as encoding a well-determined quantity specification. Relevant to the present discussion is the observation that such an emphatic force brought about by *zheng* is always associated with an interpretative effect that the quantity denoted by [Num-*zheng*Cl-N] is subjectively evaluated as high. This is corroborated by the fact that [Num-*zheng*Cl-N] can never co-occur with elements that downgrade the quantity, such as the adverb *zhi* 'only' as in (a) and a 'not-count-as-much' statement as in (b):

(35) a. Lisi zhi he le yi (#zheng-)ping hongjiu
Lisi only drink Asp one whole-bottle$_{Cl}$ wine
'Lisi drank only a (#whole) bottle of wine.'

b. Lisi du le yi (#zheng-)ben shu;
Lisi read Asp one whole-Cl book
zhe bu suan duo
this not count.as much
'Lisi read a (#whole) book; this does not count as much.'

The subjective flavor of [Num-*zheng*Cl-N] can also be manifested by the fact that, similar to cases involving gradable pre-classifier adjectives, it is infelicitous to use [Num-*zheng*Cl-N] in a definition statement, as shown below. All these facts lend empirical support to the stance that the non-gradable pre-classifier *zheng*, similar to gradable pre-classifier adjectives, also plays a role in conveying a subjective evaluation meaning.

(36) a. Xinhuazidian shi yi (*zheng-)ben gongjushu
Xinhua-Dictionary be one whole-Cl reference-book
'*Xinhua Dictionary* is a (*whole) reference book.'

b. Dawei shi yi (*zheng-)zuo zhuming diaosu
David be one whole-Cl famous statue
'*David* is a (*whole) famous statue.'

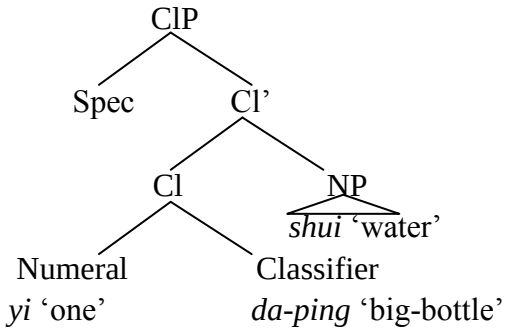
c. Xiehou shi yi (*zheng-)ping xiangshui de mingzi
Chance be one whole-bottle$_{Cl}$ perfume DE name
'*Chance* is the name of a (*whole) bottle of perfume.'

To sum up, it was demonstrated in this section that [Num-ModCl-N] distinctively differs from [Num-Cl-N] in that the former is necessarily associated with the speaker's subjective evaluation concerning the extent of the partition unit denoted by the Cl. Specifically, it was shown that for gradable pre-classifier adjectives such a subjectiveness effect is rooted in the very semantic nature of the adjective per se, while for the non-gradable pre-classifier *zheng* the subjective interpretation is introduced via an emphatic force brought about by *zheng*.

4.3.3 A syntactic proposal

In existing studies within the generative framework, there have been two main syntactic approaches proposed to deal with the syntax of the adjectively modified classifier in Mandarin Chinese. Tang (1990) represents the first line of approach. She postulates a pre-classifier adjective and a classifier as forming a word-level element, as depicted below:

(37)



It is true that such an analysis accommodates the fact that Chinese pre-classifier adjectives do not have a phrase status, as has been illustrated in Section 4.1. However, it runs into difficulties when it comes to the discrepancy between Cls and ModCls in terms of entering into the [Num-Cl-N]/[Num-Cl-*de*-N] alternation. As has been noted by e.g. B.-F. Lu (2007) and Hsieh (2008), a numeral classifier construction containing a modified classifier permits an intervening *de* between the classifier and the head noun, which (in some cases) constitutes a sharp contrast with the counterpart expression composed by a simplex classifier, as exemplified below. Uniformly treating both simplex classifiers and modified classifiers as X^0 elements that take an NP as its complement, Tang's account cannot desirably predict this contrast.

(38) a. san tiao (*de) yu
three Cl DE fish
'three fishes'

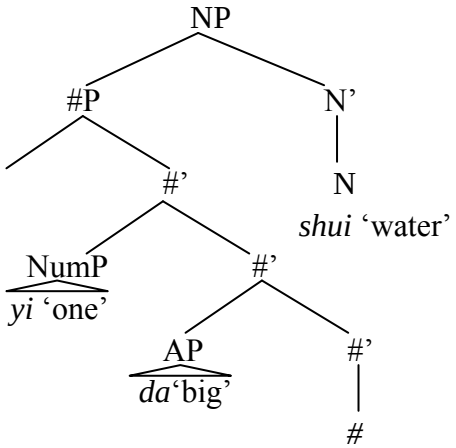
b. san da-tiao de yu
three big-Cl DE fish
'three big fishes'

(39) a. *yi zhang de dipian
one Cl DE negative
'a negative'

b. yi xiao-zhang de dipian (from Hsieh 2008: Ch. 2, (46))
one small-Cl DE negative
'a small negative'

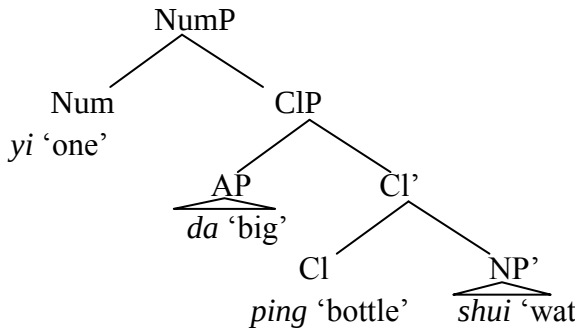
Along the second approach, a pre-classifier adjective was assigned a specifier status. This line was attempted by Hsieh (2008) and X.-P. Li (2011), who proposed structure (a) and structure (b), respectively:

(40) a.



(Hsieh 2008)

b.



(X.-P. Li 2011)

Such an approach is problematic in the following respects. On the syntactic side, both Hsieh's and X.-P. Li's hypothesis would necessitate an XP status for pre-classifier adjectives, which is however contrary to the non-phrasal syntactic behaviors exhibited by pre-classifier adjectives (cf. Section 4.1). On the semantic side, X.-P. Li claimed that (i) a pre-classifier adjective modifies [Cl-N] but not a classifier or a noun, and that (ii) a

pre-classifier adjective is predicative of the denotation of [Cl-N] (cf. X.-P. Li 2011: Section 2.5). If this is on the right track, it would be expected that a pre-classifier adjective should be able to participate in forming a predicational expression with [Cl-N]. Failing such expectation, the ungrammatical (b)-expressions below strongly suggest that there should be no predicational relation between the pre-classifier adjective and [Cl-N]:

(41) a. yi da-da'er wenjian
one big-pile$_{Cl}$ file
'a big pile of files'

b. *zhe da'er wenjian hen da
this pile-Cl file very small
"*This pile of files is very big."

(42) a. yi xiao-duan lu
one small-section$_{Cl}$ road
'a small section of road'

b. *zhe duan lu hen xiao
this section-Cl road very small
'*This section of road is very small.'

Before getting down to a new syntactic proposal on [Num-ModCl-N], let's recall the following key facts: (i) the use of ModCls does not depend on the presupposition of a following noun; (ii) [Num-ModCl-N] conveys a subjective evaluation meaning. To configurationally incorporate these facts, I follow the spirit of Doetjes & Rooryck (2002; D&R henceforth) in proposing a functional projection Evaluative Phrase (EvalP) to represent the underlying structure of [Num-ModCl-N].

In D&R (2002), a distinction is drawn between the "pure degree" quantificational construction and the "comparative" quantificational

construction in French, both of which exhibit a linear word order of [NP-*de*-NP]:

(43) a. beaucoup de livres (*pure degree*)
a.lot DE books
'a lot of books'

b. une montagne de livres (*comparative*)
a mountain DE books
'a mountain of books'

Such a dichotomy is based on the following phenomena. The first relevant fact concerns the agreement pattern. It is observed that agreement is triggered by the element following *de* in "pure degree" cases whereas by the element preceding *de* in comparative cases (data from D&R 2002: (2)):

(44) a. beaucoup de livres sont/*est tombé(s)
a.lot DE books are/is fallen
'a lot of books are/*is fallen.'

b. une montagne de livres *sont/est tombée
a mountain DE books are/is fallen
'a mountain of books *are/is fallen.'

Another difference between the two constructions concerns the (im-)possibility of being paraphrased in terms of quantity. It is found that while a comparative paraphrase of quantity is unavailable for "pure degree" cases like (43a), as shown by the ungrammatical (45a), it is perfectly welcomed by comparative cases like (43b), as illustrated by the well-formed (45b) (data from D&R 2002: (4)):

(45) a. *The quantity of books is such that it resembles a lot.

b. The quantity of books is such that it resembles a mountain.

To derive these discrepancies, at the syntactic level D&S assign two different configurations to the two constructions. To be specific, it is assumed that the comparative construction is underlyingly a relative clause involving predicate inversion while the pure degree construction correlates with a functional projection expressing evaluation (in the sense of Cinque (1999)). Irrelevant technical discussions aside, the syntactic structure proposed for the pure degree construction is schematized as below:

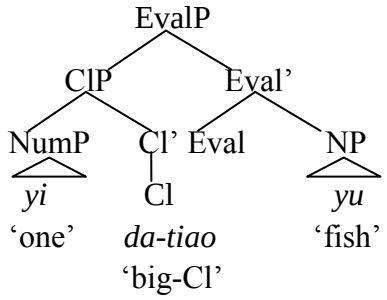
(46) [$_{\text{EvalP}}$ *beaucoup* Eval^{0} [$_{\text{DP}}$__ *de* [$_{\text{NP}}$ *livres*]]] (D&R 2002: (20b))

Under this analysis, *beaucoup* 'a lot' is assumed to be base-generated at [Spec, EvalP], and the whole construction, which underlyingly correlates with an EvalP, has to be interpreted as expressing an evaluation of high quantity. The linking element *de* is assumed to be originated at D and to indicate that the quantity of the head noun is not specified, and the EvalP layer serves to provide specification for the unspecified quantity information.

The proposal of the syntax of [Num-ModCl-N] to be presented here is inspired by D&S's DP-internal EvalP analysis with my revision. The basic idea is that the semantic interpretation of [Num-ModCl-N] can be read off directly from the underlying structure it correlates with. Specifically, it is hypothesized that [Num-ModCl-N] underlyingly correlates with a functional projection EvalP as depicted below. Eval is a phonologically null functional head which encodes a [+Eval] feature and is responsible

for the (subjective) evaluation interpretation of the whole construction. Eval is considered as taking as its complement an NP, and the occupant of [Spec, EvalP] serves to specify a subjective evaluation over the NP. In accordance with the facts discussed in Section 4.3.2, it is considered that the [Num-ModCl] combination conveys a subjective interpretation and carries a [+Eval] feature (which is in turn brought about by the pre-classifier adjective contained, as elaborated above). Structurally, it is assumed that [Num-ModCl] is an intransitive ClP headed by a compound classifier and is base-generated at [Spec, EvalP], by means of which the [+Eval] feature of Eval is checked via a Spec-Head configuration.

