On the semantics of classifiers in Chinese

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ABSTRACT

This dissertation investigates the semantics of classifiers in Chinese. We argue that a **lexical** distinction between classifiers in terms of notions like "sortal" *versus* "mensural" classifiers (Lyons 1977), or "count" *versus* "mass" classifiers (Cheng & Sybesma 1998) cannot be established in Chinese. There is a distinction that is fundamental in the Chinese classifier system, but it is a semantic distinction: we propose that classifiers have two basic semantic functions—the counting function and the measure function. Relying on Chierchia's (1998b) argument that Chinese bare nouns are kind terms, we argue that on the counting function, the classifier applies to the denotation of bare nouns, the kind, and return a set of atomic entities, which can be counted as one in context (Rothstein 2010). On the measure function, the classifier first combines with the numeral to form a complex modifier which denotes the set of entities of the head noun type whose measure value is the quantifity denoted by the numeral (Krifka 1995, Chierchia 1998a, Landman 2004, Rothstein 2009).

Chapter 1 sets the scene for the rest of the dissertation. Section 2 contains a brief introduction to the morpho-syntactic properties of nominal phrase in Chinese for readers that are not familiar with how nominal phrases in classifier languages behave. Section 3 provides a brief introduction to the semantic issues to be discussed later in the dissertation like the mass/count distinction, the interpretation of bare nouns, and the counting and measure functions of classifiers in Chinese. Section 4 gives an overview of the remainder of the dissertation.

Chapter 2 is concerned with the mass/count distinction of Chinese nominal phrases. Cheng & Sybesma (1998) argue that the mass/count nominal distinction is a grammatically relevant phenomenon in Chinese. They propose that there **is** a mass/count distinction in Chinese nominal phrases, and that this distinction is reflected at the level of classifiers and not of nouns. They suggest that there are two types of classifiers in Chinese, "count classifiers" and "mass classifiers" which modify 'count' nouns and 'mass' nouns respectively. They further claim that mass and count classifiers are structurally different. They assume that count classifiers belong to a functional class and mass classifiers belong to a lexical class (derived from nouns), and they propose that count classifiers are base-generated in the position of Cl^0, while mass classifiers start out in N and then undergo N-to-Cl movement. They suggest that the distinction between mass and count classifiers shows up in two syntactic tests: (i) the presence of pre-classifier adjectives and (ii) the possibility of placing the particle *de* after the classifier.

Against this, further empirical examination of the data (Lu 1987, Luo 1988) shows that there are many counterexamples to these two syntactic diagnostics. The tests are unable to distinguish mass classifiers from count classifiers in a clear-cut way. Since there is no other evidence available supporting the distinction made by Cheng and Sybesma, we claim that there is no evidence for a mass/count distinction in Chinese. We also argue against the assumption of Cheng and Sybesma that the clasifiers that they assume are mass classifiers form a lexical class (inherently nouns), while the classifiers that they identify as count classifiers belong to a functional class. We show that different mass classifiers have different amounts of nominal properties, and, crucially, so do count classifiers. We claim that though most classifiers in Chinese are nominal in origin, they are distinctive from nouns and they constitute a separate and independent category. Following Tang (1990) and A. Li (1999), we suggest that Chinese classifiers are base generated as heads of an independent projection of Classifier Phrase.

Chapter 3 explores the semantics of bare nouns in Chinese. Having argued in Chapter 2 that the mass/count nominal distinction cannot be established in Chinese, we now explore Chierchia's (1998b) proposal that all Chinese nouns are mass nouns. In his 'nominal mapping hypothesis', Chierchia (1998b) suggests that Chinese is an argumental language, in which (i) all the nouns are born as arguments, i.e. Chinese nouns occur freely in argument positions in their bare forms, and (ii) they make reference to kinds. Following Carlson (1977), who argues that mass nouns in English generally denote kinds, this implies that all Chinese nouns have the same types of denotations as English mass nouns. This hypothesis has been quite influential and has been adopted by many scholars, but as Chierchia admits himself, it is very 'speculative'. The first and foremost goal of Chapter 3 is to examine the plausibility of Chierchia's hypothesis by using different tests. We show that there is good evidence to accept it.

It is well established in the literature that, besides kind readings, Chinese bare nouns have object-level interpretations, which include both definite and indefinite interpretations. The bare noun *shu* 'book' in 'I bought *shu'* can either mean 'I bought the book(s)' or 'I bought some book(s)'. Following the work in Carlson 1977 and Chierchia 1998a, 1998b we argue that the kind interpretation is the default reading for Chinese bare nouns, and that object-level readings are derived from the kind reading.

The final section of Chapter 3 discusses different constructions in Chinese that make reference to kinds, including bare nouns, kind classifier phrases and N suffixed with *–lei* 'kind'. We show that these differ from each other in their distribution and interpretation.

Bare nouns are felicitous with predicates expressing properties about individuals and kinds. When kind ClPs are used as subjects, they must be introduced by the existential quantifier *you* 'there be'. N-*lei* is only felicitous with predicates expressing properties about (sub)kinds, not individuals. We argue that a comparative study of these three types of kind-referring nominals not only help us understand the semantics of Chinese nouns in a more profound way, but also shed light on the issue of how different kinds of kind references can be expressed in Chinese.

Chapter 4 is the heart of the dissertation. In this chapter, we discuss the semantics of classifiers in Chinese. What we mean by this is not the lexical meanings of different classifiers, but the properties that characterize the interpretation of classifiers as a class, or put differently: the interpretative function of classifiers as an independent category. We make two main arguments concerning the semantics of classifier: (i) Classifiers have two basic functions, the counting function and the measure function. (ii) The counting and measure readings of classifiers are distinguished syntactically in Chinese. We discuss various pieces of syntactic evidence to show the distinction between these two readings. Assuming the distinction, we take [±Counting] and [±Measure] as features constraining the **default** interpretation of classifiers. We discuss the four types of classifiers that can be distinguished within this feature system.

In Chapter 5 we discuss the distributional patterns and the semantic functions of pre-classifier adjectives and the post-classifier *de*. We argue that pre-classifier adjectives appear before classifiers in counting contexts only. This means that they can only appear before [+C, -M] and [+C, +M] classifiers, and the latter only on their counting interpretation. We also argue that while pre-classifier adjectives precede the classifier and the noun at the surface level, they do not stand in a direct modification relation to the classifier, nor to the noun. In contrast, we propose that they modify the constituent "Cl+N". Since we have argued (in Chapter 4) that there is no Cl+N constituent in measure phrases, this explains naturally why pre-classifier adjectives do not appear in measure expressions. Concerning the semantic function of pre-classifier adjectives like as *da/xiao* 'big/small', we argue that they have an 'expressive' meanings in that they express the speaker's evaluation of the atomic entity in the denotation of "Cl+N" to be *big* or *small* from a particular perspective chosen by the speaker.

With respect to the partical *de*, we find (contra Cheng & Sybesma (1998)) that *de* is found both after individual and non-individual classifiers. We argue that Num-Cl-*de*-N always has a measure reading, in that Num-Cl denotes the quantity of entities represented by N. We argue that the particle *de* subordinates the constituent of Num-Cl to the head noun as a modifier. It shifts Num-Cl from a predicate of type $<d, t>$ to a modifier of type

<<d, t> <d, t>>. Both counting and measure classifiers can be used in measure phrases forced by the particle *de*. We distinguish two types of measure readings: (i) the *as much as …* type, in which the classifier denotes a measure unit; (ii) the *as many as …*type, in which the classifier denote counting unit.

Chapter 6 looks at classifiers beyond the counting and the measure uses and beyond the language of Mandarin Chinese. We discuss the "Cl+N" construction in three Chinese languages: Mandarin, Wu and Cantonese. The "Cl+N" construction is found in all these three Chinese languages, but its distribution and the interpretation with respect to (in)definiteness differs in these languages. In Mandarin Chinese, the "Cl+N" construction is only found in postverbal positions and has an indefinite interpretation. In the southern Chinese languages Cantonese and Wu, this construction is available in both preverbal and postverbal positions. In particular in Wu, "Cl+N" has a definite reading, and indefinite when appearing preverbally (cf. Li & Bisang 2010). In Cantonese, preverbal "Cl+N" has a definite reading and postverbal "Cl+N" is either definite or indefinite (see Cheung 1972, Cheng & Sybesma 1999, 2004).

The (in)definite "Cl+N" constructions have been described and discussed by many linguists for different Chinese dialects (Cheung 1972, Shi &Liu 1985, Cheng & Sybesma 1999, 2004, Li & Bisang 2010 and many others). No agreement has been reached about the syntactic status and the semantic function of the classifier in "Cl+N". Many questions are still left open. We discuss the following questions:

(i) What are the factors that constrain the distributions of indefinite and definite "Cl+N"? Is it possible that pragmatic factors concerning information structure play a role?

(ii) What are the syntactic structures of indefinite and definite Cl+N? For example, does indefinite Cl+N project into NumP or ClP? Is the definite "Cl+N" a maximal projection of ClP or DP?

(iii) Is the "Cl+N" construction derived from the counting phrase or the measure phrase of classifiers?

(iv) What are the semantic functions of classifiers in indefinite and definite "Cl+N" constructions?

With respect to the first question, we argue that the interpretation of the classifier in "Cl+N" as definite or indefinite is constrained by pragmatic factors, especially the information structure. Chinese languages are topic-prominent languages, in which preverbal nominals function as topics or secondary topics and postverbal postions are usually focus positions (Li & Thompson 1976, 1981, Xu & Liu 2007) This makes it natural to interpret pre-verbal

nominals as definite and post-verbal nominals as indefinite. Hence, definite "Cl+N" are prototypically found in pre-verbal positions and indefinite "Cl+N" are restricted to post-verbal positions.

Our answer to the second question is that on the indefinite reading of Cl+N, the classifier is projected into the head of ClP, and on the definite reading, the classifier undergoes Cl-to-D raising and heads a DP, where the classifier has the head feature of definiteness.

Concerning the third question, we claim is that the "Cl+N" construction is only available when the classifier has a counting interpretation and that the counting function of classifiers can be extended to the reference domain to mark (in)definiteness, characterized as "weak familiarity" à la Roberts (2003).

As for the semantic functions of classifiers, we propose that indefinite "Cl+N" is a ClP, which is inherently predicative and that definite "Cl+N" is a DP, where the classifier is raised from Cl to D. When the classifier raises to D, it is associated with an existential quantifier interpretation (Landman 2004).

CHAPTER 1   INTRODUCTION

1.   Research objectives and data

This dissertation explores the semantics of classifiers in Chinese. We make two main proposals in this dissertation. We first argue that there is no evidence for a mass/count distinction in the nominal phrases in Chinese: in Chinese all nouns are mass nouns denoting kinds. Secondly, we claim that Chinese classifiers have two basic functions: a counting function and a measure function, and we claim that the distinction between these two readings is reflected at the syntactic level. On the counting function, the classifier applies to the denotation of the bare noun, a kind, and returns a set of atomic entities, which count as one in a particular context (see Rothstein 2010). On the measure function, the classifier first combines with the numeral to form a complex modifier, which denotes the set of entities of the head noun type whose measure value is the quantity denoted by the numeral-classifier (see Krifka 1995, Chierchia 1998a, Landman 2004, Rothstein 2009).

We will base the discussion of the semantics of classifiers largely on the data of Mandarin Chinese, though we will also draw data from other Chinese languages, such as Wu and Cantonese. In the last Chapter, we will explicitly discuss differences between classifiers in Mandarin, Wu and Cantonese. Therefore, when we use the expression 'Chinese', we really mean the Chinese languages or the Sinitic languages, and not just Mandarin.

We now provide some general background information about the three Chinese languages that we discuss in this dissertation: Mandarin Chinese, Wu Chinese and Cantonese (Yue Chinese).

Mandarin Chinese was originally spoken across most of Northern and South-western areas of China. It now has become the national language of People's Republic of China. The variant of Mandarin studied in this dissertation is the *Putong-hua* 'common language', i.e. standard Mandarin.

Cantonese, a southern Chinese language, is spoken in the southern provinces of China, including Guangdong Province, Guangxi Province, Hong Kong Special Administration Region and Macau Special Administration Region. The variant of Cantonese we study here is Hong Kong Cantonese (mainly based on Matthews & Yip's 1994 grammar).

Wu Chinese is spoken in the Yangtze Delta area including Shanghai City, Zhejiang Province and southern Jiangshu Province. The Wu data presented in this dissertation are based on the *Fuyang* dialect, the mother tongue of the author. The dialect belongs to the *Taihu Lake* groups of the Northern Wu dialect. It is spoken in the *Fuyang* city, in the northwest of

Zhejiang province and to the southwest of Shanghai. The dialect has about 600,000 native speakers.

The language data used in this dissertation follows the following conventions:

Mandarin: Pinyin (People's Republic of China's official Romanization system)

Cantonese: Jyutping (the Linguistic Society of Hong Kong Cantonese Romanization Scheme)

Wu (Fuyang): IPA symbols

Note that the data we use in the dissertation is Mandarin, unless marked otherwise.

The author himself is a bilingual speaker of Mandarin and the Fuyang dialect of Wu Chinese. The Mandarin examples used in this dissertation come from various sources, e.g. retrieved from the Peking University Corpus, googled from the internet, made up by the author or otherwise cited from others. They are all carefully checked with other Mandarin speakers from different parts of China. My informants include Chen Yujie (Henan), Hung Yuchen (Taiwan), Liang Xinliang (Liaoning), Liu Hui (Beijing), Lu Bingfu (Shanghai), Wang Luming (Zhejiang), Wang Jian (Jiangsu), Li Luxia (Hunan), and Victor Pan (Hubei). The Wu examples are made up by the author and double-checked with his mother, Xu Yinfeng, and his sister, Li Ping-Er. The Cantonese examples are taken from Matthews & Yip's (1994) reference grammar of Cantonese and Cheng & Sybesma's (1999) paper. In addition, we also checked some of the Cantonese examples with our colleages, SingSing Ngai and Hilario de Sousa, who are native speakers of HongKong Cantonese.

2. The realm of classifiers in Chinese

This section will briefly introduce classifier and nominal phrases in general in Chinese. In section 2.1, we give an overview of the morpho-syntactic properties of Chinese nominal phrases. In section 2.2 we give an introduction to classifiers and their syntactic status in the structure of the nominal phrase in Chinese.

2.1 Chinese as a number-less and article-less language

Unlike most Indo-European languages, Chinese has no number morphology to mark the singularity or plurality of nouns. For example, the Chinese bare noun *gou* can mean *dog* or *dogs*. The examples of *yi zhi gou* 'one Cl dog' in (1.a) and *wu zhi gou* 'five Cl dog' in (1.b) only differ in their numerals. Even when there is a plural quantifier, such as *xuduo* 'many' in (1.c), the noun *gou* is used in its bare form. So Chinese is regarded to be a 'number-less' or

'number-neutral' language (Rullmann & You 2006). The examples in (1) to (3) are from Mandarin.