(47)



Such an analysis on the one hand can straightforwardly derive the observed interpretational property (i.e. subjectivity) of [Num-ModCl-N]. On the other, it allows us to well account for the grammaticality of the quantificational [Num-ModCl-*de*-N] in Mandarin Chinese. Notice that semantically [Num-ModCl-*de*-N] differs from its *de*-less counterpart in that it is always associated with a focus interpretation on [Num-ModCl], parallel to cases involving [MeaClP_Q-*de*-N] (cf. Chapter 3). Consider the following examples:

(48) a. Lisi yong le san da-zhang (#de) zhi,
Lisi use Asp three big-Cl DE paper

Mali ye yong le san da-zhang (#de) zhi

Mali also use Asp three big-Cl DE paper

'Lisi used three big pieces of paper; Mali also used three pieces of paper.'

b. Lisi yong le san da-zhang (#de) tongbanzhi,

Lisi use Asp three big-Cl DE art-paper

er bu shi caozhi

but not be coarse-paper

'Lisi used three big pieces of art paper but not coarse paper.'

c. Lisi yong le san da-zhang de zhi,

Lisi use Asp three big-Cl DE paper

Mali zhi yong le liang xiao zhang

Mali only use Asp two small Cl

'Lisi used three big pieces of paper, while Mali only used two small pieces.'

Example-(a) represents the context where there is no contrast being introduced at all; in example-(b), a semantic contrast is set between entities rather than between quantities. As shown above, in neither of the two situations can *de* be felicitously used between [Num-ModCl] and N. By contrast, in the context where the quantificational property denoted by [Num-ModCl] is set in a contrast, as in (c), the appearance of *de* is natural. Given this, coupled with the structure of [Num-ModCl-N] as proposed in (47), the well-formedness of [Num-ModCl-*de*-N] can receive a straightforward explanation under the DP-internal FocP analysis developed in Chapter 3. To be concrete, [Num-ModCl-*de*-N] is derived from movement of [Num-ModCl] from [Spec, EvalP] to [Spec, FocP], a process phonetically signaled by the focus marker *de*, as schematized below. Along this line, the ungrammaticality of (38a) and (39a) can be

attributed to the non-constituency of *san tiao*/*san zhang* and the impossibility of moving *san zhang/san zhang* to [Spec, FocP].

(49) $[_{FocP}\ [_{ClP}$Num-ModCl$]_i\ [_{Foc'}$ *de* $[_{EvalP}\ t_i\ [_{Eval'}$ Eval NP]]]]

A third consequence of this proposal pertains to the licensing of the quantificational [Num-Cl-*de*-N] which contains an individual classifier. It has been noted that though generally an individual classifier cannot participate in forming a quantificational construction in the form of [Num-Cl-*de*-N], in the context of "aboutness" or "approximation", or when the numeral involved is a contextually high round number, [Num-Individual Cl-*de*-N] could be ruled in, as illustrated by the contrasts below (cf. Hsieh 2008; X.-P. Li & Rothstein 2010, 2012; X.-P. Li 2011):

(50) a. ta peng zhe liang ben (*de) shu
he carry Asp two Cl DE book
'He is carrying two books.'

b. ta peng zhe shi duo ben de shu
he carry Asp ten more Cl DE book
'He is carrying 10 something books.'

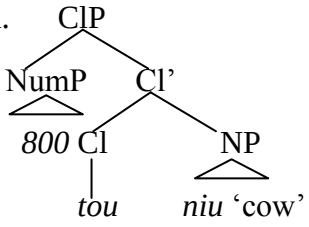
(51) a. women you ba tou (*de) niu
we have eight Cl DE cow
'We have eight cows.'

b. women you 800 tou de niu
we have Cl DE cow
'We have eight hundred cows.'

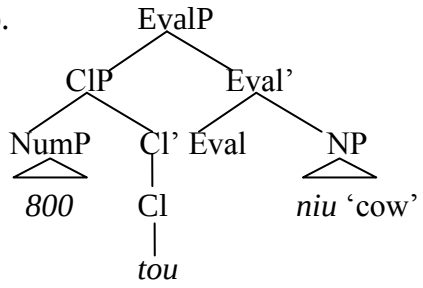
Within the present framework, it is suggested that this be best explained in that the numeral classifier construction containing an

approximately estimated cardinality or a contextually large round number would be more likely to be associated with an evaluative force as it has to do with the speaker's subjective judgment or estimate about the quantity. Given this, it seems to be promising to speculate that at the syntactic level, a [Num-Individual Cl-N] sequence containing a numeral of this type – which starts out as correlating with structure (a) – may be associated with structure (b) when the evaluative flavor is strongly intended by the speaker:

(52) a.



b.



Given (b), the possibility of forming a quantificational [Num-Individual Cl-*de*-N] is unsurprising, as in this case it is syntactically possible for [Num-Individual Cl] to undergo specifier movement to a DP-internal [Spec, FocP].

To summarize, in this section a functional projection EvalP was assigned to [Num-ModCl-N], by means of which the idiosyncratic semantic property of this construction can be directly derived. By syntactically distinguishing ModCls from simplex classifiers, the discrepancy between the two in terms of forming a licit quantificational [Num-(Mod)Cl-*de*-N] construction can be well accounted for. Upon

extending the EvalP account to cases involving simplex individual classifiers, an explanation was provided for some apparently exceptional examples concerning the well-formedness of [Num-Cl-*de*-N] in Mandarin Chinese.

4.4 Summary

It was argued in this chapter that syntactically Chinese pre-classifier adjectives combine with classifiers to form compound classifiers (cf. also Tang 1990), and that semantically they uniformly take classifiers as modifying targets (contra Yan 2003; Zong 2009; X.-P. Li 2011). In view of the fact that [Num-ModCl-N] is necessarily associated with an interpretive effect of subjectivity, a novel syntactic account was proposed that [Num-ModCl-N] underlyingly correlates with EvalP in the sense of D&S (2002).

Chapter 5 Referentiality of [Num-Cl-N]

This chapter will examine the referential properties of the [Num-Cl-N] expression in Mandarin Chinese. Section 5.1 will provide a critical review on Cheng & Sybesma's (1999, 2005) work, in the system of which Chinese numerals are considered as existential quantifiers and [Num-Cl-N] is treated as inherently carrying an existential indefinite interpretation. Section 5.2 will elaborate on the determination of interpretation of [Num-Cl-N] in Mandarin Chinese. In Section 5.3, a claim will be made concerning the intrinsic semantic nature of [Num-Cl-N], based on which a syntactic hypothesis on the argumental [Num-Cl-N] will be proposed in Section 5.4.

5.1 A numeral-as-quantifier analysis

5.1.1 Cheng & Sybesma (1999, 2005)

When dealing with the representation of indefiniteness in Mandarin Chinese, Cheng & Sybesma (1999, 2005; C&S henceforth) make a claim that it is numerals that are responsible for an indefinite interpretation. Such a viewpoint is mainly based on the facts as below, where [Num-Cl-N] appeas to be able to express either a specific indefinite or non-specific indefinite interpretation (depending on the nature of the predicate) but never a definite interpretation.

(1) a. wo xiang mai yi ben shu
I want buy one Cl book
'I would like to buy a (specific/non-specific)book/*the book.'

b. ta he-wan le yi wan tang
he drink-finish Asp one bowl-Cl soup
'He finished a (specific) bowl of soup/*the bowl of soup.'

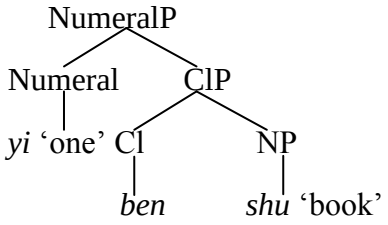
For (a), *mai* 'buy' is a predicate which denotes an unbounded activity and imposes no restriction on the (non-)specificity of its object; therefore, *yi ben shu* 'a book' could be interpreted as either nonspecific or specific. Whereas for (b), given that *he-wan* 'drink-finish' denotes a bounded event and obligatorily forces a specific interpretation onto indefinites (Sybesma 1992: 176-178), *yi wan tang* 'a bowl of soup' can only obtain a specific meaning. Note that in both examples the numeral classifier expressions cannot have a definite reading. In view of this, C&S consider Chinese numerals as "comparable to indefinite articles in Germanic languages" and the [Num-Cl-N] construction as "invariably indefinite" (C&S 2005). More specifically, it is advocated that "noun phrases with overt numerals necessarily yield an indefinite interpretation, owing to the quantificational nature (∃) of numerals" (C&S 1999: 528).

In terms of the distribution of [Num-Cl-N], a generalization put forth by C&S is that "(a)ll indefinites occur in postverbal position only" (C&S 2005), based on the example as below (taken from C&S 2005: (8a)):

(2) *yi zhi gou yao guo malu
one Cl dog want cross road
Intended: 'A dog wants to cross the road.'

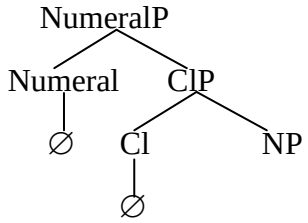
Based on this, at the syntactic level, C&S propose a NumeralP to represent indefiniteness in Chinese, with Numeral being assumed as the locus encoding an indefinite interpretation. Accordingly, *yi ben shu* 'a book' is assigned a structural as below:

(3)

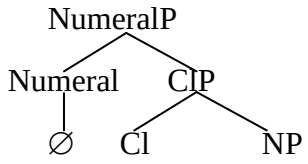


Under the assumption that “(t)he indefinite interpretation of nominals in Chinese is linked to the presence of a NumeralP (the head of which may be overt or nonovert)” (1999: (38)), C&S assign NumeralPs to indefinite bare nouns and indefinite [Cl-N] phrases, with the former being assumed as containing both an empty Numeral and an empty Cl whereas the latter only involving an empty Numeral.

(4) *Indefinite bare nouns*



(5) *Indefinite [Cl-N]*



Given the existence of an empty Numeral in the underlying structure, C&S explain why neither indefinite [Cl-N] nor indefinite bare nouns can occur in the subject position in the following way. Following Longobardi (1994), they assume that an empty Numeral, just like other empty categories, must be lexically governed. Accordingly, indefinite [Cl-N] and indefinite bare nouns, as have been assumed to underlyingly correlate with

NumeralPs headed by an empty Numeral, must be distributionally restricted to postverbal positions for the sake of being lexically governed, whereas preverbal positions would always be unavailable because they are not lexically governed positions.

As for the mechanism to make definite numeral phrases in Chinese (meaning e.g. 'the three students'), the claim made by C&S is that it is necessary to resort to demonstratives, as exemplified below:

(6) zhe/na san ge xuesheng lai le
this/that three Cl student come Asp
'These/Those three students came.'

Summarizing, C&S propose to treat numerals in Chinese as existential quantifiers and syntactically assume Numeral as the locus of indefiniteness. In what follows I will address some problems of such a numeral-as-indefinite-quantifier theory and attempt to present an alternative account.

5.1.2 Criticism on C&S's analysis

Analyzing Chinese numerals as existential quantifiers amounts to treating existential quantification as being built into the lexical meaning of Chinese numerals. An immediate prediction of this line is that [Num-Cl-N] in Chinese should be inherently existential. Notice that in the existing literature, a common assumption on the interpretation of existential indefinites is that they are associated with expressing the existence of individuals, while the specific vs. nonspecific distinction merely reflects how the speaker contextually construes the referent in question (Milsark 1974; Keenan 1987; Diesing 1992; Steedman 2009; among many others).

Following this line of analysis, the present discussion will adopt the term "referential" in the sense of Keizer (2007) to define existential indefinites. To be concrete, all existential indefinites will be treated as referential as they are "referring either to an evoked or inferrable discourse entity or introducing a new entity into the discourse" (Keizer 2007: 69). It is not difficult to understand the referential nature of specific indefinites as they are associated with fixed referents in the context. As for nonspecific indefinites, along the line of Keizer, they are also not incompatible with the notion of referentiality as "reference can be made to an entity even if the speaker does not have a specific, identifiable, individual or group of individuals in mind" (Keizer 2007: 69). With this in mind, in what follows I will present both theoretical and empirical evidence to argue that Chinese numerals should not be taken as existential quantifiers.

5.1.2.1 Theoretical considerations

The first argument against an existential-quantifier analysis of Chinese numerals has to do with the Blocking Principle proposed by Chierchia (1998b). According to Chierchia, type shifting operations in all languages should be subject to a principle that "Don't do covertly what you can do overtly". The basic idea is that, if a language has a morpheme which semantically corresponds to a particular type shifting, such type shifting should always be overtly realized via the use of the morpheme rather than in some covert fashion. The Blocking Principle can be formally put as the following (from Chierchia 1998b: (26)):

(7) *Blocking Principle* ('Type Shifting as Last Resort')

For any type shifting operation τ and any X:

*τ (X)

if there is a determiner D such that for any set X in its domain,

$D(X) = \tau(X)$

Take English for example. While English may covertly resort to ∃ ("existential") and ∩ ("nominalizing") as automatic type-changing functors, a covert type-shift operation via ι is always blocked because of the existence of a lexical definite determiner *the*. This point can be illustrated by the following examples:

(8) a. Dogs are in the garden. (covert type-shifting of *dogs* via ∃: ✓)
b. I love dogs. (covert type-shifting of *dogs* via ∩: ✓)
c. *(**The**) dogs are mine. (covert type-shifting of *dogs* via ι: ✗)

Following the spirit of Chierchia, if Chinese numerals are indeed indefinite determiners corresponding to ∃ quantification, according to the Blocking Principle, it would be expected that all existential indefinite expressions in Chinese have to resort to the use of numerals, which is nevertheless contrary to the fact. As shown below, it is perfectly fine for bare nouns in Chinese to be used as existential indefinites. The fact that numerals in Chinese do not give rise to a blocking effect suggests that numerals should not be taken as lexicalization of ∃.

(9) wo zai chufang-li kanjian le laoshu
I in kitchen-in see Asp rat
'I saw a rat/rats in the kitchen.'

The second argument against an existential-quantifier account for Chinese numerals pertains to the Redundancy Principle proposed by Zamparelli (2000), based on a comparison between Chinese *yi* 'one' and

the English article *a*. It was claimed in the literature that the unstressed *yi* 'one' in Chinese can be considered as a counterpart of the indefinite article *a* in English (Chao 1968; Fang 2002), an echo of C&S's theory. Such a viewpoint, however, runs into difficulties when it comes to the contrast as below:

(10) a. *every a student
b. mei yi ge xuesheng
every one Cl student
'every student'

In Zamparelli (2000), the ungrammaticality of [*every*-*a*-N] in English has been attributed to a violation of the Redundancy Principle which states that:

(11) REDUNDANCY: two functional words F_i, F_j within the same DP give an impossible representation if the meaning of F_i entails the meaning of F_j or vice-versa.
(from Zamparelli (2000): Ch.4, (333))

Given that semantically universal quantification entails existential quantification, according to the Redundancy Principle, the non-licensing of co-occurrence of *every* and *a* naturally follows. Following Zamparelli in assuming that the Redundancy Principle is part of the grammar and holds universally, if *yi* 'one' is indeed the Chinese counterpart of the indefinite article *a* in English, one would expect that *yi* can never co-occur with the universal quantifier *mei* 'every', which is nevertheless contrary to the fact, as shown in (10). This provides another piece of evidence for the

necessity of distinguishing Chinese numerals from true indefinite determiners.

5.1.2.2 Empirical considerations

Some empirical problems raised by C&S's analysis will be discussed below from two aspects, one concerning the interpretation of [Num-Cl-N] and the other the distribution of [Num-Cl-N].

5.1.2.2.1 Interpretation of [Num-Cl-N]

To begin with, let's revisit the interpretation of [Num-Cl-N]. An observation which challenges the numeral-as-existential-quantifier viewpoint is that the available reading of a [Num-Cl-N] phrase is in fact not confined to the existential one. To illustrate, first note that as a referential expression, an existential indefinite, no matter specific or nonspecific, would always allow for coindexation with a pronoun or a definite description, as shown below:

(12) a. *Specific existential indefinite*

mei yi ge nühai dou xihuan yi wei yanyuan$_i$,
every one Cl girl DOU like one Cl actor
ta$_i$/na wei yanyuan$_i$ jiu shi Liang Chaowei
he/that Cl actor then be Liang Chaowei
'Every girl likes a (specific) actor$_i$; he$_i$/that actor$_i$ is Liang Chaowei.'

b. *Non-specific existential indefinite*

mei yi ge nühai dou xihuan yi wei yanyuan$_i$ bingqie
every one Cl girl DOU like one Cl actor and

xiwang neng gen ta_i /na wei $yanyuan_i$ heying

hope can with he/that Cl actor take.a.picture

'Every girl likes a (different) $actor_i$ and hopes to take a picture with him_i/that $actor_i$.'

If C&S are on the right track in treating Chinese numerals as existential quantifiers, it would be expected that all [Num-Cl-N] expressions are semantically referential and should unexceptionally pass the coindexation test. Contrary to this expectation, counterexamples are easy to be found. As shown below, some [Num-Cl-N] phrases cannot be coindexed with either a pronoun or a definite expression occurring in the continuation:

(13)a. zhe zhang chuang shui-bu-xia liang ge ren_i,

this Cl bed cannot.sleep two Cl person

#$tamen_i$/na liang ge ren_i tai pang le

they/that two Cl person too fat SFP

'(Generally,) this bed cannot sleep two $persons_i$; #$they_i$/those two $persons_i$ are too fat.'

b. Li-xiaojie yi ci he-bu-wan yi ping $niunai_i$,

Miss. Li one time-Cl drink-not-finish one bottle-Cl milk

#na ping $niunai_i$ tai da le

that bottle-Cl milk too big SFP

'(Generally,) Miss Li cannot finish one bottle of $milk_i$ a time; #that bottle of $milk_i$ is too big.'

On the other hand, we do find examples where [Num-Cl-N] expressions obtain a definite reading. Consider the following examples:

(14) a. *Context: A is talking about his/her two puppies*

A: wo yao chuqu yi ge yue, shei lai zhaogu
I will be.away one Cl month who come take.care.of
wo de Huzi he Niuniu ne?
I DE Huzi and Niuniu SFP
'I will be away for a month. Who will take care of my Huzi and Niuniu?'

B: bie danxin，ba liang zhi xiaogou jiao-gei wo ba
do.not worry BA two Cl puppy give-to I SFP
'Do not worry. Given the two puppies to me.'

b. zuotian Wu Yanzu he Gu Tianle lai-dao women xuexiao,
yesterday Wu Yanzu and Gu Tianle come-to we school
women gen liang wei yanyuan zhankai le relie de hudong
we with two Cl actor conduct Asp active DE interaction
'Wu Yanzu and Gu Tianle came to our school yesterday; we had an active interaction with the two actors.'

c. ban-li shi ge xuesheng dou bu jige
class-in ten Cl student DOU not pass
'The ten students in the class all failed.'

Consider (a). Though commonly a [Num-Cl-N] phrase taken as the object by *ba* would be interpreted as a specific indefinite (Sybesma 1992), here *liang zhi xiaogou* "two Cl puppy" is used to anaphorically refer to the two dogs mentioned in the previous discourse (i.e. *Huzi* and *Niuniu*) and necessarily acquires a definite reading. Similarly for (b) and (c), both "two Cl actor" and "ten Cl student" can only be interpreted as definite expressions. The definiteness of these [Num-Cl-N] phrases can be verified by a uniqueness/maximality effect, which is by no means available for indefinite [Num-Cl-N] expressions (cf. Lyons 1999 and the references

therein). Such a uniqueness/maximality effect can be illustrated by the contrast below between (a)- and (b)-examples.

(15) a. A: shei lai zhaogu wo de Huzi he Niuniu?
who come take.care.of I DE Huzi and Niuniu
'Who will come to take care of my Huzi and Niuniu?'
B: bie danxin, ba liang zhi xiaogou jiaogei wo ba;
not worry BA two Cl puppy give I SFP
lingwai yi zhi xiaogou jiaogei Lisi.
another one Cl puppy give Lisi
'Don't worry and give the two puppies to me; #give another one to Lisi.'

b. Lisi gang ba liang zhi yemao gan-zou,
Lisi just BA two Cl stray-cat drive.away
you you yi zhi pao le jinlai
again have one Cl run Asp in
'Lisi just drove away two stray cats, another one ran in.'

(16) a. zuotian Wu Yanzu he Gu Tianle lai-dao women xuexiao;
yesterday Wu Yanzu and Gu Tianle come-to we school
women gen liang wei yanyuan zhankai le relie de hudong,
we with two Cl actor conduct Asp active DE interaction
houlai gen ling yi wei yanyuan pai le hezhao
then with another one Cl actor take Asp group-photo
'Wu Yanzu and Gu Tianle came to our school yesterday; #we had an active interaction with the two actors and then took a group photo with another actor.'

b. Lisi xian gen liang wei pengyou qu le Xizang,
Lisi first with two Cl friend go Asp Tibet
houlai gen ling yi wei pengyou qu le Yunnan

then with another one Cl friend go Asp Yunnan

'Lisi first went to Tibet with two friends and then went to Yunnan with another friend.'

(17) a. ban-li shi ge xuesheng dou bu jige,
class-in ten Cl student DOU not pass
lingwai you yi ge xuesheng meiyou canjia kaoshi
another have one Cl student not.have take test
'(All of) the ten students in the class failed; #there is another student who has not taken the test.'

b. ban-li you shi ge xuesheng bu jige,
class-in have ten Cl student not pass
lingwai you yi ge xuesheng meiyou canjia kaoshi
another have one Cl student not.have take test
'There are ten students in the class who failed; there is another student who has not taken the test.'

For all (a)-examples above, due to a uniqueness/maximality effect associated with the definite [Num-Cl-N] expression, a continuation which asserts the existence of another individual would result in infelicity. In contrast, in (b)-examples, as the [Num-Cl-N] expressions are indefinite and have nothing to do with a uniqueness/maximality effect, such kind of continuation is perfectly allowed.

Summarizing, [Num-Cl-N] expressions in Chinese do not necessarily carry an existential force. The fact that [Num-Cl-N] may also be used as either a non-referential or a definite expression challenges C&S's theory that Chinese numerals are existential quantifiers.

5.1.2.2.2 Distribution of [Num-Cl-N]

In addition to the interpretation properties of [Num-Cl-N], C&S's generalization concerning the distribution of [Num-Cl-N] also turns out to be problematic when more empirical facts are taken into consideration. C&S claim that only postverbal positions are licit sites for [Num-Cl-N], but the following examples show that it could be fine for a [Num-Cl-N] sequence to occur in preverbal positions, where it may exhibit definite, indefinite, or non-referential readings:

(18) a. Definite [Num-Cl-N]

Zhangsan meiyou shijian zhaogu Huzi he Niuniu,
Zhangsan not.have time take.care.of Huzi and Niuniu
xianzai liang zhi xiaogou zhu zai wo jia
now two Cl puppy live at I home
'Zhangsan has no time to take care of Huzi and Niuniu; now the two puppies are living at my home.'

b. Indefinite [Num-Cl-N]

wo gang yao zou,
I just be.about.to leave
yi zhi gou turan chong le jinlai
one Cl dog suddenly rush Asp in
'I was just about to leave, suddenly a dog rushed in.'

c. Non-referential [Num-Cl-N]

liang ge ren chi-bu-wan zheme duo fan,
two Cl person eat-not-finish so much rice
(#tamen hen shou)
they very thin

‘(Generally,) two people cannot finish so much rice (; #they are very thin.)’