(1) a. yi   zhi   gou

     one   Cl   dog

     'one dog'

   b. wu   zhi   gou

     five   Cl   dog

     'five dogs'

   c. xuduo   gou

     many   dog

      'many dogs'

Another difference between nouns in Chinese and many Indo-European languages is that Chinese has neither definite nor indefinite articles in the nominal domain. Native speakers can choose demonstratives, such as *zhe* 'this' or *na* 'that' in Mandarin, to express definiteness overtly, as exemplified in (2.a), and numeral phrases such as 'one+Cl+N', are used to express indefiniteness, as in (2.b). As Cheng & Sybesma (1999) show, NumPs in Chinese always express indefiniteness.

(2) a. zhe   ben   shu   shi   wo-de

      this $Cl_{-volume}$ book   be   mine

      'This book is mine.'

   b. wo   mai   le   yi   ben   shu.

     I   buy   Perf   one $Cl_{-volume}$ book

     'I bought a book.'

Chinese bare nouns have great flexibility in contextual interpretation with respect to number and (in)definiteness. For example, the bare noun *gou* 'dog' in (3) has at least four interpretations, i.e. 'a dog', 'dogs', 'the dog' and 'the dogs'.

(3) wo   kanjian   gou   le.
   I   see   dog   Part
   a. 'I saw a dog.'
   b. 'I saw dogs.'
   c. 'I saw the dog.'
   d. 'I saw the dogs.'

In sum, Chinese is not only a number-less language but also an article-less language, and the nouns are open for singular or plural interpretation, and for definite and indefinite interpretation.

2.2 Chinese as a classifier language

Although Chinese lacks number marker or (in)definiteness marker, Chinese has individual classifiers, which are not found in Indo-European languages. Greenberg (1972) formulates the typological generalization that number morphology and classifiers are to some extent in complementary distribution and that there is a tendency for languages without grammatical number to have individual classifiers. In this sense, Chinese languages and Indo-European languages can be seen as two typologically different classes of languages, the former are "classifier languages" and the latter are "non-classifier languages", or "number-languages". I use "classifier languages" to refer to languages where modifying count nouns with numerals always requires a classifier (other linguists have also used the term in this way) and "non-classifier languages" to refer to languages which do not always require a classifier to count. I do not use the distinction between languages which have a count/mass distinction and those which don't so as not to prejudice the discussion of Cheng and Sybsema (1998) in Chapter 2. English and other Indo-European languages do have **non-individual classifiers**, including group classifiers, container classifiers etc (see e.g the discussion in Landman 2004, Rothstein 2009).

Mandarin, Wu, and Cantonese are representative classifier languages, because they all have a well-developed system of numeral classifiers in the nominal domain. None of these languages can have constructions such as "Num+N". It is obligatory to have a mediating element between the Num and the N, regardless of whether the noun refers to discrete entities - such as *zhuozi* 'desk' in Mandarin (4.a) or *iaʔ səŋ* 'student' in Wu (4.b) or *syu* 'book' in Cantonese (4.c) - or refers to homogenous entities, such as *shui* 'water' in Mandarin (5.a), *ɲiuna* 'milk' in Wu (5.b), and *hyut* 'blood' in Cantonese (5.c).

(4) a. san   *(duo)   hua   [Mandarin]

      three $Cl_{blossom}$ flower

      'three blossoms of flowers'

    b. n̩ian   *(gə)   iaʔsəŋ   [Wu]

      two   Cl   student

      'two students'

    c. yat   * (bun)   syu   [Cantonese]

      one Cl_{volume} book

      'one book'

(5) a. yi   *(ping)   shui   [Mandarin]

      one Cl_{bottle} water

      'a bottle of water'

    b. n̩ian   *(bæ)   n̩iuna   [Wu]

      two Cl_{glass} milk

      'two glasses of milk'

    c. yat   *(dihk)   hyut   [Cantonese]

      one Cl_{drop} blood

      'a drop of blood'

We call the mediating element between Num and N a classifier. These are the elements *duo* 'blossom' in (4.a), *bun* 'volume' in (4.c), and *ping* 'bottle' in (5.a). The classifiers in (4) and (5) represent two different types of classifiers, namely individual and non-indiviudal classifiers respectively. Classifiers, like *duo*, *ge* and *bun* in (4), are individual classifiers, which (usually) modify nouns denoting discrete entities, (but see the discussion in chapter 4). They are exclusively found in classifier languages. The classifier *duo* 'blossom' in (4.a) has the lexical meaning of *bud* or *blossom*, and it usually modifies flowers or flower-like entities. The classifier *gə* in (4.b) is a general classifier, which can modify most nouns which refer to discrete entities, such as *people*, *apple* etc. The classifier *bun* 'volume' is a special classifier for books. According to Chao (1968), there are more than 50 individual classifiers in Mandarin, each of which modifies a special class of nouns.

In contrast, the classifiers used in (5) such as *di* 'drop' and *bæ* 'glass' and *dihk* 'drop' are found both in classifier languages and non-classifier languages[1]. They are called non-individual classifiers, and they usually modify nouns denoting homogeneous entities or plural discrete entities. This class includes (in Mandarin) container classifiers, such as *xiang* 'box', *guo* 'pot' etc, group classifiers, such as *qun* 'group', *shu* 'bouquet' etc, and partition classifiers, *duan* 'section', *pian* 'piece' etc.[2]

Classifiers can also appear after determiners in Chinese. For instance, in Mandarin the classifier is obligatory after some determiners, such as *mei* 'each', *ji* 'several', as in (6). It is optional after the demonstratives *zhe/na* 'this/that' and quantifiers such as *xuduo* 'many', *yixie* 'some', as in (7).[3] Classifiers are not allowed after *daduoshu* 'most' and *suoyou* 'all', as in (8). We refer readers to Gil & Tsoulas (2009) for relevant discussion about determiners which do not allow classifiers in Japanese and Korean.

(6) a. mei   *(ge)   xuesheng

     every   Cl   student

     'every student'

    b. ji   *(ge)   xuesheng

     several   Cl   student

     'several students'

---

[1] We use 'classifier' to mean an lexical item which mediates between a number word and an NP expression. In this sense classifiers occur both in Chinese languages and in languages like English, in the latter case in so-called 'pseudopartitive constructions' (see e.g Schwarzchild 2006 and references cited there), although only 'classifier languages' have individual classifiers. As we will argue later, only in Chinese-type languages do classifiers constitute a special grammatical category, projecting a Classifier Phrase. In English and Modern Hebrew, for example, classifiers are nouns (see e.g. Rothstein 2009).

[2] The term partition *classifiers* has nothing to do with the "partitive construction", i.e. 'three of the boys', '50 grams of the sugar' (Jackendoff 1977, Ladusaw 1982 etc). Partition classifier refer to a special class of classifiers, which include *duan* 'section', *di* 'drop' and *kuai* 'piece' etc. When modifying nouns, they imply a part-whole relation. For example, in the example of *liang di shui* 'two drops of water', the homogeneous entity *shui* 'water' is partitioned into single drops by the partition classifier *di* 'drop'. The example of *yi kuai rou* 'a piece of meat' entails that there exists a large chunk or piece of meat, from which we get a single piece, as picked out by the partition Cl *pian* 'piece'. NPs with partition classifiers resemble pseudopartitives in English (see e.g. Koptjevskaja-Tamm 2001).

[3] There is a difference between Mandarin and Wu-Cantonese with respect to demonstratives. In Mandarin, the classifier is optional after demonstratives, but it is obligatory in Wu and Cantonese.

(7) a. zhe   (ge)   xuesheng

   this   Cl   student

   'this student'

  b. xuduo   (ge)   xuesheng

   many   Cl   student

   'many students'

  c. yixie   (ge)   xuesheng

   some   Cl   student

   'some students'

(8) a. daduoshu   (*ge)   xuesheng

   most   Cl   student

    'most students'

  b. suoyou   (*ge)   xuesheng

   all   Cl   student

   'all students'

It is standardly assumed in the literature that there is a classifier projection between the Number Phrase and the Noun Phrase in Mandarin (e.g. Tang 1990, A. Li 1999, Cheng & Sybesma 1999). We follow this view and adopt A. Li's (1999) syntactic structure for Mandarin Determiner Phrases in (9).

(9)

```
              DP
           /      \
         D        NumP
               /      \
             Num      ClP
                    /      \
                  Cl       NP
                            |
                            N
```
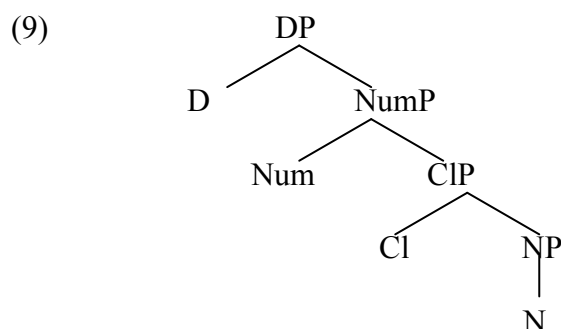
We assume that the various functional nodes are projected only when there is a lexical element filling in that position. We assume that all determiner phrases in the Chinese languages under discussion have the DP structure in (9). But, as we will discuss in Chapter 6, the D element is realized in different languages by different elements, e.g. by demonstratives in Mandarin and by classifiers in Wu.

3. Basic semantic issues of Chinese classifier phrases

In this section, we will introduce some important semantic issues concerning Chinese classifier phrases: the mass/count distinction in 3.1; the interpretation of Chinese bare nouns in 3.2; and the semantics of Chinese classifiers in 3.3. We will also introduce some aspects of the basic theoretical framework which will be used in this dissertation.

3.1 The mass/count distinction of Chinese nominals
3.1.1 The mass approach

The mass/count nominal distinction is a grammatical distinction in many languages. A language that makes the distinction between count nouns and mass nouns has some grammatical devices which reflect the distinction. English is a language that has a mass/count distinction, so let's see how the distinction shows up grammatically (cf. Gillon 1992, Chierchia 1998a, Rothstein 2010).

(i)   Properties of the noun
   a. Count nouns occur with numeral determiners, but mass nouns cannot;
      *three chairs vs. *three furniture*
   b. Count nouns take plural morphology, but mass nouns don't;
      *chair/chairs vs. furniture/*furnitures*
   c. Count nouns do not normally occur in the singular with classifiers, mass nouns do:
      *three pieces of chair vs. *three pieces of furniture*

(ii)   Sensitivity of determiners to the mass/count distinction
   a. some determiners only select count nouns
      *each/every/a book; several/few/many books; * every*/several furniture (s)*
   b. some determiners only select mass nouns
      little/much water;   *little/*much book
   c. some determiners select mass and plural nouns
      a lot of/plenty of wine;   a lot of/plenty of books; *a lot of/*plenty of book;
   d. some determiners are unrestricted
      the/some books;   the/some water;

The distinction between mass and count nouns is language specific. For one thing, which nouns are mass and which are count varies from language to language. For example, the

English mass noun *hair* is translated into Italian as a count noun *capello/capelli*, and the Italian count noun *mobile/mobili* is translated into English as the mass noun *furniture*. And secondly, some languages have the grammatical distinction, while others don't. We propose with Chierchia (1998a,b) that in Chinese all nouns are mass nouns. There are at least two reasons for making such a claim.

Firstly, as we mentioned before, Chinese does not mark singularity or plurality. All nouns in Chinese behave like mass nouns that cannot be counted by numerals directly without the help of a classifier (e.g. the examples in (4) and (5)). Secondly, determiners in Chinese are not sensitive to the properties of the nouns, e.g. the mass/count distinction. There are two types of determiners in Chinese: the first type directly modifies nouns, as in (10); the second type must first combine with a classifier and then the complex determiner can modify the noun, as in (11). However, the nouns modified by these two types, the determiner or the determiner classifier complexes, can either refer to discrete entities like *xuesheng* 'student' or to homogeneous entities, like *shui* 'water'. In other words, in Chinese, it is impossible to find the contrast corresponding to *many* vs. *much* and *few* vs. *little*.

(10) a. henduo   xuesheng /shui
        a lot of   student/water
        'a lot of students/water'
     b. yixie   xuesheng/shui
        some   student/water
        'some students/water'
     c. hen   shao   de   xuesheng /shui
        very   few/little   Mod   student/water
        'very few students/ a little water'

(11)a. mei   *(ge)   xuesheng

      every   Cl   student

      'every student'

   b. mei   *(di)   shui

      every   Cl$_{drop}$ water

      'every drop of water'

   c. ji   *(ge)   xuesheng

      several   Cl   student

      'several students'

   d. ji   *(di)   shui

      several   Cl$_{drop}$ water

      'several drops of water'

With these two facts in mind, we propose that in Chinese there is no morpho-syntactic property available to distinguish mass nouns from count nouns. We thus follow Krifka (1995) and Chierchia (1998b) in assuming that all nouns in Chinese behave like mass nouns, and that the classifier is obligatory between Num/Det and N.

3.1.2 The mass/count approach

Contra Chierchia (1998b), Cheng & Sybesma (1998) argue that there **is** a mass/count distinction in Chinese nominal phrases, but that this distinction is reflected at the level of classifiers and not of nouns. They suggest that there are two types of classifiers in Chinese, "count classifiers" and "mass classifiers", which select "count nouns" and "mass nouns" respectively. Semantically, count classifiers simply name the unit in which the entity denoted by the noun naturally occurs and mass classifiers create a unit of measure (also see Lyons 1976, Tai &Wang 1990, Croft 1994).

Cheng & Sybesma (1998) give two syntactic criteria to distinguish mass classifiers from count classifiers: (i) the availability of adjectives before classifiers and (ii) the possibility of the particle *de* after classifiers.

Concerning the first criterion, Cheng & Sybesma argue that mass classifiers can be preceded by adjectives like *da/xiao* 'big/small', but count classifiers cannot. Compare (12) with (13). Classifiers like *zhang* 'piece', *xiang* 'box' in (12) are felicitous with adjectival modification, but classifiers like *wei* (a honorific classifier for people) or *zhi* (a classifier for animals) in (13) are not.

(12) a. yi   da   zhang   zhi   [mass classifiers]
         one   big   Cl-piece   paper
         'a big piece of paper'
      b. na   yi   xiao   xiang   shu
         that   one   small   Cl-box   book
         'that small box of books'

(13) a.* yi   da   wei   laoshi   [count classifiers]
         one   big   Cl   teacher
      b.* yi   da   zhi   gou
         one   big   Cl   dog

Concerning the second criterion, Cheng and Sybesma argue that mass classifiers can be followed by the modification marker *de,* but count classifiers cannot. For example, classifiers like *wan* 'bowl' and *xiang* 'box' in (14) can be followed by the particle *de,* whereas classifiers like *tou* 'head' and *gen* in (15) cannot.

(14) a. san   wan   de   tang   [mass classifiers]
         three   Cl-bowl   DE   soup
         'three   bowls of soup'
      b. liang   xiang   de   shu
         two   Cl-box   DE   book
         'two boxes of books'

(15) a.* ba   tou   de   niu   [count classifiers]
         eight   Cl-head   DE   cow
      b.* jiu   gen   de   weiba
         nine   Cl   DE   tail

Cheng & Sybesma (1998) call the classifiers in (12) and (14) mass classifiers (or "massifiers") and those in (13) and (15) count classifiers (or simply "classifiers").

In Chapter 2, we will look carefully at these arguments and show that there are many counterexamples to these diagnostic tests.

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3.2 Interpretation of Chinese bare nouns

The assumption that all Chinese bare nouns are mass does not automatically give an answer to the question of how they are interpreted, in particular, the question of whether they denote predicates or kinds. Chinese bare nouns have a wide range of uses in different contexts. For example, the bare noun *jing* 'whale' can be used in argument positions, where it denotes kinds (16.a) or individuals (16.b). It can also be used in predicative positions, as in (17). It is individual-denoting in (17.a-b) and sub-kind denoting in (17.c).

(16) a. jing   kuai   jue-zhong   le.
     Whale   soon   vanish-kind   Part
   'Whales will soon be extinct.'
  b. dongwuyuan de   jing   shou-shang   le.
    zoo   Mod   whale   get hurt   Part
   'The whale(s) in the zoo got hurt.'

(17) a. Moby Dick   shi   jing.
     Moby Dick   be   whale
     'Moby Dick is a whale.'
  b. yi   tiao   jing
    one   Cl   whale
   'an (individual) whale'
  c. lanjing   shi   jing.
    Blue whale   be   whale
   'Blue whales are whales.'

We will argue, following Chierchia 1998b, that the kind reading is the basic reading of Chinese bare nouns and that predicative uses are derived from the kind reading.

According to Chierchia (1998a, 1998b), English mass nouns denote kinds. "Kinds are functions from worlds/situations onto the largest plural entity in the set denoted by the mass nouns in that world/situation" (Chierchia 1998b: 349).

(18) a. For any property P associated with the denotation of the mass N and the world of evaluation w:

$$^\cap P = \lambda w. \sqcup_D(P_w) \qquad OR \qquad ^\cap P_w = \sqcup_D P_w$$

b. $^\cup$ is the function from kinds to sets of individuals, such that for every kind:

$^\cup(^\cap P)=P$

We adopt Chierchia's (1998b) use of the down operator $^\cap$ and the up operator $^\cup$, which allow us to get a kind from the corresponding property or vice versa. Put differently, the 'down'operator nominalizes, and the 'up' operator predicativizes.

On the assumption that all Chinese bare nouns are mass nouns, we assign the same interpretation (18) to Chinese bare nouns.

For the object-level interpretations, we follow Chierchia (1998b)'s analysis in which the property stands in a Carlsonian instantiation relation to the kind term. We propose that the post-copula bare NP undergoes type-shifting from kind denotations to the set of instantiations of the kind via the $^\cup$ operator. This is illustrated in (19) for the interpretation of *Moby Dick shi jing* "Moby Dick is a whale", where *shi* is the copula.

(19) a. $\|jing\|=^\cap$whale   [Kind reading (default)]

    b. $\text{SHIFT}(\|jing\|)=\lambda x.x\in{}^{\cup\cap}$whale   [Shifted predicative reading]

    c. $\|shi\|(\text{SHIFT}(\|jing\|))=\lambda x.x\in{}^{\cup\cap}$whale

    d. $\lambda x.x\in{}^{\cup\cap}$whale (moby-dick)

        = moby-dick.$\in{}^{\cup\cap}$whale

(19.d) asserts that Moby Dick is in the denotation of the set of instantiations of the whale kind. We will discuss the semantics of bare nouns and of the other object-level readings of bare nouns in great detail in Chapter 3.

3.3 Counting/measure functions of Chinese classifiers

Chinese nouns are mass nouns, and as we will show, their denotations don't correspond to sets of atoms. To count a mass noun denotation, we need a classifier to individuate a level at which to count. That is why the classifier is always obligatory between Num and N in Chinese. However, the function of the classifier is not always to count: classifiers can also be used to measure entities. In this dissertation, we will make a distinction between counting and measure functions of classifies. Two explicit accounts of the semantics of classifiers are given in Krifka (1989, 1995) and Rothstein (2009, 2010). In this section we discuss some aspects of these theories.

3.3.1 Counting function of classifiers

In the literature, the counting function of classifiers is usually called the "individuation" or "individuating" function (e.g. Greenberg 1972, Paris 1981, Croft 1994, Bisang 1993, 1999, Cheng & Sybesma 1998, 1999, Chierchia 1998b and many others). Greenberg (1972) states that "classifiers are units of enumeration employed to mark countability"; Paris (1981:69) says: the classifier is "une marque d'individuation, de singularisation" (i.e. a marker of individuation and of singularization); and Cheng & Sybesma's (1998) state: "with the individuating function, the classifiers are able to single out discrete entities", whereas Chierchia's (1998b:347) says: "a classifier will be necessary to individuate an appropriate counting level" and "classifier phrases map mass noun denotations into sets of atoms", while Bisang's (1999: 20) says: "classifiers actualize the semantic boundaries which already belong to the concept of a given noun", and "classifiers have recourse to inherent properties which make the individuality of a given noun".

All this still leaves the explicit semantics of the individuating function of the classifier to be worked out.

Rothstein (2010) gives such an explicit account of the individuation function of classifiers in English. She argues that count nouns are derived from abstract root nouns via a 'counting' operation, and that classifiers explicitly introduce the same operation. Count nouns and "classifier+mass nouns" denote sets of semantically atomic entities counted as one according to a context-dependent criterion. She suggests that individuating "Cl+Ns" in English and in Chinese are equivalent to count nouns in English type languages.

Rothstein (2010) argues that mass nouns and count nouns are of different types. She follows Chierchia (1998a) in assuming that count nouns and mass nouns are interpreted in relation to the same domain - an atomic Boolean semi-lattice generated by a possibly vague set of atoms. She proposes that all lexical nouns N are associated with an abstract root noun N_{root}, denoting a Boolean sublattice of D. She proposes that the denotation of a mass noun, N_{mass} is identical to the associated N_{root}. So mass nouns are of type $<d, t>$ (where d is the type of entities and t the type of truth values).

Count nouns denote sets of entities that are atomic in a particular context k. A context variable k is a non-empty subset of non-overlapping entities in D, a set of things which count as atomic units in that particular context. Count nouns are derived from root nouns by a counting operation, which intersects N_{root} with k. The counting operation, $COUNT_k$ gives as the denotation of the count noun N_k, the set of ordered pair $<d, k>$, for all d in $N_{root} \cap k$. Accordingly, the denotation of a count noun can be represented as in (20):

(20) The interpretation of a count noun N_{count} in context k is $N_k = \{<d, k>:d\in N_{root} \cap k\}$

The count noun consists of pairs of objects and a counting context k, where the objects are N_{root}-entities that do not overlap in k and count as 1. Such objects are called **semantic** atoms. Since the criterion for what counts as an atom is semantically encoded by the specification of the context. Count nouns provide a mechanism for grammatical counting, in the sense that "counting is putting entities in one-to-one correspondence with the natural numbers and requires a decision as to what counts as one entity" (Rothstein 2010:20).

Thus, for Rothstein count nouns are of a different type from mass nouns: type $<d\times k, t>$, functions from ordered pairs to truth values.

The semantics correctly predicts that mass nouns cannot be directly modified by numerals. Since counting is relative to a context k, only entities in $D\times\{k\}$ can be counted. In order for the minimal elements of N_{mass} to be counted, a classifier must be used. The most neutral classifiers are *unit of* and *piece of* and can be thought of as an explicit expression of the $COUNT_k$ operation as in (21):

(21) I bought a unit of furniture/ one piece of furniture.

Rothstein suggests that the classifier *unit of* is analyzed as a function from D into $D\times\{k\}$, which applies to a mass noun and which individuates entities relative to a particular context. Rothstein's semantics makes use of projections:

(22) $\pi_1(N_k)=\{d:<d, k>\in N_k\}$

$\pi_2(N_k)=k$

$\pi_1(<d, k>) =d$

$\pi_2(<d, k>) = k$

Rothstein's semantics for classifier *unit of* and the NP *unit of furniture*: are:

(23) a. $\|unit_k\ of\| = \lambda P\lambda x.\pi_1(x)\in (P\cap k)\wedge\pi_2(x) = k$

b. $\|unit_k\ of furniture\| = \|unit_k\ of\|(\|furniture\|)$

$= \lambda x.\pi_1(x)\in (FURNITURE\cap k)\wedge\pi_2(x)= k$

As will be argued in Chapter 4, Rothstein's (2010) semantics of English classifiers and count nouns can be extended to interpret Chinese classifiers on the counting reading. We argue there that on the counting function, the classifier takes the NP as complement, and the classifier phrase is the complement of Num. We will discuss the counting function of two types of classifiers, individual classifiers and non-individual classifiers.

3.3.2 Measure function of classifiers

In the literature on Chinese classifiers, the fact that Chinese classifiers can have a measure function has been all but ignored. Krifka (1989, 1995) is one of the few who discuss the measure reading of classifiers. Krifka takes the measure readings as the basic interpretation of the classifiers and treats the individuating function as a special case of the measure functions.

Krifka (1995) assumes that Chinese bare nouns are kind denoting, and that predicative readings of bare nouns are realized from the kind reading by some operator R. Krifka (1995:400) argues that the classifier which is a lexical realization of this operator. He suggests that Chinese classifiers, such as *qun* 'group' and *zhi* in (24), take a kind and yields a measure function that measures the number of specimens of that kind.

(24) a. san   qun   xiong

     three Cl_{-herd} bear

     'three herds of bear'

  b. san   zhi   xiong

     three   Cl   bear

     'three (individual) bears'

Krifka (1995: 400) assumes two syntactic rules for the ClPs:

(i)   MP $\rightarrow$ Num M   (where M stands for 'measure')

(ii)   NP $\rightarrow$ MP N.

The structure of the noun phrase according Krifka is: $[_{NP}[_{MP}Num+M]$ $[_N N]]$, which is interpreted with functional application. Accordingly, we get the following interpreations for the examples in (24), as shown in (25) and (26). Note that *k* is a variable over kinds. (ignoring aspects of intensionality).

(25) a. $\|qun\| = \lambda n\lambda \boldsymbol{k}\lambda x.R(x, \boldsymbol{k}) \wedge \text{herd}(x)=n$

b. $\|san\ qun\| = \lambda \boldsymbol{k}\lambda x.R(x, \boldsymbol{k}) \wedge \text{herd}(x)=3$

c. $\|san\ qun\ xiong\| = \lambda x.R(x, \text{BEAR}) \wedge \text{herd}(x)=3,$

(26) a. $\|zhi\| = \lambda n\lambda \boldsymbol{k}\lambda x.R(x, \boldsymbol{k}) \wedge \text{OBJECT-UNIT}_{\boldsymbol{k}}(x)=n$

b. $\|san\ zhi\| = \lambda x.[R(x, \boldsymbol{k}) \wedge \text{OBJECT-UNIT}_{\boldsymbol{k}}(x)=3$

c. $\|san\ zhi\ xiong\| = \lambda x.R(x, \text{BEAR}) \wedge \text{OBJECT-UNIT}_{\text{BEAR}}(x)=3$

There is a fundamental difference between (25) and (26). (25) is a straightforward measure reading, where the classifier *herd* first applies to the Num to form a complex modifier, which applies to objects that consist of three herds of bears. However, in (26), Krifka introduces the OBJECT-UNIT operator, which takes a kind and yields a measure function that measures the number of specimens of that kind. So in (26.c), the classifier *san zhi* applies to a set of plural entities and picks out those that consist of three individuals that instantiate the *bear* kind.

Krifka himself does not discuss the dual functions of classifiers, i.e. the fact that a single classifier can have both a counting and a measure reading. According to the syntax he adopts and the semantics he proposes, Krifka treats the counting function as a special kind of measure reading. The compositional semantics that he gives, where the classifier combines with the Num and "Num+Cl" modifies the nominal, is the structure that we will propose as the semantics for the measure reading, but not for the counting reading. We will show (in Chapter 4) that there are cases where the classifier is genuinely ambiguous between a counting reading and a measure reading, and that these two readings are associated with different structures.

The measure/counting ambiguity of classifier is discussed briefly in Chiechia (1998a) and explicitly in Landman (2004) and Rothstein (2009). In his analysis of container classifiers such as *three bottles of water*, Landman (2004) argues that the container classifier *bottle* is ambiguous between having an individuating reading and a measure reading. On the individuating reading, the classifier *bottle* denotes a set of concrete *bottles*, and on the measure reading, it denotes a unit of measuring (as much as to fill a bottle). Therefore, on the counting reading, *three bottles of water* denotes a set of plural entities, each of which consists of three bottles, and on the measure reading, *three bottles of water* denotes entities that are *water* and whose quantity is the equivalent of the contents of three bottles. Landman proposes

that the individuating and measure interpretations of classifiers associate with syntactic structures. Rothstein (2009) shows that there is good empirical evidence to support this, both in English and in Modern Hebrew.

In this dissertation, we will show that in Chinese, the counting and measuring functions of classifiers are semantically distinct, and that here too the different semantic functions are associated with different syntactic structures. We propose to take [±Counting] and [±Measure] as features constraining the default interpretations of Chinese classifiers. Accordingly, the following four types can be distinguished logically:

[+C, -M] classifiers can be inserted in a counting syntactic structure as denotes a version of the COUNT$_k$ function described above.

[-C,+M] classifers are inserted in a measure syntactic structure and denotes a measure function.

[+C,+M] classifiers naturally occur in both structures, and are associated with both interpretations.

There is a fourth type of classifier [-C,-M] which we will argue has a different function: it classifies not individuals but kind terms.

4. Overview of the dissertation

Chapter 2 of the dissertation is concerned with the question of whether there is a mass/count distinction of nominal phrases in Chinese. We examine Cheng & Sybesma's (1998) claim that the mass/count nominal distinction is grammatically realized in Chinese classifiers, and examine the two syntactic tests that they argue substantiate this claim: (i) the presence of pre-classifier adjectives and (ii) the optionality of the particle *de* after the classifier. We show that the facts do not support Cheng and Sybesma's distinction between mass classifiers and count classifiers.

Chapter 3 explores the semantics of bare nouns in Chinese. We follow Chierchia (1998b) and propose that all Chinese nouns are mass nouns. Chierchia (1998b) suggests that Chinese is an argumental language, in which (i) all the bare nouns occur freely in argument positions in their bare forms, and (ii) bare nouns make reference to kinds. We show that there is good evidence to accept Chierchia's hypothesis. Chinese bare nouns also have object-level interpretations (both definite and indefinite). Following Carlson (1977) and Chierchia (1998a, 1998b), we argue that the kind interpretation is the default reading for Chinese bare nouns and that object-level readings are derived from the kind reading. We will focus on the variability of the interpretation of bare nouns in predicative positions

(post-copula positions). The final section of Chapter 3 discusses different ways of making reference to kinds in Chinese: bare nouns, kind classifier phrases, and N suffixed with *–lei* 'kind'. We show that these expressions have different interpetations and distributions.