To recapitulate the discussion so far, it has been made clear that in terms of both the theoretical treatment and the empirical claims with respect to Chinese [Num-Cl-N] expressions, C&S’s analysis is not without problems. Instead, some new generalizations were made as follows: (i) Chinese numerals are not inherently associated with an existential quantificational force; (ii) The [Num-Cl-N] sequence in Mandarin is compatible with definite, existential indefinite (either specific or nonspecific), and non-referential readings; (iii) A [Num-Cl-N] phrase in Mandarin may occur preverbally when it is on definite, indefinite, or non-referential readings.

5.2 Determination of the interpretation of [Num-Cl-N]

This section will investigate how the interpretation of [Num-Cl-N] in Manderin Chinese is contextually determined.

5.2.1 Cases with overt markers

Let’s begin with cases where the interpretation of [Num-Cl-N] is determined by an overt marker. As for [Num-Cl-N] phrases in object positions, it is observed that the existence/absence of a dynamic aspectual marker directly bears on the (non-)referentiality of the [Num-Cl-N] object:

(19) a. zhe zhang chuang shui liang ge ren,
this Cl bed sleep two Cl person

na zhang chuang shui san ge ren

that Cl bed sleep three Cl person

'(Generally,) this bed is for two persons to sleep in while that bed is for three persons to sleep in.'

b. zhe zhang chuang shui **le/guo** liang ge ren,

this Cl bed sleep Asp/Asp two Cl person

na zhang chuang shui **le/guo** san ge ren

that Cl bed sleep Asp/Asp three Cl person

'Two persons slept/have slept in this bed while three persons slept/have slept in that bed.'

(20)a. Li-xiaojie zaoshang chi yi ge pingguo,

Miss. Li morning eat one Cl apple

wanshang chi yi ge li

evening eat one Cl pear

'(Generally,) Miss Li eats an apple in the morning and a pear in the evening.'

b. Li-xiaojie zaoshang chi **le** yi ge pingguo,

Miss. Li morning eat Asp one Cl apple

wanshang chi **le** yi ge li

evening eat Asp one Cl pear

'Miss Li ate an apple in the morning and a pear in the evening.'

As shown above, in (a)-sentences where no aspectual marker occurs, most naturally the [Num-Cl-N] objects would obtain a non-referential reading; whereas in (b)-sentences which contain dynamic aspectual markers such as *le* (the perfective maker) or *guo* (the experiential maker), the [Num-Cl-N] objects have to be interpreted referentially (see Section 5.2.2 below for further discussions on the possibility that a [Num-Cl-N] object co-occurring with an aspectual marker may acquire a definite reading).

As for [Num-Cl-N] occurring in the subject position, a crucial observation is that if it is preceded by *you* 'have', an existential reading necessarily emerges; while if it is followed by *dou*, a definite reading is the only licit one[41].

(21) a. **you** liang ge xuesheng xie-bu-wan wu fen baogao
have two Cl student write-not-finish five Cl report
'There are two students who cannot finish writing five reports.'
b. liang ge xuesheng **dou** xie-bu-wan wu fen baogao
two Cl student DOU write-not-finish five Cl report

[41] Here I leave aside the case where a [Num-Cl-N] subject is contained in the scalar construction (*lian*)…*dou*. Notice that when accompanied by the (either overtly or covertly realized) focus marker *lian* – an element with a scalar nature which gives rise to an 'even' reading – a [Num-Cl-N] expression needs to be interpreted as meaning a quantity related to some contextually least likely/expected event (e.g. Paris 1998; Portner 2002; Shyu 2004; Xiang 2008). In this case, either a referential or non-referential reading could be possible for [Num-Cl-N], depending on the context and the speaker's intension. Consider the following illustrating examples:

(i) a. zhe ge xiangzi tai zhong le, guji (lian) 10 ge nanren$_i$ dou tai-bu-qi,
this Cl box too heavy SFP estimate even Cl man DOU lift-not-up
tamen$_i$ tai shou le
they too thin SFP
'This box is too heavy; it is estimated that even 10 men$_i$ cannot lift it up; #they$_i$ are too thin.'
b. nimen tai diulian le, (lian) san ge haizi$_i$ dou shuo-bu-guo,
you too shameful SFP even three Cl child DOU speak-not-surpass
tamen$_i$ cai buguo shi xiaoxuesheng a!
they just nothing.but be pupil SFP
'It is such a shame that you were even unable to out speak three children$_i$; they$_i$ are nothing but just pupils!'

As indicated by the above contrast in terms of licensing coindexation between a [Num-Cl-N] sequence and a pronoun, albeit both being sandwiched between *lian* and *dou*, while 'ten men' in (a) is used non-referentially and cannot enter into a coindexation relation, 'three children' in (b) is used to refer and allows a co-indexed pronoun. Given that *lian…dou* is a fixed construction whose peculiar semantic property is *jointly* determined by *lian* and *dou* while what concerns me here are markers which are *solely* responsible for the interpretation of [Num-Cl-N], all the *dou*-examples discussed in this chapter will be irrelevant to the *lian…dou* construction and do not involve a covert *lian.*

'The two students cannot finish writing five reports.'

It is particularly worth pointing out that modals on their own do not suffice to determine the interpretation of a [Num-Cl-N] subject. This is shown by the following examples: although all of these sentences contain the modal *yinggai* 'should', the subject 'two students' obtains a non-referential reading in (a), an existential reading in (b), while a definite reading in (c), indicating that *yinggai* itself has no decisive say in the quantificational force of the subject.

(22) a. liang ge xuesheng yinggai xie wu fen baogao
two Cl student should write five Cl report
'(Generally,) two students should write five reports.'

b. **you** liang ge xuesheng yinggai xie wu fen baogao
have two Cl student should write five Cl report
'There are two students who should write five reports.'

c. liang ge xuesheng **dou** yinggai xie wu fen baogao
two Cl student DOU should write five Cl report
'Each of the two students should write five reports.'

A crucial claim to be made here concerning the interpretation of an argumental [Num-Cl-N] determined by overt markers is that, such a determining process needs to be conducted in a highly local fashion. This is mainly motivated by the following facts. On the one hand, observe that the markers like *you* and *dou* would only play a role in determining the interpretation of a [Num-Cl-N] subject while having nothing to do with the lower [Num-Cl-N] within VP. As illustrated by the examples below, other things being equal, adopting either *you* or *dou* merely affects the interpretation of the subject 'two students' but not the object 'five reports':

(23) a. **you** liang ge xuesheng xie-wan le wu fen baogao
have two Cl student write-finish Asp five Cl report
'There are two students$_{[existential]}$ who finished writing five reports$_{[existential]}$.'

b. liang ge xuesheng **dou** xie-wan le wu fen baogao
two Cl student DOU write-finish Asp five Cl report
'The two students$_{[definite]}$ both finished writing five reports$_{[existential]}$.'

On the other, the presence/absence of a dynamic aspectual maker is found to be merely relevant to the interpretation of a [Num-Cl-N] expression within the VP domain while having nothing to do with a [Num-Cl-N] subject. This is illustrated by the comparison below: while in the context of (a) the aspectual marker *le* gives rise to an existential reading for the object 'five reports', in the absence of *le* as in (b), the object 'five reports' obtains a non-referential reading irrespective of the existence of a sentence-initial existential marker *you*.

(24) a. **you** liang ge xuesheng xie-wan **le** wu fen baogao
have two Cl student write-finish Asp five Cl report
'There are two students$_{[existential]}$ who finished writing five reports$_{[existential]}$.'

b. **you** liang ge xuesheng xie-bu-wan wu fen baogao
have two Cl student write-finish five Cl report
'There are two students$_{[existential]}$ who cannot finish writing five reports$_{[non-referential]}$.'

To close this subsection, I would like to make the following generalizations concerning different types of overt markers responsible for

determining the interpretation of argumental [Num-Cl-N] in Mandarin Chinese: (i) dynamic aspectual markers such as *le* and *guo* are associated with a referential reading of the [Num-Cl-N] object; (ii) the sentence-initial *you* determines an existential reading for the [Num-Cl-N] subject; (iii) the [Num-Cl-N] subject followed by *dou* (excluding the *lian…dou* construction) acquires a definite reading. The determination of the interpretation of a [Num-Cl-N] sequence is subject to a locality constraint which requires that the "lower" markers such as aspectual markers are merely concerned with the [Num-Cl-N] object but not the [Num-Cl-N] subject, whereas the "higher" markers such as *you* and *dou* are responsible for only the [Num-Cl-N] subject but not the [Num-Cl-N] object.

5.2.2 Cases without overt markers

This subsection will discuss the case in which a [Num-Cl-N] subject obtains an existential reading without being accompanied by *you* 'have' and the case where a [Num-Cl-N] phrase could be used as a definite expression in the absence of the marker *dou*.

To begin with the existential preverbal [Num-Cl-N], consider the contrast below:

(25) a. *yi zhi gou yao guo malu
one Cl dog want cross road
Intended: 'A dog wants to cross the road.' (from C&S 2005: (8a))

b. wo gang yao zou,
I just be.about.to leave
yi zhi gou turan chong le jinlai
one Cl dog suddenly rush Asp in

‘When I was just about to leave, a dog suddenly rushed in.’

Based on examples like (a), many authors have made an empirical claim that an existential indefinite in Chinese cannot occur at the subject position without a preceding *you* ‘have’ (e.g. C&S 1999, 2005; Y.-H. Li 1998; Tsai 2001). Obviously, sentence-(b) constitutes a counterexample to such a viewpoint. Below are more contrasts concerning the licensing of existential preverbal [Num-Cl-N] phrases in Mandarin:

(26) a. *liang ge ren zai dajia
two Cl person at fight
Intended: ‘Two people are fighting.’

b. kan! liang ge ren zai dajia!
look two Cl person at fight
‘Look! Two people are fighting!’

(27) a. *yi ge nansheng ganmao le
one Cl boy catch.a.cold Asp
Intended: ‘A boy caught a cold.’

b. women ban yi ge nansheng ganmao le
we class one Cl boy catch.a.cold Asp
‘A boy in our class caught a cold’

(28) a. *liang ke shu bei yizou le
two Cl tree BEI remove Asp
Intended: ‘Two trees were removed.’

b. sushe menkou liang ke shu bei yizou le
hall doorway two Cl tree BEI remove Asp
‘Two trees in front of the hall were removed.’

(29) a. *yi ge xuesheng yao lai women xi fangwen
one Cl student will come we department visit

Intended: ‘A student will come to visit our department.’

b. yi ge zai Hafo du yuyanxue de xuesheng
one Cl at Harvard study linguistics DE student
yao lai women xi fangwen
will come we department visit
‘A student who studies linguistics at Harvard will come to visit our department.’

The fact that (b)-examples are fine in Mandarin Chinese strongly suggests that the licensing of a preverbal existential [Num-Cl-N] should not depend on the presence of *you*. It is especially worth noticing that (b)-examples differ from (a)-counterparts in that they contain some specifying information that can help anchor down a particular event or identify a particular individual in the discourse. To be concrete, for (25b), the temporal environment in which a dog appears is specified as “when the speaker was about to leave”; for (26b), the vocative expression *Look!* indicates a coincidence of the time of spotting a two people-fighting event and the utterance time; for (27b), the topic “our class” restricts the context/domain in which “a boy that caught a cold” is identified; for (28b), the topic “in front of the hall” conveys the location information of “two trees”; for (29b), the prenominal modifier specifies the affiliation of the referent of “a student”. In contrast, in all (a)-examples the preverbal existential [Num-Cl-N] phrases are uttered in an out-of-the-blue way, where no background information concerning the existing event/individual has been specified.

This leads me to make a generalization as the following. Mandarin Chinese may resort to two means to create a felicitous existential [Num-Cl-N] subject: one is to adopt a sentential *you* ‘have’, an element which has been widely treated as an existential operator over individuals

in Chinese (cf. Y.-H. Li 1998; Tsai 2001); the other is to specify or to contextually imply spatiotemporal clues such as e.g. discourse background, appropriate modifiers, etc.