Chapter 4 discusses the semantics of classifiers in Chinese. We argue that the counting and measure readings of classifiers are distinguished syntactically in Chinese. We propose that on the counting function, the classifier applies to the denotation of bare nouns, i.e. kind terms, and returns a set of atomic entities, which are counted as one in a certain context, following Rothstein's 2010 semantics for count nouns. On the measure function, the classifier first combines with the numeral to form a complex modifier, which denotes the set of entities of the head noun type whose measure value is the quantity denoted by the numeral, i.e. we follow basically the semantics of measuring in Krifka 1995. (See also Landman 2004, Rothstein 2009).

Based on the feature [±Counting] and [±Measure], we develop a four-way classification of Chinese classifiers. With this, we claim that in Chinese, classifiers cannot be divided into two lexical groups, like sortal and mensural classifiers (as in Lyons 1977, Crofts 1994) or count and mass classifiers (Cheng & Sybesma 1998). Instead, the important distinction lies in the different uses of classifiers, as expressions introducing counting or expressions introducing measuring.

In Chapter 5, we address the questions left open in Chapter 2. Namely, what are the distributional patterns and the semantic function of pre-classifier adjectives and the post-classifier *de*? We propose an account which crucially uses the distinction between counting and measure functions of classifiers.

We argue that pre-classifier adjectives can appear before classifiers in the counting context. That is, they can only appear before [+C, -M] and [+C, +M] classifiers (the latter only on their counting interpretation), but not before [-C, +M] or [-C, -M] classifiers. We propose that pre-classifier adjectives modify the constituent of "Cl+N" but not the classifier or the noun. As for the semantic function of pre-classifier adjectives such as *da/xiao* 'big/small', we argue that these phrases have 'expressive' meanings in that they express the speaker's evaluation of the atomic entity in the denotation of "Cl+N" to be big or small from a particular perspective chosen by the speaker.

With respect to the post-classifier *de*, we argue that Num-Cl-*de*-N always has a measure reading in that Num-Cl denotes the quantity of entities represented by N. We distinguish two types of measure readings: the *as much as …* type and the *as many as …*type. In both readings, the original meaning of the classifier is incorporated into measure phrase

marked by *de*: the measure interpretation in the *as much as…* type, the counting interpretation in the *as many as…* type. We argue that the particle *de* subordinates the constituent of Num-Cl to the head noun as a modifier. It shifts Num-Cl of type <d, t> to a modifier of type <<d, t> <d, t>>.

Chapter 6 discusses the uses of classifiers beyond the contexts of counting and measure in Mandarin, Wu, and Cantonese. In these languages the "Cl+N" construction differs with respect to (in)definiteness. In Mandarin Chinese, the "Cl+N" construction is only found in postverbal positions and has an indefinite reading. In Cantonese and Wu, this construction is available in both preverbal and postverbal positions. In Wu "Cl+N" has a definite reading when appearing preverbally, and indefinite when appearing postverbally (Li & Bisang 2010). In Cantonese, preverbal "Cl+N" has a definite reading and postverbal "Cl+N" is either definite or indefinite (see Cheung 1972, Cheng & Sybesma 1999, 2004).

We make the following three claims concerning the "Cl+N" construction.

First, we claim that indefinite and definite "Cl+N" have different structures. We argue that the indefinite "Cl+N" is a classifier phrase and is inherently predicative, while the definite "Cl+N" is a Determiner phrase, in which the classifier is raised from Cl^0 to D^0 and the classifier is a definite article which carries the feature familiar/identifiable.

Secondly, we propose that the interpretation of the classifier in "Cl+N" as definite or indefinite is constrained by pragmatic factors, especially the information structure and word order. Chinese languages are topic-prominent languages, and preverbal nominals tend to be interpreted as topics or secondary topics (e.g. Li & Thompson 1981). This means that preverbal NPs are by default interpreted as definite. That is why definite "Cl+N" is prototypically found in preverbal positions.

Thirdly, we suggest that the construction of "Cl+N" is only available when the classifier is interpreted with a counting function, not with a measure function, since both definite and indefinite "Cl+N" imply the singularity of entities and they don't emphasize the quantity of entities. We propose that the Cl+N construction can be modified by a contextual modifier, which links it to contextually familiar material, giving the Cl+N construction a definite interpretation.

Finally, in Chapter 7, we draw some general conclusions.

CHAPTER 2 MASS/COUNT DISTINCTION IN CHINESE REVISITED

1. Introduction

This chapter is concerned with the question of whether there is a mass/count distinction in Chinese nominal phrases.

Cheng & Sybesma (1998) claim that there is a mass/count distinction in Chinese nominal phrases, which is reflected at the level of classifiers. They make a distinction between two types of classifiers in Chinese, "count classifiers" and "mass classifiers" (or "massifiers"), which modify 'count' nouns and 'mass' nouns respectively. They also propose that mass and count classifiers are structurally different. According to them, count classifiers belong to a functional class and mass classifiers belong to a lexical class (derived from nouns). Count classifiers are base-generated as the head of classifier phrases, while mass classifiers start out in N and then undergo N-to-Cl movement. They suggest that the distinction between mass and count classifiers can be diagnosed by two syntactic tests: (i) the presence of pre-classifier adjectives and (ii) the optionality of the particle *de* after the classifier.

However, a further empirical examination of the data shows that there are many counterexamples against the two syntactic diagnostics suggested by Cheng & Sybesma (1998) (see Lu 1987, Luo 1988, Tang 2005, X.P. Li 2007, Hsieh 2007, 2008).

Pre-classifier adjectives are possible both before count classifiers and before mass classifiers, and the particle *de* is found both after count classifiers and after mass classifiers. Therefore, these two tests are unable to distinguish mass classifiers from count classifiers in the clear-cut way Cheng & Sybesma suggest is possible. We thus claim that these two diagnostics are insufficient to establish the presence of a mass/count distinction in Chinese.

Additionally, we will argue that even though most Chinese classifiers have a nominal origin, it is implausible that mass classifiers constitute a lexical class (of inherent nouns) and count classifiers belong to a functional class. We will show that count classifiers are no less lexical than mass classifiers, and that mass classifiers are no less functional than count classifiers. As will be shown, mass classifiers include both classifiers with high degrees of nominal properties (i.e. those that can be used as nouns independently) and classifiers with low degrees of nominal properties (i.e. those that cannot be used as nouns or as morphemes in noun compounds), and that the same is true for count classifiers. Following Tang (1990) and A. Li (1999), we argue that classifiers in Chinese are distinguished from nouns in that they

constitute an independent category and are base-generated as the head of a functional projection of Classifier Phrase.

This rest of the chapter is structured as follows. In Section 2, we will lay out Cheng & Sybesma's (1998) syntactic proposal about the distinction between mass and count classifiers. Section 3 re-examines the test of the presence of pre-classifier adjectives and the test of the possibility of post-classifier *de*. A sample of counterexamples will be presented to show that the two syntactic diagnostics are not legitimate criteria for distinguishing between mass and count classifiers. Section 4 makes a comparison between Chinese and English classifiers. As will become clear from this comparison, Chinese classifiers constitute an independent category and they are base-generated into the head of ClP, whereas English classifiers are nouns in nature. Section 5 discusses the implausibility of making a distinction between two lexically different types of classifiers, mass classifiers and count classifiers. Since the distinction between mass and count nouns rests on there being a distinction between mass and count classifiers, we conclude that there is no basis for a mass-count nominal distinction either. We propose an alternative account of the distribution of pre-classifier adjectives and post-classifier *de* in Chapter 5.

2. Syntactic distinction between mass and count classifiers

This section examines Cheng & Sybesma's arguments about mass/count classifiers in Chinese. In Section 2.1, we will introduce the two lexically different types of classifiers, mass and count classifiers. Section 2.2 introduces the lexical/functional distinction of classifiers. Section 2.3 gives an overview of the two syntactic diagnostics for the distinction between count and mass classifiers.

2.1 Introduction to mass/count classifiers

As we saw in Chapter 1, Chinese bare nouns behave similar to mass nouns in English in many respects. For example, (i) Chinese nouns are number-neutral, i.e. there is no distinction between singular and plural nouns; (ii) they cannot be modified by numerals without the assistance of classifiers.

Some linguists, notably Krifka (1995) and Chierchia (1998b), make the explicit claim that all the Chinese bare nouns have the semantics of mass nouns. For example, Chierchia (1998b) suggests that Chinese is characterized as a [+argument, -predicate] language, whose nouns are mapped onto arguments and denote mass entities, referring to kinds.

Contra Chierchia (1998b), Cheng & Sybesma (1998) argue that there is a mass/count distinction in Chinese nominal phrases, but that this distinction is reflected at the level of classifiers, not of nouns. They suggest that there are two types of classifiers in Chinese, "count classifiers" and "mass classifiers", which select "count nouns" and "mass nouns" respectively. Semantically, count classifiers simply name the unit in which the entity denoted by the noun naturally occurs, and mass classifiers create a unit of measure (also see Lyons 1976, Tai &Wang 1990, Croft 1994). This implies a semantic distinction between two types of nouns. Count nouns come with a natural unit of counting, while mass nouns do not have an intrinsic unit of counting associated with them, and they are still mass when they are modified by mass classifiers.

Nouns like *child*, *flower* and *fish* all denote discrete entities, which exist in our world as naturally discrete individuals. Classifiers modifying those nouns simply spell out the units intrinsic to them, but do not create any external units. For example, *duo* 'blossom' is the natural unit for *hua* 'flower' and *wei* 'tail' for *yu* 'fish'. These classifiers are individual classifiers, or "count classifiers" in Cheng & Sybesma's (1998) terminology.

(1) a. san   duo   hua   [individual classifier]
         three   Cl$_{blossom}$ flower
         'three flowers'
     b. yi   wei   yu
         one   Cl$_{tail}$ fish
         'a tail of fish'
     c. liang   ge   pingguo
         two   Cl   apple
         'two apples'

In contrast, some classifiers express external units of entities referred to by nouns. Consider the examples in (2).

(2) a. yi   shu   hua   [group classifier]

       one $Cl_{-bouquet}$ flower

       'a bouquet of flowers'

    b. liang   xiang   pingguo   [container classifier]

       two Cl_{-box} apple

       'two boxes of apples

    c. yi   di   shui   [partition classifier]

       one Cl_{-drop} water

       'a drop of water'

The natural unit for *hua* 'flower' is *duo* 'blossom', but *hua* can also have an external unit such as *shu* 'bouquet' in (2.a), which indicates how the discrete flowers are formed into a group. The use of container classifier *xiang* 'box' in (2.b) is similar to *shu* 'bouquet' in (2.a). The noun *shui* 'water' in (2.c) denotes homogeneous entities, which itself has no atomic structure, so the classifier *di* 'drop' imposes an external unit on it. The classifiers in (2) are non-individual classifiers or "mass classifiers", which impose external units on the stuff in the denotation of the noun they modify (Cheng & Sybesma 1998).

To sum up, according to Cheng & Sybesma (1998), individual classifiers, such as *duo* 'bud', *wei* 'tail' and the general classifier *ge* (as exemplified in (1)), are count classifiers, while container classifiers, group classifiers, partition classifiers etc. (as exemplified in (2)) are mass classifiers or massifiers.

Similar dichotomies of classifiers have been suggested by others (e.g. Lyons 1977, Tang & Wang 1990, Croft 1994 etc). For example, using Frege's notion of "sortal", Lyons (1977) makes a distinction between 'sortal' and 'mensural' classifiers, which correspond to individual and non-individual classifiers respectively. He (1977: 463) claims that 'a sortal classifier is the one which individuates whatever it refers to in terms of the kind of entity that it is and that a mensural classifier is the one which individuates in terms of quantity'.

2.2 Lexical/functional distinction of classifiers

Cheng & Sybesma (1998) suggest that count classifiers and mass classifiers belong to different categories: count classifiers form a closed class and mass classifiers belong to an open class. According to them, count classifiers, such as the general classifier *ge* and specific classifiers of *ben* 'volume', *duo* 'blossom' in (1), are grammaticalized classifiers and they cannot be used independently as nouns, whereas mass classifiers are full nominal elements

and any noun which can be seen to create a unit for measuring can be used as a mass classifier. For example, this applies, they assume, to the container classifiers of *wan* 'bowl' and *bei* 'cup' in (2).

Relying on the above assumption, Cheng & Sybesma (1998) argue that count classifier phrases and mass classifier phrases have different syntactic structures, though both have the same sequence of Num-Cl-N at the surface level. In the case of count classifier phrases, the classifier is base-generated in the head of the ClP which takes NP as its complement, as in (3.a). For mass classifier phrases, the classifier starts in N and then undergoes N-to-Cl movement, as in (3.b).

(3) a   ClP   b.   ClP

        liang 'two'   Cl'   *san* 'three'   Cl'

                     Cl⁰   NP   Cl⁰   NP

                duo 'blossom'   *hua* 'flower'   N   NP
                                                            wan 'bowl'   *tang* 'soup'
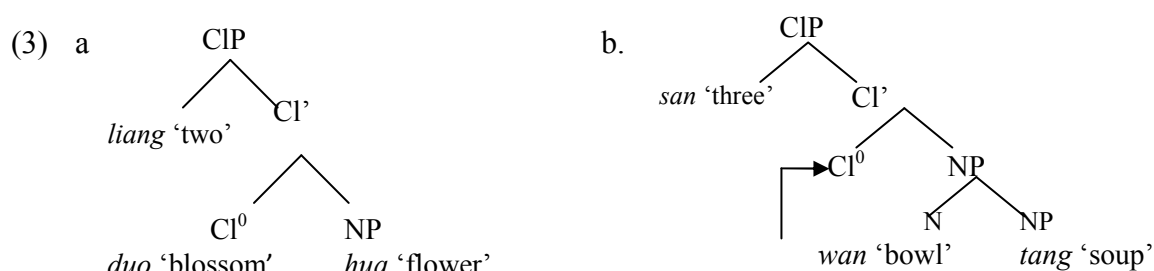
They also mention that the motivation for the N-to-Cl movement of the nouns lies in the fact that mass nouns are of a different type from count nouns. They are measure expressions that can select another noun as complement, and in order to realise this property, they must move from N to Cl position. As Cheng and Sybesma write: "although they (mass classifiers) are nouns, they are nouns of a certain type: they can be used as a measure and in that capacity they select another noun. One way to formalize this is by appealing to an idea proposed by Hoeskstra (1988), who argues that nouns of this type have a feature, let's call it CONT of 'content', and this feature enables the noun to thematically select (and Case-mark) another noun: the content. At some stage during the derivation, the measure noun moves to fill the head of ClP." (Cheng & Sybesma 1998:17)

2.3 Two syntactic diagnostics

Cheng & Sybesma (1998) propose two syntactic criteria to distinguish mass classifiers from count classifiers: (i) the availability of adjectives before classifiers and (ii) the possibility of the particle *de* after classifiers.

The first criterion Cheng and Sybesma suggest is that mass classifiers can be preceded by adjectives like *da/xiao* 'big/small', but count classifiers cannot. Compare (4) with (5).

(4) a. yi   da   zhang   zhi   [mass classifiers]

   one   big   Cl-piece   paper

   'a big piece of paper'

   b. na   yi   xiao   xiang   shu

   that   one   small   Cl-box   book

   'that small box of books'

(5) a.* yi   da   wei   laoshi   [count classifiers]

   one   big   Cl   teacher

   Intended: 'a big teacher'

   b.* yi   da   zhi   gou

   one   big   Cl   dog

   Intended: 'a big dog'

(4) shows that mass classifiers like *zhang* 'piece', *xiang* 'box' are felicitous with pre-classifier adjectives; (5) shows that individual classifiers like *wei* (a honorific classifier for people) or *zhi* (a classifier for animals) cannot have pre-classifier adjectives. Cheng & Sybesma explain this difference in terms of differences in lexical properties of mass classifiers and count classifiers. Assuming that pre-classifier adjectives have a direct modification relation with the classifier, they argue that mass classifiers are nouns in nature and can be modified by pre-classifier adjectives. Count classifiers, on the other hand, are grammaticalized classifiers, and as such, they are functional elements that cannot be modified by adjectives.

The second criterion that Cheng and Sybesma suggest is that mass classifiers can be followed by the particle *de* (as in 6)), but count classifiers cannot (as in (7))

(6) a. san   wan   de   tang   [mass classifiers]

   three   Cl-bowl   DE   soup

   'three bowls of soup'

   b. liang   xiang   de   shu

   two   Cl-box   DE   book

   'two boxes of books'

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(7) a. ba   tou   (*de)   niu   [count classifiers]

　　　 eight   Cl$_{-head}$ DE   cow

　　　 'eight heads of cows'

　　 b. jiu   geng   (*de)   weiba

　　　 nine   Cl   DE   tail

　　　 'nine tails'

Cheng & Sybesma (1998) claim that Num-Cl-*de*-N is not a classifier phrase but a noun phrase. They argue that Num-Cl-*de*-N is a relativized noun, in which the head N is modified by Num-Cl-*de*, which is treated as a relative clause and denotes the amount of entities referred to by N. Put explicitly, Cheng & Sybesma suggest that the sequence of Num-Cl-*de*-N is derived from the deep structure　[N[Num-Cl]], which is argued to be a nominal small clause (NC), in which N is the subject and Num-Cl is a predicate. Note that the modification marker *de* is argued to be a complementizer, which heads the CP.[4]　Hence, they propose deriving (8.b) from (8.a). The corresponding syntactic structures for the derivation are given in (9).

(8) a wo   he   le   tang   san   wan

　　　 I   drink   Perf   soup   three   Cl$_{-bowl}$

　　　 Lit.: 'I drank soup three bowls.'

　　 b. wo   he   le   san   wan   de   tang

　　　 I   drink   Perf   three   Cl$_{-bowl}$ DE   soup

　　　 'I drank three bowls of soup.'

---

[4] Tang (1996) argues that in the construction of [N [Num+Cl]], N and the [Num-Cl] stand in a predication relation. For her these are not small clauses, however, because verbs like *drink* in (8) and *buy* in (10) are not subcategorized to take a small clause as complement. Instead, she (1996:471) proposes that [Num-Cl] is better treated as the lowest argument of the verb and N as the next lowest argument, where semantically they stand in a predication relation. She also argues that [Num-Cl-N] and [N [Num-Cl]] are two distinctive constructions and that [N [Num-Cl]] should not be transformationally derived from [Num-Cl-N].

(9) a.   ➔   b.

```
                NC (nominal clause)                              ClP
              /              \                                 /     \
           ClP              ClP                             CP       ClP
        tang_i 'soup'      /    \                         /    \     tang 'soup'
                         san     Cl'                   OP_i      C
                       'three'   /  \                          /   \
                               Cl    NP                      NC      C
                               ↑    /   \                   /  \    de
                               |   N     NP               t_i   ClP
                               |  wan    pro_i                   /\
                               |__| 'bowl'                      /__\
                                                             sanwan pro_i
                                                             'three bowls'
```
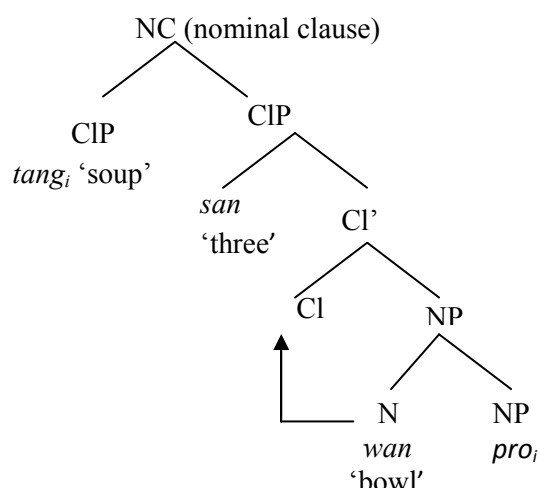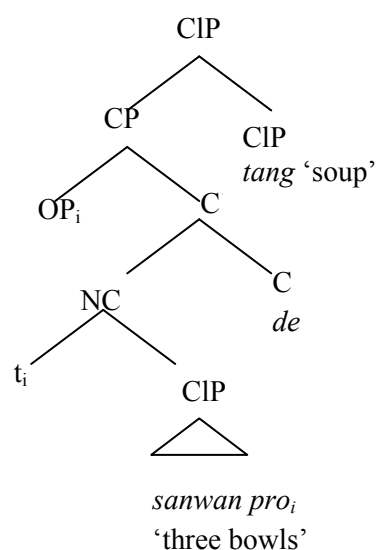
Cheng & Sybesma (1998) assume that Chinese bare noun phrases are structurally not bare, but are fully-fledged ClPs. So in (9.a), the bare noun *tang* 'soup' is projected into a ClP and it is the subject of the nominal clause, and the ClP *san-wan* 'three bowls' is its predicate. They further propose that the subject *tang* 'soup' can undergo subject relativization, i.e. *tang* 'soup' is modified by a relative clause, as realized by Num+Cl. This relative clause is taken as a complement by the CP, headed by *de*, on the left side. In addition, there is an operator OP, which is generated in the Spec position of CP and binds the trace left by the subject *tang* 'soup' in the relative clause.

    Cheng & Sybesma (1998) argue that this subject relativization is only possible for mass ClPs and not for count ClPs, even though count ClPs can be used as predicates in nominal small clauses. Let us consider the examples in (10).

(10)   a. ta   mai le   shi   zhi   bi.
   he   buy Perf   ten   Cl   pen
            'He bought ten pens.'
       b. ta   mai   le   bi   shi   zhi
            he   buy   Perf pen   ten   Cl
            'He bought pens, numbered ten.'
       c. * ta   mai   le   shi zhi de   bi.
            he   buy   Perf ten   Cl DE   pen
            Intended: 'He bought ten pens.'

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(10.a) illustrates the use of the count classifier *zhi* in a standard Numeral Classifier Phrase. (10.b) shows that count classifiers like *zhi*, along with Num *shi* 'ten', can constitute the predicate of the nominal small clause, i.e. the count ClP *shi zhi* 'ten Cl' can be predicated of the subject *bi* 'pen'. However, Cheng & Sybesma (1998) argue that the nominal small clause of (10.b) cannot be relativized as in (10.c) and that the syntactic derivation from (11.a) to (11.b) via subject relativization is impossible.

(11)   a.   NC (nominal clause)   →//→   b.   ClP

a. tree: NC (nominal clause) → ClP [ClP *bi* 'pen'] [ClP *Shi* 'ten' [Cl' [Cl *zhi*] [NP *pro_i*]]]

b. tree: ClP → [CP [OP_i] [C' [NC [t_i] [ClP *shi* 'ten' [Cl' [Cl *zhi*] [NP *pro_i*]]]] [C *de*]]] [ClP *bi* 'pen']
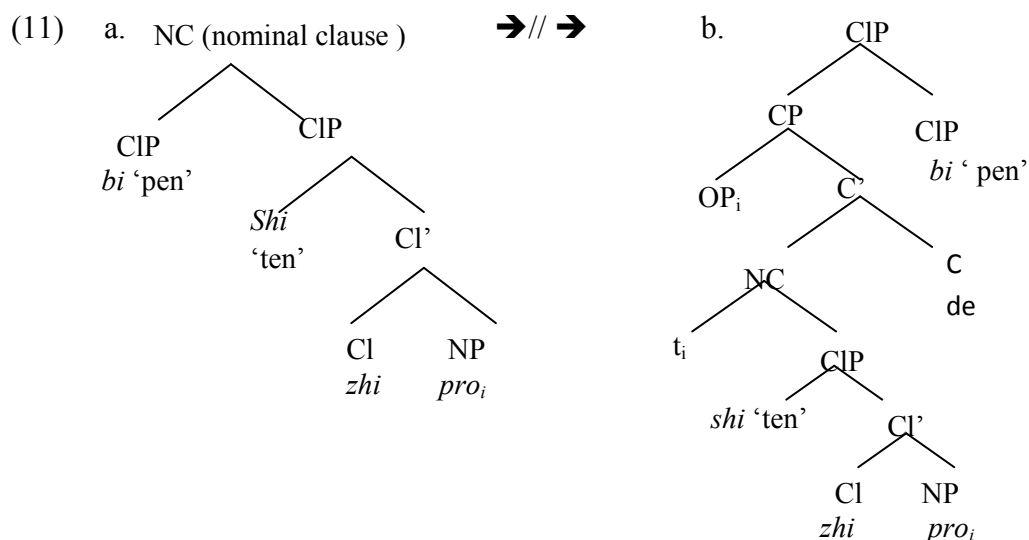
Cheng & Sybesma (1998:15) assume that "Chinese noun phrases, including regular overt and null pronouns, are really full-fledged ClPs. Though generated in NP, Chinese nouns undergo N-to-Cl movement. As a consequence, in the regular case of pronominal, the binding domain of a pronominal is outside ClP." After relativization, as in (9.b) and (11.b), *pro* is in a configuration that leads to a bound variable interpretation (since *pro* cannot have independent reference). It is coindexed with the subject of the predicate, which in turn is bound by an operator. Cheng & Sybesma argue that this kind of binding is only possible for mass classifiers, as in (9.b), but not for count classifiers as in (11.b). They argue that "mass classifiers undergo N-to-Cl movement and the *pro* in mass ClPs is a ClP, whereas count classifiers are base-generated as classifiers and they must take NPs as complement", so "*pro* is not a full-fledged pronoun and it stays in the NP rather than moves to Cl" (Cheng & Sybesma 1998:16). Therefore, the *pro* in (11.b) cannot have a proper binding domain.

It is difficult to see how this argument really works, since the *pro* in each case is in NP position. The difference between the two structures is that in (9a) *pro* is the complement of a nominal head which raises to classifier position, while in (11) it is directly the complement of the functional head. But it is unclear why this difference has the grammatical consequences that Cheng & Sybesma propose. Presumably, if *pro* is a real problem for count

ClPs, then the problem also remains for mass ClPs. No matter how mass classifiers move, e.g. N-to-Cl, the *pro* always stays in N and is the complement of Cl, exactly like its counterpart in count ClPs. As shown by their syntactic tree, the *pro*s in both cases in (9.b) and (11.b) are in NP position. There doesn't seem to be any independent evidence for the syntactic distinction of *pro* as ClP and *pro* as NP that they propose. As a consequence, the analysis stipulates a lot of abstract structure and special rules for interpreting *pro* in each of the two structures.[5]

Cheng & Sybesma's (1998) syntactic proposal, as presented here, can thus be summarized as the conjunction of the following three claims:

(i) there is a nominal mass/count distinction in Chinese, as reflected in count/mass classifiers;

(ii) count classifiers are fully grammaticalized classifiers while mass classifiers are nouns in nature; and accordingly they have different syntactic structures;

(iii) the distinction between mass and count classifiers is supported by the syntactic evidence of (a) the possibility of pre-classifier adjectives and (b) the optionality of the post-classifier *de*.

Cheng & Sybesma's (1998) mass/count proposal is based on the facts presented in (4) to (7). These facts have been noticed earlier by other Chinese linguists such as Chao (1968), T'sou (1976), Paris (1981), Tang (1990) etc. They all note that not all classifiers show the same degree of grammaticality with respect to the tests of pre-classifier adjectives and of post-classifier *de*. While these earlier scholars also use these diagnostics to separate individual classifiers from the rest, they do not correlate the contrast with the count/mass distinction, as Cheng & Sybesma (1998) do.

3. Re-examination of the two diagnostics

In this section, we will examine empirically the two sytnactic diagnostics used by Cheng & Sybesma (1998), i.e. the possibility of pre-classifier adjectives and the optionality of post-classifier *de*. The data from previous descriptive works and corpora shows that the usefulness of these two diagnostics is undermined by the presence of many counterexamples. We will suggest that as a consequence, they cannot be taken as legitmate criteria for the distinction between count and mass classifiers.

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[5] Thanks Gabi Danon and Victor Pan for going thorough and discussing with me about the syntax part of Cheng & Sybesma (1998) on several occasions.

3.1 Diagnostics 1: possibility of pre-classifier adjectives

Recall Cheng & Sybesma's (1998) argument about pre-classifier adjectival modification. They argue that mass classifiers can be preceded by adjectives, while count classifiers cannot. On their analysis, this is because mass classifiers are nouns in nature, and they can thus be directly modified by adjectives, while count classifiers belong to a functional category, and cannot be modified by adjectives.

Cheng & Sybesma (1998) also point out that pre-classifier adjectival modification is constrained by the following two constraints (also see Paris 1981, Lu 1987, Tang 1990). Firstly, only a small number of adjectives, such as *da/xiao* 'big/small', can be inserted in pre-classifier position. Secondly, the element *de*, which typically links the modifier and the modifiee, cannot occur between the adjective and the classifier. For example, the particle *de* can optionally appear after the adnominal modifier *da* 'big', e.g. *yi xiang da (de) shu* 'a box of big (de) books', but it is disallowed after a pre-classifier adjective *da* 'big', e.g. *yi da (*de) xiang shu* 'a big box of books'. Note that it is possible to use *de* after some classifiers, e.g. *yi xiang de da shu* 'a box of big books' is acceptable.

Now, the fact that only a small subset of the set of adjectives can precede classifiers weakens Cheng & Sybesma's claim that mass classifiers can be preceded by adjectives because they are nominal. If this claim were correct, then we would expect to get a wider range of adjectives. With regard to this problem, Cheng & Sybesma suggest that the adjectival modification of the classifier is allowed only in its 'abstract function as a container'. They claim that, in *He carted four wheelbarrows of dung into the fields* (from to Hoeskstra 1988), it is possible to modify the noun *wheelbarrow* with adjectives like *big* but not with modifiers like *wooden*, because (they claim) *big* modifies *wheelbarrow* in its abstract function as a container, while *wooden* would modify the concrete thing. In other words, Cheng & Sybesma (1998) assume that pre-classifier adjectives in Chinese modifiy the volume of the container denoted by the classifier.