As for creating a definite [Num-Cl-N] expression without a following *dou*, it is observed that [Num-Cl-N] might felicitously obtain a definite interpretation *only* when a unique discourse referent – which is intended as the antecedent of [Num-Cl-N] – has been explicitly specified in the context. To be more precise, the Familiarity Presupposition in the sense of Heim (1982) must be satisfied, namely that the information about the discourse referent of [Num-Cl-N] has to be introduced in the local context of interpretation and held in common by the participants in the conversation. As illustrated below, only when a unique antecedent of [‘two’-Cl-‘puppy’] (e.g. a unique group of puppies composed by Huzi and Niuniu) has been identified in the discourse can [‘two’-Cl-‘puppy’] be appropriately used as a definite expression (either as a definite subject or a definite object). By contrast, when no such antecedent referent has been contextually specified and the referent of [‘two’-Cl-‘puppy’] appears as new information, as in (31), a definite interpretation is unavailable for [‘two’-Cl-‘puppy’].

(30) Huzi he Niuniu shi Lisi yang de xiaogou.
Huzi and Niuniu be Lisi raise DE puppy
‘Huzi and Niuniu are puppies raised by Lisi.’
yinwei Lisi xia zhou bu zai jia,
because Lisi next week not at home
‘Because Lisi will not be at home next week,’
i. liang zhi xiaogou hui zai wo jia zhu yi ge libai
two Cl puppy will at I home live one Cl week
‘**The** two puppies will live at my home for one week.’

ii. wo yao qu bangmang zhaogu liang zhi xiaogou
I will go help take.care.of two Cl puppy
'I will go to help take care of **the** two puppies.'

(31) (*When uttered out of the blue*)
xia zhou wo yao qu bang pengyou zhaogu liang zhi xiaogou
next week I will go help friend take.care.of two Cl puppy
'Next week I will go to help a friend take care of (*the) two puppies.'

The fact shown above in conjunction with the discussion in Section 5.2.1 motivates a generalization as follows. Mandarin Chinese may resort to two means to give rise to a definite [Num-Cl-N] expression: one is to adopt the adverb *dou*, which forces a definite reading for a preceding [Num-Cl-N]; the other is via an interpretational condition involving the Familiarity Presupposition, which may bring about either a definite [Num-Cl-N] subject or a definite [Num-Cl-N] object.

5.3 Semantic type of [Num-Cl-N]

5.3.1 Y.-H. Li (1998): a NumP vs. DP distinction

In her 1998 paper Li discussed an individual- vs. quantity-denoting distinction concerning Chinese numeral classifier constructions. Li's individual- vs. quantity-denoting dichotomy does not completely correspond to the non-referential vs. referential difference proposed here (cf. Section 5.1). Specifically, while non-referential [Num-Cl-N] expressions defined in the present framework fall under the quantity-denoting type in Li's sense, some referential [Num-Cl-N] expressions defined here could possibly be classified as quantity-denoting along Li's line. Such a discrepancy is inevitable because Li and I have

adopted different criteria in subcategorizing [Num-Cl-N]. To be specific, considering that an essential difference between quantity-denoting [Num-Cl-N] and individual-denoting (i.e. existential) [Num-Cl-N] lies in that only the former but not the latter can appear at the subject position, Li takes [Num-Cl-N] expressions appearing at the subject position uniformly as quantity-denoting. Whereas under the present analysis, as the (non-)referentiality of [Num-Cl-N] is captured in terms of its interpretational rather than distributional property and no premise is assumed on the syntactic position each type of [Num-Cl-N] should appear, the possibility is open that a [Num-Cl-N] subject may fall under the referential type. Below are some examples that have been treated as quantity-denoting by Li but would be categorized under the referential type in my account for they all pass the coindexation test (cf. Section 5.1.2; examples from Y.-H. Li 1998: (5)-(7) with slight revision).

(32) a. liang zhang chuang$_i$ (, wo tingshuo,) ji le wu ge ren.
two Cl bed I hear-say squeeze Asp five Cl person
na liang zhang chuang$_i$ yiding hen da
that two Cl bed must very large
'Two beds$_i$ (, I heard,) were crowded with five people. Those two beds$_i$ must be very large.'

b. san ge baomu$_i$ jiu zhaogu ni yi ge xiaohai a?
three Cl babysitter just care you one Cl child SFP
you name duo shi xuyao tamen$_i$ zuo ma?
have so many thing need they do SFP
'Three babysitters$_i$ just took care of your one child? Are there so many things that need them$_i$ to do?'

c. liang-san ge laoshi$_i$ jiu ba na qun ye xiaohai
two-three Cl teacher then BA that group-Cl wild child
kongzhi zhu le, tamen$_i$ zenme zuodao de?
control hold Asp they how make.it SFP

'Two or three teachers$_i$ controlled that group of wild children. How did they$_i$ make it?'

At the syntactic level, Li assumes that a quantity-denoting [Num-Cl-N] expression is underlyingly a NumP whereas an individual-denoting [Num-Cl-N] expression must involve a D(eterminer) projection, with the NumP taken by an empty D as complement as illustrated below (from Y.-H. Li 1998: (13)). Following Longobardi (1994), Li assumes that a null D is interpreted as an existential operator by default, hence an existential reading of [$_{DP}$ D [$_{NumP}$ Num-Cl-N]].

(33) a. [$_{NumP}$ san ge xuesheng]
three Cl student

b. [$_{DP}$ D [$_{NumP}$ san ge xuesheng]]
three Cl student

Notice that on the technical side, such a NumP vs. DP analysis raises an issue on how to define the semantic type of NumP. In regard to the nominal phrase that is licensed to be taken by D as complement, a standard view in the literature is that such a nominal phrase must be of a non-argument semantic type (Abney 1987; Stowell 1991; Longobardi 1994; Szabolcsi 1994; Chierchia 1998b; Zamparelli 2000). However, according to Li's analysis, NumPs are something able to stand on their own as syntactic arguments on the one hand while eligible to serve as the complement of D on the other. This immediately leads to an inquiry as to what is the very semantic nature of NumPs. Put it differently, a question might be asked as to how to understand the notion of "quantity": Should it be understood as a special kind of individual (i.e. inherently being arguments), a property (i.e. being born predicative), or some sort of

individual-and-property "hybrid" (i.e. being able to freely shift between an argument type and a predicate type)? This question will be approached in the next subsection.

5.3.2 [Num-Cl-N] as a property-denoting expression

Concerning the semantic type of [Num-Cl-N] phrases, the stance to be taken in the present study is that they are inherently property-denoting, namely, being of the type <e, t>. The basic claim is as the following: (i) for cases where the classifier involved serves to discretize a noun denotation, the [Num-Cl-N] phrase denotes a set of members *x* such that each *x*, which satisfies the descriptive content of N, has the cardinality denoted by Num and that each component individual contained in *x* is determined according to the discretizing criterion specified by the classifier; (ii) for cases where the classifier involved denotes a standardized interval unit (i.e. encoding a well-determined quantity specification), the [Num-Cl-N] expression denotes a set of members *x* such that each *x*, which satisfies the descriptive content of N, is possessed with the measure value denoted by [Num-Cl]. Accordingly, *liang zhi xiaogou* (two Cl puppy), for example, starts out as denoting a property of "being two puppies" (i.e., represented by a set of members *x* such that each *x* contains two puppies) and *liang jin pingguo* (two catty-Cl apple) a property of "being two catties of apples" (i.e., represented by a set of members *x* such that each *x* contains two catties of apples).

This claim is largely motivated by the observation that [Num-Cl-N] in Chinese exhibits a remarkable parallelism to property-denoting elements rather than individual-denoting expressions in terms of modification. Consider modification by *zheme/name* 'so' first. In Chinese *zheme* and *name* are adverbs exclusively compatible with property-denoting phrases.

This can be clearly illustrated by the contrast between (34) and (35): in (34) *zheme* and *name* are used to modify a definite or a quantified noun phrase, and the sentences are totally out; whereas in (35) *zheme* and *name* are modifiers of property-denoting phrases such as APs or VPs, where the expressions are fine:

(34) a. *zheme/name na liang ge pingguo
so/so that two Cl apple
Lisi chi le ban ge xiaoshi
Lisi eat Asp half Cl hour
'*For such those two apples, Lisi had been eating for half an hour.'

b. * zheme/name you liang ge pingguo
so/so have two Cl apple
Lisi chi le ban ge xiaoshi
Lisi eat Asp half Cl hour
'*For such there are two apples, Lisi had been eating for half an hour.'

c. * zheme/name mei yi ge/dabufen/shaoshu pinguo
so/so every one Cl/ most/ a minority apple
'*such every apple/most apples/a minority of the apples'

(35) a. zheme/name piaoliang
so/so pretty
'so pretty'

b. ni zenme zheme/name xihuan lüyou?
you how.come so/so like travel
'How come you like travelling so much?'

Relevant to the discussion here is the observation that [Num-Cl-N] in this respect patterns with property-denoting rather than

individual-denoting elements, as shown by the grammaticality of [*zheme/name*-Num-Cl-N] below.

(36) a. zheme/name liang ge pingguo
so/so two Cl apple
Lisi chi le ban ge xiaoshi
Lisi eat Asp half Cl hour
'For such two apples, Lisi had been eating for half an hour.'

b. zheme/name liang jin pingguo
so/so two catty-Cl apple
Lisi chi le ban ge xiaoshi
Lisi eat Asp half Cl hour
'For such two catties of apples, Lisi had been eating for half an hour.'

Further evidence indicating a property-denoting nature of [Num-Cl-N] comes from modification by complex adjectival expressions in the sense of Zhu (1956/2001; see also S.-Z. Huang 2006, 2008; S.-Z. Huang & Li 2009). To illustrate, first consider the contrast between (a) and (b) below, which shows that a complex adjectival expression cannot directly combine with a bare noun whereas a simple adjective can:

(37) a. da chitang
big pool

b. *hen da chitang
very big pool

(38) a. bai yifu
white clothes

b. *xuebai yifu

snow-white clothes

In dealing with this contrast, S.-Z. Huang's (2006, 2008) and S.-Z. Huang & Li (2009) have put forth a constraint on the nominal modification structure, claiming that a modifiee and its modifier must be of the same semantic type. Specifically, assuming that in Chinese both bare nouns and simple adjectives are of the type <e> whereas complex adjectives are of the type <e, t>, the ungrammaticality of the (b) expressions has been attributed to a mismatch in semantic type between the modifier and the modifiee.

The present study will side with S.-Z. Huang & Li in assuming such a type match constraint on the modifier and the modifiee. As for [Num-Cl-N] phrases, interestingly, it is observed that they are perfectly compatible with complex adjectival expressions while incompatible with simple ones[42] (cf. S.-Z. Huang & Li 2009):

(39) a. *da/^{OK}hen da yi ge chitang

big/ very big one Cl pool

'a pool which is *(very) big'

b. *piaoliang/^{OK}ting piaoliang liang ge nühai

pretty / very pretty two Cl girl

'two girls who are *(very) pretty'

c. *zhong /^{OK}hen zhong liang sheng qiyou

heavy / very heavy two liter-Cl gasoline

'two liters of gasoline which is *(very) heavy'

[42] S.-Z. Huang & Li (2009) claim that only when the numeral is *yi* 'one' can [Num-Cl-N] be modified by complex adjectives. Such a claim seems to be too strong: as shown by (b)- and (c)-examples in (39) and (40), it is completely fine for a [Num-Cl-N] expression containing a non-*yi* numeral to be modified by a complex adjective.