Their explanation for the second constraint is given as follows. Cheng & Sybesma (1998) argue that N-to-Cl movement is an instance of head movement in which the combination of the adjective and the N forms a complex head. As a consequence, this structure does not allow the insertion of the modification marker *de*. This explanation is due to Tang (1990). Given that Cheng & Sybesma (1998) argue that mass classifiers are nouns in nature and pre-classifier adjectives have a direct modification relation with the classifiers, the complex head of Adj+Cl should be seen as a complex noun head.

The argument then is: pre-classifier adjectives have a direct modification relation with mass classifiers, which form complex noun heads, and semantically, pre-classifier adjectives modify the abstract use of the mass classifiers, i.e. the container use ('volume' in our terms).

There are two main problems with this. Firstly, the examples of mass classifiers that they discuss and analyze are restricted to container classifiers. However, there are other types of mass classifiers, including group classifiers, such as *qun* 'group' and *dui* 'pile', and partition classifiers, such as *duan* 'section' and *pian* 'piece' etc. These three types of mass classifiers show different lexical or grammatical properties and it is not straightforward to extend Cheng & Sybesma's analysis of container classifiers to them.

In Cheng & Sybemsa's (1998) paper, there are two examples which are not container mass classifiers:

(12) a. yi   da   zhang   zhi
         one   big   Cl_piece   paper
      'one big piece of paper'
      b. yi   da   qun   ren
         one   big   Cl_group   people
      'a big group of people'

The two mass classifiers in (12), *zhang* 'piece' and *qun* 'group', are not like container classifiers, such as *ping* 'bottle' and *wan* 'bowl', in several important aspects. They do not have the salient nominal features as container classifiers, such as *wan* 'bowl' or *bei* 'cup'. As illustrated in (13), container classifiers, such as *wan* 'bowl', can be used as nouns and be modified by the general classifier, while this is less felicitous for partition classifier *zhang* 'piece', as in (13.b) and the group classifier *qun* 'group', as in (13.c).

(13) a. yi   ge   wan
         one   Cl   bowl
      'a bowl'
      b.* yi   ge   zhang
          one   Cl   piece
      c.???/* yi   ge   qun
              one   Cl   group

The examples in (13) suggest that classifiers like *qun* 'group' and *zhang* 'piece' are more functional than lexical (nominal) and that they are not true nouns. If Cheng & Sybesma are correct that pre-classifier adjectives directly modify mass classifiers due to their nominal nature, then these examples are unexplained, since they are mass classifiers with not so many 'nominal' properties, that do nevertheless allow the presence of pre-classifier adjectives.

Moreover, mass classifiers like *qun* 'group' and *zhang* 'piece' do not involve the feature of CONTENT. On Cheng & Sybesma's reasoning, they would thus not undergo N-to-Cl movement and be raised to Cl^0 in order to express "the thematic selection of another noun which expresses the content". In contrast, they are expected to be base-generated under the node of Cl^0, and hence they are expected to pattern with count classifiers. With this, we would expect that they cannot have pre-classifier adjectives. And this, of course, is not the case.

Thus, Cheng & Sybesma's syntactic analysis may correctly capture some properties of container classifiers, but it seems difficult to extend it to the more general category of "mass classifiers", which includes group classifiers and partition classifiers etc.

The second problem with Cheng & Sybesma's argument is that there are many cases where count classifiers are felicitous with pre-classifier adjectives..

Cheng & Sybesma (1998) argue that examples like (5) (as repeated in (14.a-b)) are not acceptable. They say that it is odd to put an adjective like *da* 'big' before a count classifier. I agree that (14.a) is impossible, but I do not think (14.b) is that bad. If we put it in an appropriately constructed context, it becomes completely acceptable, as in (14.c).

(14) a.* yi   da   wei   laoshi
         one   big   Cl   teacher
      b.* yi   da   zhi   gou
         one   big   Cl   dog
      c. na   tou shizi   bu-dao ban ge xiaoshi jiu   ba   *yi da zhi gou*   gei chi le.
         that Cl lion less than   half Cl hour   Foc OM *one big Cl dog* give eat Part
         'That lion ate up a BIG dog within half an hour.'

It has been noted in the literature that many count classifiers go naturally with adjectives (e.g. Lu 1987, Luo 1988, X.P.Li 2007). Lu (1987) studies the possibilities of adjectival modification of classifiers in great detail. According to his study, 24 of the at least 54

(according to Chao 1968) individual classifiers can be preceded by an adjective. Some of Lu's examples are illustrated in (15) (see Lu 1987: 54-57 for more examples).

(15)   a. Xiaoling chi le   yi   da/xiao   ge   mantou.
            Xiaoling eat   Perf   one big/small Cl   steamed bum
        'Xiaoling ate a BIG/SMALL steamed bum.'

        b. zhe yi xiao   fu   hua   hua   le   ta   ban-nian shijian.
          this one   small Cl   picture take Perf him half year   time
          'It took him half a year to paint this SMALL painting.'

        c. ta   jian-shang   kang   le   yi   da/xiao   jian xingli.
          he   shoulder-on   carry   Perf one   big/small   Cl   baggage
          'He carried a BIG/SMALL baggage on his shoulder.'

Ge in (15.a) is a 'general classifier' in Chinese, which modifies nouns denoting discrete entities in general. The other two classifiers, *fu* in (15.b) and *jian* in (15.c), are also typical individual classifiers, which modify *hua* 'painting' and *xingli* 'baggage' respectively. As shown in (15), those individual classifiers can all be preceded by the adjective *da* 'big' or *xiao* 'small'.

      Cheng & Sybesma (1998) are aware of the examples mentioned by Lu (1987), but they treat them as exceptions. However, if 24 individual classifiers out of 54 are compatible with pre-classifier adjectives, it is not so appropriate to consider those examples as exceptions. More examples like those in (15) can be freely generated. Examples in (16) are from X.P. Li (2007).

(16)   a. ta chi le   yi   da   tiao huanggua.
          He   eat Perf   one big   Cl   cucumber
          'He ate a cucumber, which is a lot for him.'

        b. wu-mao   qian   mai   le   yi   da   geng   huanggua.
          fifty-cent   money buy   Perf one big Cl   cucumber.
          'Fifty cents bought me a cucumber, which is a large quantity (w.r.t. the money).

        c. yi ge   yue ta juran ba yi da ben   zidian   quan   bei   le.
          one Cl month he Foc   OM one big Cl-volume dictionary all   recite   Perf
          'Surprisingly, only in one month, he recited the whole dictionary, which is a lot (a
          large vocabulary w.r.t. the short time spent).'

As a supplementary study to Lu's (1987), Luo (1988) argues that many of the individual classifiers that are thought to be incompatible with pre-classifier adjectives in Lu (1987) are actually acceptable, if appropriate contexts are provided. Consider the examples in (17). The phrases of *yi da zhang chung* 'one big Cl bed' and *yi da tou yeniu* 'one big Cl-head wild cow' are listed as unacceptable in Lu (1987). But Luo (1988) illustrates the following two contexts in which they are felicitous:

(17) a. ta   wu-li   jiaju   tai duo,   baifang-de ye   bu   jiangjiu, yi   jinmen
      he   house-in furniture too much   arrange   also not   carefully   once   enter

      youbian jiu   shi yi   da zhang jiu-shi mu-chuang,   zuobian yi   ge   da ligui,
      right-side Foc be one   big Cl   old-style woodenbed left-side one Cl   big wardrobe

      zhuozi, yizi,   shafa   ba   wuzi   gao-de   yongjiubukan.
      table   chair   sofa   OM   house   make   crowed

    'He has too much furniture at home. Once entering, (on the right side lthere is a BIG old-style wooden bed, and on the left side, there is a big wardrobe, a table, a chair and a sofa. They are packed like sardines.'

   b. feizhou shi   hen xiong. Liang zhi shizi   jiu neng ba   yi   da tou   yeniu   chiwan.
     African lion very cruel   two   Cl   lion Foc can   OM one big Cl   wildcow eat up

    'African lions are very cruel. Two lions can eat a BIG wild cow in a short time.'

The examples from (15) to (17) are obvious counterexamples to the generalization made by Cheng & Sybesma (1998) that pre-classifier adjectives are only allowed before mass classifiers. Thus, our empirical examination of the data suggests that adjectives like *da/xiao* 'big/small' are not only possible before mass classifiers but also before count classifiers.

     The two problems exposed above indicate that pre-classifier adjectives cross-cut the distinction between count and mass classifiers and that the presence of pre-classifier adjective before classifiers is not a legitimate criterion to tell apart mass classifiers from count classifiers. The semantics of the pre-classifier adjectives will be pursued in Chapter 5.

3.2 Diagnostic 2: Possibility of post-classifier *de*

Cheng & Sybesma (1998) argue that mass classifiers can be followed by the particle *de*, but count classifiers cannot. This observation has been criticized by Tang (2005) and Hsieh (2007, 2008). Tang (2005, 1990) shows that the particle *de* not only follows mass classifiers (18), but also count classifiers in examples like (19):

(18) a. liang   mi   de   bu   [mass classifiers]

two   meter   DE   cloth

'cloth that is sorted in accordance with two meters'

b. liang   bang   de   rou

two   pound   DE   meat

'meat that is sorted in accordance with two pounds'

(19) a. liang   ben   de   shu   [count classifier]

two   Cl$_{-volume}$ DE   book

'books that are sorted in accordance with two in number'

b. wu   ge   de   pingguo

five   Cl   DE   apple

'apples that are sorted in accordance with five in number'

Tang (1990, 2005) argues that *de*-marked classifiersand *de*-less classifiers have different syntactic structure and are associated with different interpretations. She argues that in *de*-less ClPs, Num-Cl and N stand in a head-complement relation and while in *de*-marked ClPs, Num-Cl and N stand in a modifier and modifiee relation. For her, *de-less* nominals are NumPs, where classifiers are projected as the head of ClPs; while *de*-marked nominals are NPs instead, where the numeral and the classifier form a modifier, which is projected as an adjunct to the NP, and the classifier does not project a classifer head position. The evidence for their structural difference will be given below, as in (20) and (21).

It is important that there is an interpretational difference between *de*-less and *de*-marked nominals is shown in the following two examples. In (20.a), the Num-Cl, i.e. *liang-bang* 'two pounds' expresses the quantity of meat as two pounds, so the total quantity is 2 pounds, not 10 pounds. In (20.b), the Num Cl *de*, i.e. *liang bang de* 'two pound *de*' is a modifier which specifies a certain sort of meat, and it is unrelated to the quantity of the meat bought in total.

(20) a. rou, ta mai le liang bang. # yigong shi shi bang.

      meat, he buy Perf two pound   altogether be ten pound

      #'Meat, he bought two pounds. Altogether (he bought) ten pounds.'

    b. rou, ta mai le liang bang de. yigong shi shi bang.

      meat he buy Perf two pound DE altogether be ten pound

      'Meat, he bought in portions of two pounds. Altogether (he bought) ten pounds.'

The interpretational difference between Num-Cl-N and Num-Cl-*de*-N also holds in count ClPs (21).

(21) a. pingguo, ta mai le wu li, # yigong shi shi li.

      apple he buy Perf five Cl altogether be ten Cl

      #'Apples, he bought two, ten in total.'

    b. pingguo, ta mai le wu li de, yigong shi shi li.

      apple he buy Perf five Cl DE altogether be ten Cl

      'Apples, he bought in quintuples, ten in total.'

So, while both Tang (2005) and Cheng & Sybesma (1998) are concerned with the sequence of Num-Cl-*de*-N, Tang's examples are not real counterexamples to Cheng & Sybesma (1998), because Tang seems to talk about a different phenomenon from what Cheng & Sybesma discusses. Jiang (2008) shows that Numeral-Classifier modifiers can appear in two different positions, either in attributive modifier position or as the head of a true classifier phrase which is a part of the pseudopartitive construction, as Schwarzschild (2006) argues for in English. Following this, Tang's examples of Num-Cl-*de*-N in (18-19) are complex NPs with Num-Cl as an attributive modifier, while the ones discussed by Cheng & Sybesma (1998) are pseudopartitive constructions, where the classifier has a true measure function, and denotes quantities of entities (as in the examples in (6)). Thus, the measure phrase of *liang bang de rou* 'two pound *de* meat' can either be interpreted in Tang's way (22.a) or in Cheng & Sybesma's way (22.b).

(22) Wo mai le san mi de bu.

    I buy Perf three Cl$_{meter}$ DE cloth

    a. I bought three meters of cloth.   [Cheng & Sybesma 1998]

    b. I bought the cloth that sells in the unit of three meters.   [Tang 2005]

These two types of Num-Cl-*de*-N also exhibit some syntactic differences. Tang's Num-Cl-*de*-N can be modified by another cluster of Num-Cl as in (23), whereas this is impossible for Cheng & Sybesma's Num-Cl-*de*-N: thus the example in (23) can only be interpreted in Tang's way, as in (23.a).   In (23), *kuai* in the first Num-Cl *liang kuai* 'two pieces' is the true classifier, which heads ClP, which takes the NP *san mi de bu* 'three meter *de* cloth' as complement:

(23)   Wo   mai   le   liang   kuai   san   mi   de   bu.
        I   buy   Perf   two   Cl$_{piece}$ three   Cl$_{meter}$ DE   cloth
        a. Tang's reading: 'I bought two pieces of cloth that sells in the unit of three meters.'
        b. Cheng & Sybesma's reading: missing

Thus there is good evidence that these examples of Tang's are not counterexamples to Cheng & Sybesma's (1998) claim about the possibility of post-classifier *de* with count classifiers.

However, Tang 2005 mentions some other examples which are true counterexamples against Cheng & Sybesma (1998).

(24)   a. Mei   chao   yue   sheng-xia   ershi-si   mei   de   luan
           every   nest   about   give-birth-down   twenty-four   Cl   DE   egg
           'Every nest has about twenty-four eggs.'
        b. Yi   nian yue   zhongzhi-le   yi-bai-sishi-duo-wan   ke   de   shumu.
           one year about   plant-Perf   one-hundred-forty-more-million Cl   DE   tree
           '(They) planted more than 1,400,000 trees a year.'

In (18) and (19), the Num+Cl expresses properties about how an unspecified quantity of entities represented by N are classified into a subclass, e.g. (18b) denotes an unspecified quantity of meat that is sorted into a number of packages of two kilos.   However, in the examples in (24), Num+Cl expresses overall quantities of entities: (24.a) means that the total number of eggs (per nest) is 24, while (24.b) means that the number of individual trees planted is more than 1,400,000. (Note that while Tang accepts (24.a), other native Mandarin speakers I consulted don't.) In these examples, the interpretation of Num-Cl-*de* is the one discussed by Cheng & Sybesma in which the classifier heads the extended nominal phrase, and hence these examples can be seen as real counterexamples to Cheng & Sybesma (1998). Tang suggests that the insertion of post-classifier *de* in the examples of (24) is related to the

'information weight' of the modifier-modifiee relation: she assumes that if the Num-Cl is a heavy and complex constituent, it is possible for *de* to follow the classifier.