(40) a. *bai/^{OK}xuebai yi tiao qunzi
white/snow-white one Cl skirt
'a skirt which is *white/^{OK}snow-white'

b. *duanzheng/^{OK}duanduanzhengzheng wu ge dazi
straight / straight five Cl big-character
Intend: 'five big characters which are (arranged) straight'

c. *zhengqi/^{OK}zhengzhengqiqi shi die wenjian
tidy / tidy ten pile-Cl file
Intend: 'ten piles of files which are tidily arranged'

In this respect, a sharp contrast, again, can be detected between [Num-Cl-N] on the one hand and individual-denoting expressions (e.g. definite or quantified noun phrases) on the other: the latter can never directly combine with complex adjectival modifiers:

(41) a. *hen da na/mei yi ge chitang
very big that/every one Cl pool
'that pool/every pool that is very big'

b. *ting piaoliang na liang ge/duoshu nühai
very pretty that two Cl/most girl
'those two girls/most girls that are very pretty'

c. *zhengzhengqiqi na shi die / suoyou de wenjian
tidy that ten pile-Cl / all DE file
'those ten piles of files/all files that are tidily arranged'

All pictures taken together, following the spirit of S.-Z. Huang (2006, 2008) and S.-Z. Huang & Li (2009) in assuming that complex adjectival expressions are of the type <e, t> and that modifiers and modifiees must be of the same semantic type, I take the fact that in Mandarin Chinese

[Num-Cl-N] phrases can be directly modified by complex adjective expressions as an indication that [Num-Cl-N] is of the type <e, t>, namely, being property-denoting in nature.

To sum up, based on empirical evidence which illustrates a syntactic parallelism in terms of modification between [Num-Cl-N] and property-denoting phrases, a conclusion was drawn that all numeral classifier noun expressions in Chinese are inherently predicative. Coupled with the syntactic analysis developed in Chapter 3, this treatment means that both [$_{ClP}$ NumP [$_{Cl'}$ Cl NP]] and [$_{MonP}$ [$_{ClP}$ NumP Cl][$_{Mon'}$ Mon NP]] are semantically predicative expressions.

5.4 Syntax of argumental [Num-Cl-N]

5.4.1 Means of argumentization

Upon the assumption that numeral classifier expressions in Chinese are born denoting properties, an immediate question arises as to how to account for an argumental [Num-Cl-N] sequence and various interpretations it may obtain (e.g. definite, indefinite, or non-referential). Under a standard viewpoint on the semantic nature of argumental nominal phrases, it has been advocated that cross-linguistically argumental nominal phrases cannot be property-denoting, predicative elements (Abney 1987; Stowell 1990; Longobardi 1994; Szabolcsi 1994; Chierchia 1998b; Zamparelli 2000). The present study will follow this spirit and assume that the inherently property-denoting [Num-Cl-N] needs to be appropriately argumentized before it licitly serves as a syntactic argument. To approach this idea, in what follows I will resort to the DP projection to account for argumentization of [Num-Cl-N].

To be specific, I assume that argumental [Num-Cl-N] underlyingly involves a DP projection. In terms of semantics, D is responsible for referentiality/quantification of the nominal expression (cf. Longobardi 1994; Chomsky 1995). Specifically, D is the locus of the [±Def] feature (see also Chierchia 2005), with [+Def] representing definiteness and [-Def] related to indefinite and non-referential cases. The basic hypothesis attempted here is that D (being phonetically null here) performs an argumentizing function by turning a property-denoting element (which is syntactically taken by D as its complement) into a variable satisfying such property. The interpretation of a DP variable (such as definite, existential, and non-referential) depends on the nature of the operator contextually binding the variable. Take [$_{DP}$ [$_{ClP}$ *liang zhi xiaogou*]] (two Cl puppy). While a "bare" ClP denotes a property of "being two puppies" (i.e. a set of pluralities each of which is composed by two puppies), the existence of a DP layer turns such property into a variable which is predicated over by the property of "being two puppies" (namely, the DP denotes a variable *x* such that *x* is a plurality of two puppies).

Along this line, more specifically, as for a [Num-Cl-N] argument which obtains a definite reading, it is assumed that the DP variable is bound by the ι-operator in the sense Partee (1987) and Chierchia (1998b). By definition, the ι-operator selects the greatest member of a set. As each member of the set denoted by [Num-Cl-N] has the same cardinality/measure value, one would not be able to determine the greatest member of such set in terms of "the member with the greatest extension". Given this, it is considered that for communication to be successful in this case, the DP variable associated with ι should be understood as the unique or maximally salient entity/plurality of entities in the discourse, whereby a typical definite interpretation is derived (cf. Chierchia 2005). For example, when a variable *x* such that *x* is a plurality of two puppies is contextually

selected by the ι-operator, *x* must be interpreted as referring to an unique plurality of two puppies which has the highest degree of salience or relevance in the given context, as illustrated by the obligatory coindexation in (a).

(42) a. *Context: A is talking about his/her two puppies*.

A. wo yao chuqu yi ge yue,
I will be.away one Cl month
shei lai zhaogu Huzi he Niuniu$_i$ ne?
who come take.care.of Huzi and Niuniu SFP
'I will be away for a month. Who will take care of Huzi and Niuniu?'

B. bie danxin，ba liang zhi xiaogou$_{i/*j}$ jiao-gei wo ba.
do.not worry BA two Cl puppy give-to I SFP
'Do not worry. Given the two puppies to me.'

b. ι*x*[two puppies (*x*)]
= the unique plurality of two puppies (if there is one; else undefined)
= {Huzi, Niuniu}

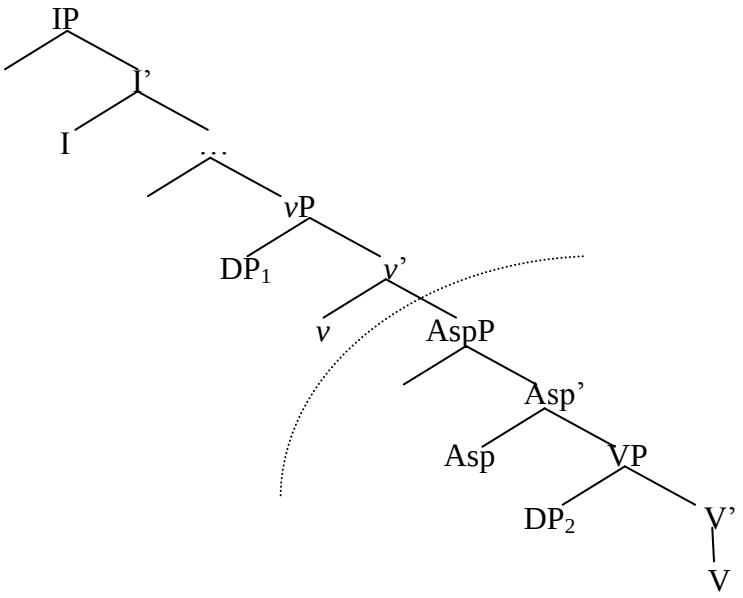
Whereas when [Num-Cl-N] is interpreted as an existential indefinite, the binder of the DP variable is the existential operator ∃, as exemplified below:

(43) a. Lisi kanjian le liang zhi xiaogou
Lisi see Asp two Cl puppy
'Lisi saw two puppies.'

b. ∃*x*[*x* two puppies ∧ Lisi saw *x*]

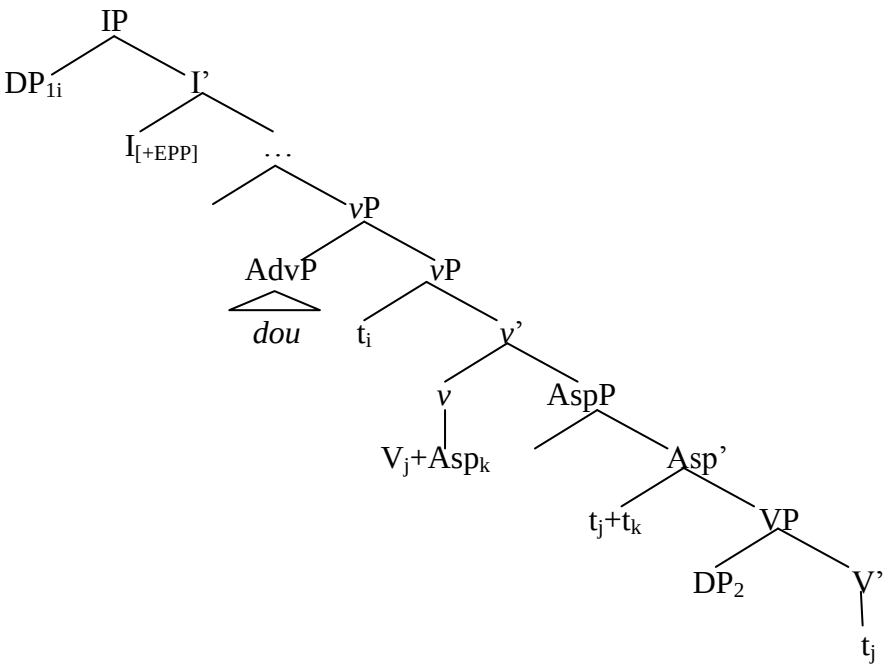
With this in mind, now consider empirical facts discussed in Section 5.2. Begin with the case where the definite/indefinite interpretation of a [Num-Cl-N] expression is associated with an overt marker. Under the DP variable analysis presented here, I hypothesize that the definite marker *dou* is a DP-variable binder which introduces the ι-operator while the dynamic aspectual markers (e.g. *le, zhe, guo*) and the sentential *you* 'have' are binders inducing the ∃-operator. Further recall that the interpretation of a [Num-Cl-N] phrase needs to be locally determined, namely, the "lower" markers like dynamic aspectual markers determine the interpretation of the [Num-Cl-N] object while the "higher" markers like *you* 'have' and *dou* bear on the interpretation of the [Num-Cl-N] subject. To embrace this within a formal account, as a preliminary, I assume an underlying argument structure as below, where I follow the basic spirit of Hale & Keyser (2002) in assuming that the external argument (e.g. DP_1) is introduced by the upper *v* whereas the internal argument (e.g. DP_2) is within the lower VP.

(44) *D-Structure*



Given this, to derive the right word order at the surface structure (i.e. "DP_1+V+DP_2"), it is assumed that V has to move to *v* via Asp (where it carries the aspectual marker like *le*, *zhe*, *guo*). I further hypothesize that except for cases involving the sentential *you* 'have' (for reasons to be discussed below), DP_1 always has to move to [Spec, IP] to check the EPP feature on I as claimed by Tsai (2001). Along this line, for cases containing an adverbial definite marker *dou* and/or an aspectual marker, the derivational process will be as follows:

(45) *S-Structure*

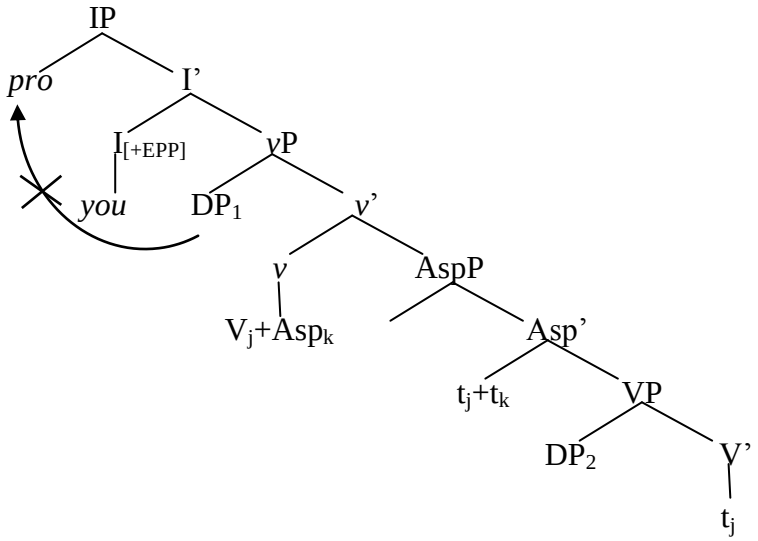


As for the syntactic status of the existential operator *you* 'have', I follow Huang (1988) in postulating that it is base-generated under I. To account for the relative word order of *you* with respect to the [Num-Cl-N] subject, I side with Liao (2011, pp 257) in assuming that this type of *you* is a dynamic predicate which requires a temporal-locative argument. Such a temporal-locative argument could be either overtly or covertly realized, as illustrated below:

(46) (zuotian wanshang/yuanzi-li) you yi liang qiche
yesterday night *yard-in* *have* *one Cl* *car*
bei touzou le
BEI *steal.away* *Asp*
'(Last night/In the yard) a car was stolen away.'