Following Tang's observation about (24), Hsieh (2007, 2008) presents some more counterexamples (from the Academia Sinica Corpus, marked from now on as "A.S. Corpus")

(25) a. jin   yi-bai   wei   de   qianjiu   renyuan   (A.S. Corpus)
         close one-hundred   Cl   DE   rescue   worker
         'close to one hundred rescue workers'
      b. hao   ji   bai   tiao   de   haishe   (A.S. Corpus)
         quite several hundred   Cl   DE   sea snake
         'quite several hundreds of sea snakes'

More counterexamples are given by X.P. Li (2007): as illustrated in (26).[6]

(26) a. ta   peng-zhe   shi   duo   ben   de   shu
         he   carry-Prog   ten   more Cl   DE   book
         'He was carrying more than 10 books.'
      b. ta   yilian   xie   le   liang-bai   duo   feng   de   xin
         she   continuously   write Perf two-hundred more Cl   DE   letter.
         'She continuously wrote letters, more than 200 letters.'

The Num-Cl-*de* in (25) and (26) are cardinality expressions but not attributive, hence the example is similar to Cheng & Sybesma's example (22.a). According to Hsieh (2007, 2008), *de* can be licensed in this position if the Num-count Cl expresses unfixed quantities or if a massifier is used. Note that her examples of count ClPs have the adverbial *jin* 'close to' before the classifier phrase. Based on the example of (26), X.P. Li (2007) argues that *de* can only be found in a context of quantification of "aboutness", not "exactness", as evidenced by *yue* 'about' or *duo* 'more'. Hence Cl+ *duo*" expresses "approximative values.

We now provide a few more cases where *de* follows count classifiers. We observe that if the numeral is a (high) round number (27) or a fraction, such as ½, ¼, ¾ etc (28), *de* can

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[6] Hsieh and I both attended the 5th annual conference of European Association of Chinese Linguistics in Leipzig, in September of 2007. We both presented our papers in the session of classifiers, in which we found we shared the similar judgment about some of the data of DE. See Hsieh (2007) and X.P. Li (2007).

also follow a count classifier. In these two cases, adverbials like *yue* 'about' or *duo* 'more' are not needed.

(27) a. cunchu-ka   man le,   wo pai le   you   yi-qian zhang de   zhaopian.
memory card full Part,   I take Perf have 1000   Cl   DE   photo
'The memory card is full. I took one thousand photos.'

b. zhe-ci   women qing le   yibai wei de   tuixiu   jiaoshi.
this time we   invite Perf 100   Cl   DE   retired teacher
'This time, we invited 100 retired teachers.'

(28) a. yi ge yi sui de yin'er mei-ci   zhi neng chi 1/3 li de ganmao-yao
one Cl one year DE baby   every time only can eat 1/3 Cl DE cold pill
'A one year old baby can only take 1/3 of a cold pill every time.'

b. mei wan   tang pingjun you 1/4 ge de   yancong
each Cl-bowl soup   equally   have 1/4   Cl DE   onion
'There is ¼ of an onion in each bowl of soup on average.'

In sum, both tests of pre-classifier adjectives and post-classifier *de* face counterexamples and neither provide a clear-cut distinction between mass classifiers and count classifiers. The tests, hence, do not establish Cheng & Sybesma (1998)'s claim that Chinese shows a mass/count distinction.

The exact semantics of pre-classifier adjectives and post-classifier *de* will be discussed in depth in Chapter 5.

4. Classifiers as a unified category

In this section, we will address the question of whether it is possible to make a distinction between mass and count classifiers in terms of their lexical/functional properties. That is, we ask whether it is plausible to correlate the distinction between mass and count classifiers with the distinction between lexical and functional properties of classifiers? Our answer is negative. As we will show, Chinese classifiers do not constituent a homogeneous category in terms of their nominal properties, they do not fall naturally into two classes of lexical classifiers and functional classifiers, but a show a continuum from low nominal degrees to high nominal degrees. We will also argue that, though most Chinese classifiers have a nominal origin, they

are an independent category, and syntactically, they head their own syntactic projection: classifier phrase, ClP.

4.1 Classifiers are all nominal in nature

Cheng & Sybesma (1998) argue that two lexically different types of classifiers can be distinguished in terms of their nominal properties. "One group of classifiers consists of elements which are completely grammaticalized as classifiers. They form a closed class, and they cannot occur as independent nouns." "The other group of classifiers do not constitute a closed class in the sense that any noun which can be seen to create a unit for measuring mass nouns can be used (notably all sorts of container words or words that can be interpreted as containers; e.g. *wan* 'bowl', *bei* 'cup'). So the latter group consists of elements which also occur as independent nouns" (Cheng & Sybesma 1998). They further argue that count classifiers are functional elements and mass classifiers are lexical (nominal) elements.

We will show that almost all Chinese classifiers have a nominal origin, but different classifiers exhibit different degrees of nominal features, and that the distinction between mass and count classifiers cannot be identified with the distinction between lexical and grammatical classifiers.[7] As will be shown below, count classifiers are no less lexical or open than mass classifiers. Among the count classifiers, there are classifiers with a large number of nominal properties, and also classifiers with a small number of nominal properties, and the same is true for mass classifiers. Therefore, classifiers with a large amount of nominal properties do not correspond to mass classifiers and classifiers with a low amount of nominal properties do not correspond to count classifiers in a consistent way.

On the one hand, some count classifiers are as lexical as some mass classifiers are. For example, the nominal nature of some count classifiers is so strongly retained that they can be used as nouns independently. These are the classifiers in the second column in (29). As nouns, they must themselves be preceded by classifiers in order to be modified by numerals. We consider those classifiers that can be used as nouns independently as classifiers with nominal properties to a high degree.

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[7] Here, we want to point out that it is a bit too strong to say that all the Chinese classifiers are derived historically from nouns. There are a few cases, in which verbs, as in (i), or adjectives, as in (ii), can be considered as classifiers. Originally, *ju* is a verb, meaning 'to hold with two hands', but it appears between Num and N in (i) and acts as a classifier, meaning 'handful'. *Wan* in (ii) is a typical adjective and means 'bent or curved', it provides a counting unit for the crescent moon on its classifier use.

(i) yi   ju   qinglei   一掬清泪   (ii) yi   wan   lengyue   一弯冷月
     one Cl$_{hold-in-both-hands}$ tear   'a handful of tears'   one Cl$_{bent}$ cold moon   'a crescent of cold moon'
We do not discuss the question as to how verbs and adjectives can become classifiers.

(29)　　　count Cl　　　　➔　　　　　　　　　N

a. yi　　**tou**　　niu　　　　　yi　　*(ge)　**tou**
　one　Cl₋head　bull　　　　one　　Cl　　head
　'a bull'　　　　　　　　　'a head'

b. wu　**shan**　men　　　　wu　　*(ba)　**shan**
　five　Cl₋fan　door　　　　five　　Cl　　fan
　'five doors'　　　　　　　'five fans'

c. san　**ben**　shu　　　　san　*(ge)　**ben**
　three　Cl₋volume　book　　three　　Cl　exercise-book
　'three books'　　　　　　'three exercise books'

d. liang　**tai**　diannao　　liang　*(ge)　**tai**
　two　Cl₋set　computer　　two　　Cl　　desk
　'two computers'　　　　　'two desks'

e. yi　**jia**　feiji　　　　yi　*(ge)　**jia**
　one　Cl₋frame　plane　　one　　Cl　stand/frame
　'a plane'　　　　　　　　'a stand'

On the other hand, other count classifiers do not have as strong a nominal nature as those in (29). According to *Hanyu Dazidian* [Comprehensive Chinese Dictionary], the classifiers in (30) were all nouns in origin. For example, the general classifier *ge* means 'bamboo branch', *zhi* means 'bird' and *mei* 'trunk' in classical Chinese. However, in modern Chinese, the lexical meanings of this group of classifiers are bleached to such a degree that they cannot be used independently anymore. In other words, these individual classifiers are more functional than lexical in Modern Chinese. Thus, the classifiers in (30) cannot be used as nouns independently, as evidenced by the ungrammaticality of modification of classifiers in the second column of (30). We consider these classifiers as classifiers with nominal properties to a low degree.

(30) a. yi   ge   ren   a' # yi   ge   ge

  one   Cl   man   one   Cl   Cl

  'a man'

  b. yi   zhi   dou   b'. #yi   ge   zhi

  one Cl   dog   one   Cl   Cl

  'a dog'

  c. yi   mei   tongqian   c'.# yi   ge   mei

  one   Cl   copper coin   one   Cl   Cl

  'a copper coin'

However, there are also count classifiers that fall between (29) and (30) in terms of nominal properties. The classifiers in (31) are not as lexical as those in (29), but they are more lexical than those in (30). On the one hand, the classifiers in (31) cannot be used as nouns independently, as evidenced by the ungrammaticality of the modification of the general classifier *ge*, shown in the second column of (31). But the classifiers in this group can be used in noun compounds in which they are the heads, as shown in the third column in (31). This indicates that the classifiers in (31) have nominal features, though to a relatively low degree.

(31)   count Cl   ➔   noun   ➔   noun compound

  a. yi **ba**   yizi   a'.# yi   ge   **ba**   a''. yi   ge   che-**ba**

  one   Cl   chair   one   Cl   grip   one   Cl   bicycle-grip

  'a chair'   Intended: 'a grip'   'a bicycle-grip'

  b. yi **duo**   hua   b'.# yi   ge   **duo**   b''. yi   duo   hua-**duo**

  one Cl   flower   one   Cl   bud   one   Cl   flower-bud

  'a flower'   Intended: 'a bud'   'a bud'

  c. yi   **zhi**   hua   c'.#yi   ge   **zhi**   c''. yi   geng   shu-**zhi**

  one   Cl   flower   one   Cl   twig   one   Cl   tree-twig

  'a flower'   Intended: 'a twig'   'a twig'

In other words, we can divide count classifiers into at least three subtypes in terms of their nominal properties. What Cheng and Sybesma call mass classifiers can be similarly divided. The first type of mass classifiers shows nominal features to a high degree: the container

classifiers. As shown in (32), they can be used as nouns independently[8] and are on a par with the count classifiers in (29).

(32)   mass Cl   ➔   N

a. yi   **ping**   shui   a'. yi   *(ge)   **ping**
   one   Cl-bottle   water   one   Cl   bottle
   'a bottle of water'   'a bottle'

b. yi   **xiang**   pingguo   b'. yi   *(ge)   **xiang**
   one   Cl-box   apple   one   Cl   box
   'a box of apples'   'a box'

c. yi   **dai**   binggan   c'. yi   *(ge)   **dai**
   one   Cl-bag   biscuit   one   Cl   bag
   'a bag of biscuits'   'a bag'

The group classifiers and some of the partition classifiers show nominal properties to a medium degree: they cannot function as nouns independently, but they can be be a part of noun compounds which can be modified by classifiers. The examples of mass classifiers in (33) pattern with the count classifiers in (31).

(33)   mass Cl   ➔   noun   ➔   Noun compound

a. yi **kun**   daocao   a'.# yi   ge   **kun**   a''. yi   ge   cao-**kun**
   one Cl-bundle straw   one Cl   bundle   one Cl   straw-bundle
    'a bundle of straws'   'a bundle'   'a straw-bundle'

b. yi **huo**   liumang   b'.# yi   ge   **huo**   b''. yi   ge   tuan-**huo**
   one Cl-group hooligan   one Cl   group   one   Cl   gang-group
    'a group of hooligan'   'a group'   'a gang'

c. yi **dui**   huo   c'.# yi   ge   **dui**   c''. yi   ge   huo-**dui**
   one   Cl-pile fire   one Cl   pile   one   Cl   fire-pile
    'a pile of fire'   'a pile'   'a   bonfire'

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[8] In written Chinese, people tend to use compounds and the suffix –*zi* is frequently added to those nouns. But in spoken Chinese, those monosyllabic words are used quite often.

Most partition classifiers have nominal properties to a low degree. They can neither be used as nouns nor can they form noun compounds, though originally they are nouns. The examples in (34) are parallel to those in (30).

(34)　　　　mass Cl　　　　➔　　　　　　Noun

a. yi　　**luo**　　wenjian　　　　a.'* yi　　ge　　**luo**

　　one　　Cl-pile　　document　　　　　one　　Cl　　pile

　　'a pile of documents'　　　　　　'a group'

b. yi　　**duan**　　ganzhe　　　　b'. * yi　　ge　　**duan**

　　one　　Cl-section　　sugarcane　　　one　　Cl　　section

　　'a section of sugarcane'　　　　　'a section'

c. yi　　**zhang**　　zhi　　　　c'* yi　　ge　　**zhang**

　　one　　Cl-piece　　paper　　　　　one　　Cl　　piece

　　'a piece of paper'　　　　　　　'a piece'

So, comparing (29-31) and (32-34), we see that count classifiers like *tou* 'head', *tai* 'set' are as lexical as mass classifiers such as *dai* 'bag', *ping* 'bottle'; and the mass classifiers like *huo* 'group', *di* 'drop' are no more lexical than count classifiers such as *ge, ba* etc.

In sum, many classifiers have nominal origins, but they exhibit different amounts of nominal properties. Hence, we cannot make a dichotomy of classifiers based on the functional/lexical features, and they do not fall into two identifiable classes of mass/count classifiers, where the first are lexical classifiers and the second functional classifiers.

4.2 A uniform syntactic projection

This subsection makes a comparative study of classifiers in Mandarin Chinese and in English. We will focus on the categorical differences. Again, here, when talking about classifiers in English, we mean group classifiers, container etc, and not the (individual) classifiers.

We propose that classifiers in non-classifier languages are nouns (see Rothstein's 2009 analysis of classifiers in English and Modern Hebrew), and that classifiers in Chinese constitute a category that has an independent syntactic status. We claim that Chinese classifiers are projected as the head of the functional projection of Classifier Phrase in a base-generated way (also see Tang 1990, A. Li 1999), while the classifiers in non-classifier languages are borrowed from nouns and do not have an independent categorical status as classifiers.

We now show three differences between classifiers in Chinese and in English.

Firstly, a wide range of adjectives can appear before English classifiers, which exhibit complex modification relations, as in (35), while only a restricted set of adjectives, such as *big/small*, are allowed preceding Chinese classifiers, as in (36) and (37).

(35) a. three blue bottles of water

b. a tasteless cup of coffee

c. an expensive cup of coffee.   (adapted from Jackendoff 1977)

In English, pre-classifier adjectives can modify classifiers, as in (35.a), where what is expressed is that the *bottle* itself is *blue*, not that the *water* is *blue*. It is also possible that pre-classifier adjectives cross the measure words to modify nouns, as in (35.b), where the *coffee* but not the *cup* is '*tasteless*'. This is called a "transparency phenomenon" by Jackendoff (1977). Another possibility is that the adjective modifies the entity denoted by the classifier phrase, i.e. Cl+N. For example, in (35.c), both the cup and the coffee themselves can be cheap, but when the coffee is served in that cup (say, in a Beach Hotel), the coffee-in-the-cup can be expensive.