It is further suggested that when *you* is surfaced as a sentence-initial element, there should be a non-overt pro-form of a temporal-locative argument occupying [Spec, IP], which checks the EPP feature on I via a Spec-Head configuration, and thus the DP movement from [Spec, *v*P] to [Spec, IP] would be blocked. As a consequence, in the surface structure *you* would always precede the [Num-Cl-N] subject.

(47) *S-Structure*



Now let us turn to the issue concerning the locality constraint on the determination of the DP variable's interpretation. To formally capture this, I propose an LF interpretational rule as stated below:

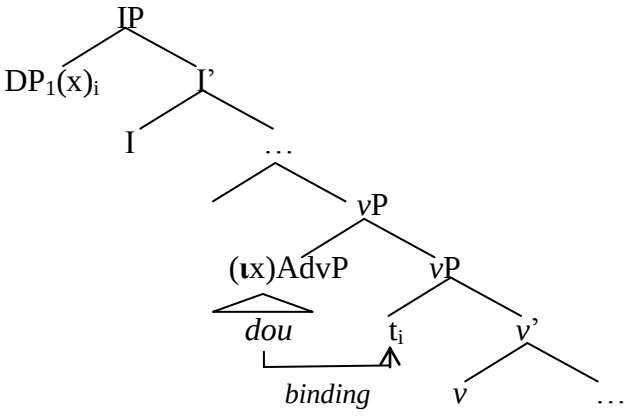
(48) *Interpretational Rule on DP Variables*

The interpretation of a DP variable is determined by the closest binder that c-commands the variable or the trace of the variable at LF.

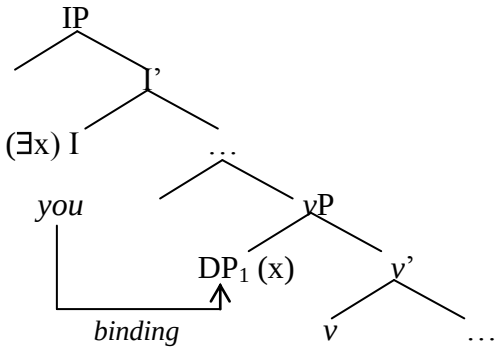
According to this, as for (45) and (47), it then naturally follows that the reading of the DP_2 variable independently depends on the ∃-operator induced by Asp, which is the closest binder of DP_2 at LF, whereas the reading of the DP_1 variable is determined by the ι-operator brought about by *dou* in (45), which projects into the AdvP locally c-commanding the trace of DP_1 at LF, and by the ∃-operator induced by the sentential *you* 'have' in (47), which is under I and immediately c-commands DP_1 at LF, as visualized below. In other words, given (48), the fact that an aspectual marker cannot serve as the binder of a DP_1 variable can be straightforwardly explained in that the former does not c-command the latter at LF; in the same vein, that neither *dou* nor *you* is able to determine the interpretation of a DP_2 variable can be accounted for in that they are not close enough to DP_2.

(49) *LF representation*

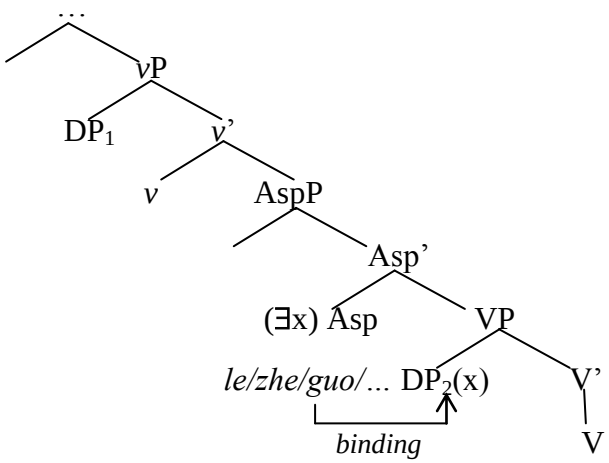
a. *dou* → definite [Num-Cl-N] subject



b. *you* ‘have’ → existential [Num-Cl-N] subject



c. dynamic aspectual markers → existential [Num-Cl-N] object

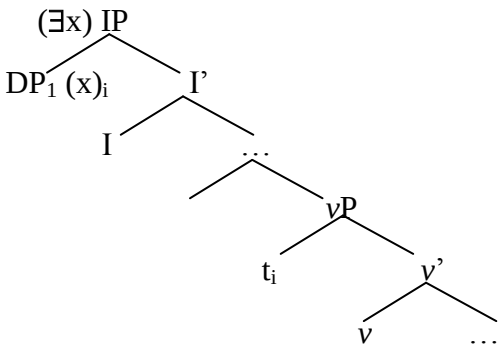


Next, let’s consider the situation where no explicit syntactic markers are adopted for determining the (in)definite interpretation of a [Num-Cl-N] sequence. As for cases where a [Num-Cl-N] subject felicitously obtains an existential reading in the presence of contextual spatial-temporal clues and where a [Num-Cl-N] expression acquires a definite interpretation via the interpretational mechanism of the Familiarity Presupposition, I intend to make the following proposal: (i) spatial-temporal clues are able to induce a non-overt ∃-operator at the sentential level (i.e. IP) at LF, which can serve as the closest binder of a free DP variable occurring at the subject position; (ii) a non-overt ι-operator could always be introduced under a

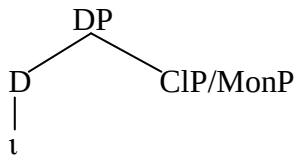
[Def]-unspecified D at LF as long as the DP variable carries the Familiarity Presupposition. See the LF representations below[43]:

(50) *LF representation*

a. Spatial-temporal clues → existential [Num-Cl-N] subject



b. Familiarity Presupposition → definite [Num-Cl-N] subject/object

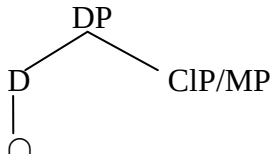


As for the non-referential [Num-Cl-N] expression occurring at the argument position, I propose to resort to the ∩-operator ("down"-operator) in the sense of Chierchia (1998) to account for the conversion of a property-denoting [Num-Cl-N] into a non-referential argumental element. To be concrete, the ∩-operator is a nominalizing device which turns properties into their "isomorphic images in the domain of individuals" (Chierchia & Turner 1988). The ∩-operator can be considered as an intensionalized version of the ι-operator (cf. Chierchia 1998b), and the denotation of an argumental [Num-Cl-N] brought about by the ∩-operator is the totality of all individuals in a given world which satisfy the property denoted by [Num-Cl-N], whose manifestations, according to Chierchia's definition, are spatiotemporally "discontinuous". Take a ClP like *liang zhi*

[43] The depiction in (b) is due to Prof. C.-T. J. Huang (p.c.).

xiaogou (two Cl puppy). Upon being argumentized by the ∩-operator, the denotation of this expression would be the totality of pluralities in a given world each of which has the property of "being two dogs". Similarly for the MonP such as *liang jin pingguo* (two catty-Cl apple), the application of the ∩-operator gives rise to the totality of pluralities in a given world each of which satisfies the description of "being two catties of apples". As for the LF representation, it is hypothesized that the non-referential [Num-Cl-N] involves a DP layer as depicted below, in which D encodes the ∩-operator and takes a ClP/MonP as its complement.

(51) *LF representation*



Further, as has been noticed by Tsai (2001) and Liao (2011), in terms of semantics a pure quantity-denoting [Num-Cl-N] argument is always associated with a generic force in that it does not presuppose the actual existence of particular, spatiotemporally bounded entities; rather, it exhibits a free-choice effect and may apply to entities scattering in different situations in a give world, as long as the entities concerned satisfy the description of [Num-Cl-N]. Given this, I suggest that the ∩-operator associated with this type of [Num-Cl-N] be induced by the generic modal (cf. Heim 1982).

The ∩-operator analysis has the following consequences. First, it can straightforwardly derive the non-referentiality of the related [Num-Cl-N]. Within the present analysis, such an interpretive effect can be naturally taken as stemming from the application of the ∩-operator in that the ∩-operator, by definition, assigns an extension of a property as the totality

of spatiotemporally unselectively bounded instantiations of this property, which concomitantly determines that [Num-Cl-N] argumentized via the ∩-operator by nature makes no reference to particular objects, hence a non-referential interpretation.

Secondly, the present analysis correctly predicts that the non-referential [Num-Cl-N] argument in subject positions would always be incompatible with other operator-inducers such as e.g. *you* 'have', as illustrated below. This can be well explained in that the [Num-Cl-N] variable in this case has already been bound by the ∩-operator and thus cannot accommodate another operator, such as the ∃-operator induced by *you*.

(52) (*you) liang ge pingguo bu gou wu ge ren chi
you two Cl apple not enough five Cl person eat
'(Generally,) two apples are not enough for five people to eat.'

Summarizing, in this subsection a hypothesis was presented that the [Num-Cl-N] argument underlyingly involves the DP projection. The phonetically empty D serves to turn the property denoted by [Num-Cl-N] into a free variable carrying such property. The fact that the argumental [Num-Cl-N] in Mandarin Chinese may exhibit definite, existential, or non-referential interpretations was accounted for in that the particular interpretation of a DP variable is determined by the external operator which locally binds the variable or the trace of the variable at LF. Specifically, the ι-operator (brought about by e.g. the occurrence of *dou* or the Familiarity Presupposition) gives rise to definiteness, the ∃-operator (associated with dynamic aspectual markers, a sentential *you* 'have', or spatiotemporal clues) leads to indefiniteness, and the ∩-operator (induced by the generic modal) brings about a non-refererential reading.

5.4.2 Syntactic licensing condition on DP

Regarding [Num-Cl-N] expressions involving DP layers, what have been dealt with so far are those where D is phonetically empty. To complete the discussion on this issue, following the standard assumption on syntactic licensing on empty categories, I put forth a formal licensing condition on the DP layer with a null D as stated below (cf. Longobardi 1994; Zamparelli 2000):

(53) *Syntactic Licensing Condition on DP with an Empty D*

A DP layer headed by an empty D can be licensed iff

(i) DP is lexically governed; or

(ii) [Spec, DP] is lexically filled.

Based on this, it is further postulated that in Mandarin Chinese NumP may undergo movement whereas Cl cannot. This coupled with the above licensing condition can help us explain the contrast below:

(54) a. Lisi mai le (yi) ben shu
Lisi buy Asp one Cl book
'Lisi bought a book.'

b. *(yi) ge zai Hafo du yuyanxue de xuesheng
one Cl at Harvard study linguistics DE student
mingnian yao lai women xi fangwen
next.year will come we department visit
Intended: 'A student of linguistics from Harvard will come to visit out department next year.'

In (a), as the [$_{DP}$[$_{ClP}$(Num)-Cl-N]] phrase is in a lexically governed position, the licensing condition (53) is respected and the sentence can be licitly formed. Example-(b) differs from (a) in that [$_{DP}$[$_{ClP}$(Num)-Cl-N]] is in the subject position and is not lexically governed. For the fact that in the presence of *yi* (b) is good whereas in the absence of *yi* (b) is out, within the present analysis this can be explained in that in the former case, NumP can move from [Spec, ClP] to [Spec, DP] in order to meet the syntactic licensing condition (ii) in (53); while in the latter case, since on the one hand no NumP movement is applicable, nor can Cl-to-D movement be allowed on the other, neither condition (i) nor condition (ii) in (53) can be satisfied, hence the ungrammaticality of the preverbal [Cl-N]. It is worth pointing out that following the spirit of Chomsky (1995), the present analysis considers movement of NumP as a Last Resort strategy for the purpose of formally licensing an empty DP layer. Accordingly, it is held that once lexical government condition has been satisfied, as in (54a), movement of NumP to [Spec, DP] would not take place.

Regarding the (non-)licensing of a preverbal [Cl-N], notice that Cantonese constitutes a contrast with Mandarin Chinese:

(55) go hoksaang jiu loi ŋodei hokhaau fongman
Cl student will come we school visit
'The student will come to visit our school.'

Concerning this, I suggest that this be attributed to a dialectal parameter in terms of the (im)possibility of Cl movement. It is assumed that Cantonese, but not Mandarin Chinese, allows for Cl-to-D movement. Accordingly, a preverbal [Cl-N] expression in Cantonese can correlate to a syntactic

structure where D is lexically filled by a classifier via Cl-to-D movement and thus the preverbal [Cl-N] can always be perfectly licensed.[44]

Lastly, to accommodate the fact that [$_{DP}$Cl-N] in Mandarin can only acquire an indefinite but never a definite reading, it is hypothesized that [+Def] is a strong feature which always needs to be checked before Spell-Out, either by lexical insertion under D or by occupation of [Spec, DP]. Given this, the lack of the definite [$_{DP}$Cl-N] expression in Mandarin can be attributed to the failure of checking [+Def] since neither specifier movement of NumP to [Spec, DP] nor head movement of Cl to D is applicable under this circumstance.

5.5 Summary

This section started with a reexamination of the semantic nature of [Num-Cl-N] in Mandarin Chinese. It was argued that [Num-Cl-N] is born as a property-denoting expression, which needs to be appropriately argumentized before serving as an argumental expression. It was assumed that the argumental [Num-Cl-N] underlyingly correlates with a DP projection headed by a phonetically null D, which semantically denotes a variable with an undetermined interpretation. In dealing with the determination of the DP variable's reading, an operator-variable analysis was presented, under which the fact that [Num-Cl-N] in Mandarin Chinese may exhibit existential, definite, or non-referential usage was explained in that a DP variable could be bound by the ∃-operator, the ι-operator, or the

[44] To deal with the fact that a preverbal [Cl-N] expression in Cantonese invariably acquires a definite interpretation while a preverbal [Num-Cl-N] in Mandarin Chinese may convey an indefinite reading (see Section 5.1.2.2.1), a tentative proposal suggested here is that Cl-to-D movement in Cantonese is not a syntactic operation coming into play *for free* but is necessarily triggered by the [+Def] feature in D. I will leave an in-depth pursuit of this line of analysis for future research.

$\cap$-operator, depending on the particular context [Num-Cl-N] occurs. Lastly, a syntactic licensing condition was put forth to account for the discrepancy between [$_{DP}$Num-Cl-N] and [$_{DP}\varnothing_{Num}$-Cl-N] in terms of licitly occurring at the preverbal position.

Chapter 6 Conclusion

This dissertation starts with a unified semantic treatment for Chinese classifiers. Based on Wiese's (2003) cognitive analysis for humans' understanding of numerical counting, it is proposed that in the case of entity quantification, Chinese classifiers, irrespective of their subcategory, uniformly serve as partition units which specify a criterion for determining well individuated divisions on a quantity scale. An atomic- vs. interval-unit distinction is made with respect to the denotation of classifiers, with atomic units bringing about minimal tokens of entities while interval units being associated with sum tokens of entities for numerical counting. With the help of the atomic- vs. interval-unit division, it is argued that the dichotomies such as e.g. classifiers vs. measure words, sortal classifiers vs. mensural classifiers, and count-classifiers vs. massifiers can be dispensed with at the semantic level in that there is no one-to-one correlation between the subtype of classifiers and the type of partition unit they may denote in the context. Crucially, it is demonstrated that none of these dichotomies is truly syntactically relevant. A new observation is made that what syntactically matters is whether or not a classifier is used to denote a standardized interval unit, namely, representing a well-determined measure value (either conventionally or contextually determined).

At the syntactic level, in view of the fact that standardized INT-classifiers can be well used for the purpose of numerical quantification without presupposing the existence of a noun denotation whereas other classifiers are semantically relational and necessarily require an entity domain to which they apply a discretizing function, it is claimed that Chinese classifiers should be further divided into two categories. Under the assumption that classifiers head their own

projections, it is hypothesized that the auto-semantic classifiers correlate with an intransitive structure (i.e. taking no complement) while the syn-semantic ones project into a transitive configuration (i.e. taking an NP complement). In addition, efforts are made for a syntactic investigation into measurement constructions composed by measure classifiers, an area which has not received sufficient attention in the literature. It is assumed that (i) [Num-Measure Cl-N] is underlyingly associated with a functional projection MonP in the sense of Schwarzschild (2006), and that (ii) [Num-Measure Cl-*de*-N] correlates with a ModP if [Num-Measure Cl] serves as an attributive modifier of the head noun, in which case *de* is a modifier marker, while projecting into a DP-internal FocP if [Num-Measure Cl] semantically quantifies over the entity domain provided by the head noun, where *de* is the phonetic realization of Foc. Such a dichotomous account for Chinese *de*-marked measurement constructions helps to solve many long-lasting issues concerning the generation and usage of [Num-Measure Cl-*de*-N] in Mandarin Chinese.

This dissertation also looks into the issue concerning adjectival modification of classifiers. A basic claim is that semantically pre-classifier adjectives are uniformly classifier-oriented. Syntactically, they do not have a phrase status but combine with classifiers to form larger compound classifiers (abbreviated as ModCls here). The use of the pre-classifier adjective is motivated by the need to specify, evaluate the extent of the partition unit denoted by the classifier. An especially significant observation at this point is that the existence of a pre-classifier adjectival modifier necessarily brings about a subjective evaluation flavor for the whole numeral classifier construction. To syntactically represent such an interpretive effect, the present study adopts an EvalP analysis in the sense of Doetjes & Rooryck (2002). Assuming that the semantic interpretation of [Num-ModCl-N] can be read off directly from its underlying structure,

it is postulated that [Num-ModCl-N] projects into an EvalP; the [Num-ModCl] sequence, taken as being born with a [+Eval] feature, is base-generated at [Spec, EvalP] and checks off the [+Eval] feature encoded in Eval.

Lastly, the dissertation closely scrutinizes the referential properties of the argumental [Num-Cl-N]. It is argued at length that Chinese numerals are not existential quantifiers and that an argumental [Num-Cl-N] can be well used as a non-referential, an indefinite, or a definite expression. Evidence is presented to show that [Num-Cl-N] in Chinese is born as a property-denoting expression. The argumental [Num-Cl-N] underlyingly correlates to a DP headed by a null D. From the perspective of semantics, such a DP is a variable whose value is determined by the operator that contextually binds it, with the ι-operator bringing about the definite reading, the ∃-operator responsible for existential indefinites, and the ∩-operator giving rise to the non-referential interpretation.

This dissertation develops a novel, non-uniform analysis for numeral classifier constructions in Mandarin Chinese. Both at and beyond the level of the Classifier Phrase, the syntactic configuration is strictly put at the serve of semantics. This line of analysis has the following implications.

First, it allows empirical issues such as e.g. the licensing of the [Num-Cl-N]/[Num-Cl-*de*-N] alternation and the diversity of the interpretation of [Num-Cl-N] to be able to receive an effective account within existing well-established theoretical frameworks, among which the X-bar theory (cf. Radford 1988; Carnie 2007), the empty category theory (cf. Chomsky 1982), the DP hypothesis (e.g. Abney 1987; Longobardi 1994; Szabolcsi 1994; Zamparelli 2000), etc. Compared with previous studies, the present project is able to better capture both the interpretational and the syntactic properties of different types of numeral classifier expressions with fewest stipulations.

Second, on the theoretical side, the present study shows that it is promising to integrate Rizzi's (1997, 2004) core spirit for analyzing clauses into the syntactic investigation of Chinese numeral classifier constructions. This lends support to the hypothesis that there is a structural parallelism between the clausal and the nominal domain (cf. Abney 1987; Bernstein 2001). This also strongly suggests a necessity of closely reexamining the internal structure of Chinese nominal phrases: it should be more articulated than has been assumed.

Lastly, the present investigation of the semantics and syntax of numeral classifier constructions leads to a widening of domains of further inquiry with respect to Chinese nominal phrases. To address some, one issue worth a separate study is the subcategorization of Chinese *de*. A growing body of evidence (both in Mandarin and Chinese dialects) has revealed that Chinese *de*-marked nominal phrases should not constitute a homogeneous construction (cf. Tsai 2010, 2011; Y.-H. Li 2011; Jin 2012). This dissertation has attempted to distinguish two *de*s occurring in [Num-Cl-*de*-N] (either as a modifier marker or as a focus marker).[45] Needless to say, to obtain a complete picture of the syntactic status and the semantic function of the prenominal *de*, much more work remains to be done.

A second topic with great research potential is the syntactic/semantic licensing condition on nominal ellipsis in Chinese. A tentative proposal put forth in the present study is that Chinese nominal ellipsis is subject to

[45] Jin (2012) discusses a third type of [Num-Cl-*de*-N] (as shown below) and proposes that here *de* should be best treated as D in the sense of Simpson (2002).

(i) a. qi bang de zhongliang
seven pound-Cl DE weight
'the weight of seven pounds'
b. liang mi de changdu
two meter-Cl DE length
'the length of two meters'

syntactic government by a [+Part] head (cf. Section 3.3). This analysis sheds new light on the research in this area, while further investigation is needed to fully justify the validity of this account.

Another promising area of inquiry concerns the syntactic representation of definiteness. It has been hypothesized that [+Def] encoded in D is a strong feature which needs to be checked before Spell-Out, either by lexical insertion under D or by occupation of [Spec, DP], whereas [-Def] does not require such kind of "overt" checking (cf. Section 5.4). This brings about an issue concerning the markedness vs. unmarkedness distinction between definites and indefinites in terms of grammatical representation. Empirically, for example, a relevant phenomenon is that [Cl-N] in Wenzhou, which is able to be interpreted as either definite or indefinite, obligatorily requires a tonal change on the classifier if it is intended as definite (cf. Cheng & Sybesma 2005; Sio 2006). In English, the grammatically "marked" nature of definite expressions is illustrated by the fact that a common noun unexceptionally requires a preceding *the* for a definite interpretation while may well stand on its own under an indefinite reading (*the people* vs. *people*, *the water* vs. *water*). In addition, recall that Cl-to-D movement in Cantonese has been speculated as a process necessarily triggered by [+Def] in D (Fn. 44, Chapter 5). All this taken together, it seems to be promising to venture a universal principle that [+Def] is a marked value for D, reminiscent of Longobardi's (1994) claim that D is associated with an existential interpretation by default. This provides us with a new perspective in investigating the linguistic encoding of definiteness/indefiniteness across languages.

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