The Chinese counterparts of (35) are not grammatical, as shown in (36). Chinese classifiers reject those attributive adjectives such as *lan* 'blue', *anggui* 'expensive' or *wuwei* 'tasteless', even though they are semantically compatible with the classifier or the noun.

(36) a.* yi   lan   ping   shui

one   blue   Cl-bottle   water

b.* yi   wuwei   bei   kaifei

one   tasteless   Cl-cup   coffee

c.* yi   anggui   bei   kafei

one   expensive   Cl-cup   coffee

However, there are indeed a few cases where adjectives can appear before classifiers. As we discussed previously, Chinese classifiers only allow a few (dimensional) adjectives to appear before them, including *da/xiao* 'big/small', *chang* 'long' or *zheng*   'whole', as in (37).

(37) a. yi   da   ping   shui
        one   big   Cl-bottle water
        'a big bottle of water'

     b. yi   xiao   bei   kafei
        one   small   Cl-cup   coffee
        'a small cup of coffee'

     c. yi   chang   tiao   xianglian
        one   long   Cl   necklace
        'a long necklace'

     d. yi   zheng   bei   shui
        one   whole   Cl-cup   water
        'a whole bottle of water'

Even though a small set of adjectives can appear before classifiers in Chinese (37), we cannot get the readings we observed in English, illustrated in (35). In Chinese, it is neither possible to interpret (37) with a transparent reading, where the pre-classifier adjectives modify the noun, nor a reading where pre-classifier adjectives modify the classifier. If the examples in (37) had a transparent reading, we would expect to get something like 'big water'. But expressions like "big water" are ungrammatical. This is because shui 'water' denotes homogeneous entities and which cannot have the property of being big or small.

It is impossible for pre-classifier adjectives to modify the classifier either. Assume that in a restaurant, a basketball player and a 5 year-old boy each were served with a bowl of rice (the bowls are the same size and the quantity of rice in each bowl is the same). Aftering serving the rice, we get two different responses from them, as in (38).

(38)   a. The basketball player says:
          zheme *yi xiao wan   fan* zenme gou   wo chi?
          Such   one small Cl-bowl rice how   enough   I   eat
          "How can such a SMALL bowl of rice be enough for me?"

       b. The five-year old boy replies:
          zheme *yi da wan   fan* zenme chi-de-xia?
          Such   one big Cl-bowl rice how   eat-up
          'How can I eat up such a big bowl of rice?'

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If pre-classifier adjectives modify classifiers giving a property of the unit denotes by the classifier, in this case its size, then it would seem that we had to interpret the adjective as a qualifying either the size of the bowl or the size of the measure in each case in (38). On the strict 'container' reading of the classifier, (38a) asserts that the bowl is big and (38b) asserts that the bowl is small. If the classifier it taken as expressing a measure, then (38a) asserts that the quantity of rice is big, while (38b) expresses that the quantity of rice is small quantity. However, such intepretations are contradictory, given the fact that the size of the bowls is the same and the quantity of rice is the same. So we conclude that it is impossible that pre-classifier adjectives do not directly modify the classifier.

We will argue in Chapter 5 that syntactically, the pre-classifier adjectives modify "Cl+N" and that semantically, they exresss the speaker's personal evaluation of the atomic entitiy dentoed by "Cl+N"to be large or small with respect to a contextually relevant criterion. (38.a) really means that the bowl of rice is a small quantity for the basketball player and (38.b) means that the same bowl of rice is a large quantity for the five-year boy, and the pre-classifier adjectives *da/xiao* in (38) express the basketball player or the five-year old boy's evaluation of the entity dentoed by Cl+N with respect to their consumption ability in a certain context.

This contrast between pre-classifier adjectival modification in English (35) and Chinese (36) suggests that English classifiers are nouns which can be directly modified by adjectives, whereas Chinese classifiers are not nouns and they reject direct modification by adjectives. Even if Chinese classifiers allow pre-classifier adjectives (37), their interpretations are different from those of the English counterparts.

A second difference between English and Chinese is that in NP-deletion in coordinated clauses, we can either delete Cl-N or N in English, as in (39), while in Chinese, we can only delete N, as in (40). Note that according to some native English speakers, (39.a) sounds better than (39.b).

(39)   a. I bought three bottles of water, and he bought two.

        b. I bought three bottles of water, and he bought two bottles.

(40) a. wo mai le   san ben shu,   ta ye mai   le   san *(ben).

I buy Perf three Cl_{volume} book, he also buy Perf three Cl_{volume}

'I bought three books; he also bought three.'

b. wo   you   wu   ping   shui,   ta zhi you   liang *(ping).

I   have five Cl_{bottle} water he only have two Cl_{bottle}

'I have five bottles of water; he only has two (bottles).'

The contrast between (39) and (40) tells us that in counting contexts, the numerals in English can be used independently without the classifiers or 'classifier + N', but in Chinese the numerals go hand-in-hand with classifiers. If we assume that only the maximal projection of NP can be elided in NP ellipsis (Lobeck 1995), then Cl+N in English can be considered as a complex nominal constituent,   but Cl+N in Chinese cannot be treated a complex noun.

In Chinese classifier phrases, we can either elide the NP as in (40), or elide the Num, as shown in (41.a-b). But we can not elide the NP and the Num at the same time. (41.c) is ungrammatical.

(41) a. wo mai le   yi ben yingyu shu, ta   mai le   ben fawen shu.

I buy Perf one   Cl   English book   he buy   Perf Cl   French book.

'I bought an English book and he bought a French one.'

b. wo mai   le   yi   ping kele, ta   mai le   xiang xuebi.

I buy   Perf one Cl   coke he buy Perf Cl   sprite

'I bought a bottle of coke and he bought a sprite.'

c.* wo mai le yi   ping kele, ta mai   le   xiang.

I   buy Perf one Cl_{bottle} coke he buy Perf Cl_{box}

The ellipsis tests in (40) and (41) suggest that Chinese classifiers cannot be used alone like nouns, and they must always attach to some other heads, such as Num or N. In this respect, they behave similarly to tense markers, which must stand along with verbs. Based on this similarity, we suggest that Chinese classifiers head a functional projection of ClP   (in the same way that tense markers project TP (Tense Phrase) or IP). This is another piece of evidence in support of our hypothesis that English classifiers are actually nouns, but Chinese classifiers are not.

A third difference between Chinese and English is that English classifiers, like other nominals, are marked for number (i.e. singular/plural), whereas Chinese classifiers are always used bare and no plural marking is available.

English has a distinction between mass and count nouns. Count nouns have a singular/plural distinction, and plural nouns can be marked overtly by the plural marker '–s'. The singular/plural distinction is also reflected on classifiers when they modify nouns, such as *a bottle of water* vs. *three bottles of water* in (42). This suggests strongly that English classifiers are nouns, assuming that the plural marker –s only attaches to nouns.

(42)   a. I bought a bottle of water.
       b. There stand three bottles of water on the table.

Chinese has no plural marker like English does. The classifier *ping* 'bottle' does not show the alternation between *bottle* and *bottles*, as in (43). It is always used in bare form without any suffix.

(43)   a. yi   ping   shui
          one   Cl$_{-bottle}$ water
       b. san   ping   shui
          three Cl$_{-bottle}$ water

The three differences I have demonstrated here are sufficient to show that Chinese classifiers and English classifiers are different in terms of their categorical features. Specifically, English classifiers share a lot of properties with nouns: –being modified by adjectives, –being number-marked, –being elided like nouns; Chinese classifiers, though most of them have nominal origins, share none of these features of English classifiers. They are better treated as a distinctive category from nouns projecting an independent functional phrase in syntactic structure.

We join Tang (1990) and A. Li (1999) in arguing that all Chinese classifiers are base-generated as the head of an independent projection of ClP, which takes NP as complement, and that the ClP is itself complement of NumP. We don't assume N-to-Cl movement for Chinese (mass) classifiers. In Chapters 4 and 5 we will argue that not all classifiers have the same structural properties, but for the moment we will assume that (44) is the general structure of the Classifier Phrase.

(44)

```
              NumP
             /    \
          Num      ClP
                  /   \
                Cl     NP
                        |
                        N
```
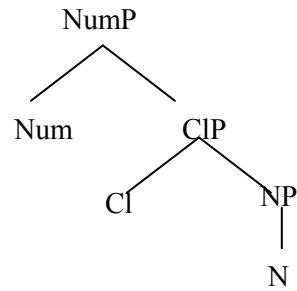
5. Conclusion

In this chapter, we have examined Cheng & Sybesma's (1998) arguments about the distinction between count and mass classifiers. We presented some new data to test the two syntactic diagnostics for the distinction between count and mass classifiers. This data shows that pre-classifier adjectives are available for both count and mass classifiers, and so is post-classifier *de*. Therefore, we suggest that these two syntactic diagnostics cannot be used as legitimate criteria for making distinction between two types of classifiers, as proposed by Cheng & Sybesma (1998). We also examined the possibility of making a distinction between classifiers based on their lexical properties, e.g. lexical v.s. functional classes. We showed that both count and mass classifiers have different subtypes of classifiers which have high, medium and low amounts of nominal properties.   We argued that because there doesn't seem to be a binary distinction between lexical classifiers and functional classifiers, we cannot use that distinction to argue for a binary distinction beween mass classifiers and count classifiers.

CHAPTER 3 SEMANTICS OF BARE NOUNS IN CHINESE

1. Introduction

This chapter is concerned with the semantics of bare nouns in Chinese. Having made the claim in Chapter 2 that the mass/count distinction of nominals cannot be established in Chinese, we now explore Chierchia's (1998b) proposal that all Chinese nouns are mass nouns. Chierchia (1998b) suggests that Chinese is an argumental language, in which (i) all the nouns are born as arguments, and (ii) they denote kinds, as do English mass nouns. Though Chierchia's hypothesis has been very influential, it is, as he admits himself (Chierchia 1998a: 92) rather "speculative". Our first and foremost goal in this chapter is to examine the plausibility of Chierchia's hypothesis. We show that there is good evidence to accept it.

It has been widely observed in the literature that Chinese bare nouns have, besides kind readings, object-level interpretations, which can be both definite and indefinite. For example, in (1.a), the bare noun *shu* 'book' is a kind term, meaning 'the book kind', and *shu* 'book' in (1.b), can either mean the book(s) or some book(s).

(1) a. shu   shi   renlei   de   jingshen   shiliang.

     book   be   human   Mod   spirit   food

     'Books are food for the human soul.'   [Generic]

     Lit: 'Books are to our mind, as food to our body

   b. wo   mai   le   shu

     I   buy   Perf   book

     'I bought some book(s).'   [Indefinite]

   OR 'I bought the book/the books.'   [Definite]

The second goal of this chapter is to answer the question: what is the relation between the kind reading and the (in)definite readings, of bare nouns? There are two possibilities. The first one is that Chinese bare nouns are ambiguous between a kind reading and object-level readings. The second possibility is that the kind interpretation is the default reading for Chinese bare nouns and that the object-level readings are derived from the kind reading. In this chapter, following Carlson (1977) and Chierchia (1998a, b), we argue for the second possibility.

The third aim of the chapter is to look more generally at reference to kinds in Mandarin. Besides bare nouns, there are two other frequently used ways to make reference to kinds in Chinese. One is to use kind classifier phrases. The other is to suffix a bare noun with the morpheme *lei*, meaning 'kind', as in the form of N-*lei* 'N-kind'. These three types of kind expressions differ from each other in their distributions and interpretations.

Bare nouns can take both kind-level predicates and predicates expressing properties of individuals:

(2) a. jing   kuai   jue-zhong   le.
      whale   soon   vanish kind   Part
      'Whales will soon be extinct.'

   b. qunian   chusheng de   jing   hen   xiongcan.
      last-year   born   Mod   whale   very   cruel
      'Whales that were born last year are very ferocious

Like bare nouns, kind ClPs allow both types of interpretations, but when a kind ClPs is a subject, it must be introduced by the existential quantifier *you* 'there be', as in (3):

(3) a. you   yi   zhong   jing   kuai   jue-zhong   le.
      there-be   one   Cl$_{-kind}$ whale   soon   extinct-kind   Part
      'A kind of whale will soon be extinct.'

   a'.* yi   zhong   jing   kuai   jue-zhong   le.
      one   Cl$_{-kind}$ whale   soon   extinct-kind   Part
      Intended: 'A kind of whale will soon be extinct.'

   b. you   yi   zhong   jing   tingjue   shifeng   lingmin.
      there-be   one   Cl$_{-kind}$ whale   hearing   very   alert
      'A kind of whale has a very sensitive hearing.'

   b'. * yi   zhong   jing   tingjue   shifeng   lingmin.
      one   Cl$_{-kind}$ whale   hearing   very   alert
      Intended: 'A kind of whale has a very sensitive hearing.'

N-*lei* can only take predicates denoting properties of (sub)kinds, not predicates denoting properties of individuals:

(4) a. jing-lei   kuai   jue-zhong   le.
        whale-kind   soon   vanish-kind   Part
        Whale kinds will soon be extinct.'
    b.# jing-lei   tingjue shifeng   lingmin.
        whale-kind   hearing vey   alert
        'Whale kinds have a very sensitive hearing.'

The distributional differences shown in (2)-(4) between these three types of kind expressions raise non-trivial questions about their semantic differences.

In Section 2, we justify Chierchia's (1998b) hypothesis that Chinese bare nouns are kind terms with various pieces of evidence. Sections 3 and 4 look at the object-level interpretations of Chinese bare nouns. In Section 3, we study the predicative use of bare nouns, e.g. in post-copula positions. Section 4 looks at definite readings of bare nouns in argumental positions, e.g. topic positions. We argue that Chinese nouns are kind denoting by default, and that the existential and the definite reading are derived (also see R. Yang 2001, H. Yang 2005). In Section 5, we compare the three types of kind referring expressions, bare nouns, N-*lei* and kind ClPs.

2. Bare nouns as kind terms

Chierchia (1998b: 353-4) develops a typology of noun reference. He assumes that nouns are either classified as predicates or as arguments, and he introduces the features [±argument] and [±predicate] as parameters constraining the way in which the syntactic category N (and its phrasal projection NP) is mapped onto its denotation in different languages. [+argument] means that N can be mapped onto denotations of the argumental type and [-argument] that it cannot. The determiner D denotes a function from predicates to arguments. In a language where N is a predicate, N must combine with a D to form an argument. In a language where N is born at the argument type, this is not necessary and we get so-called "bare NP arguments". French is argued to be an [-argument, +predicate] language, in which every noun is a predicate, and nouns cannot be made into arguments without projecting D. English is a language parameterized with the setting of [+argument, +predicate]. This means that nouns in English can be either predicative or argumental. In English, mass nouns are [+argument], while count nouns are [+predicate]. This means that count nouns must combine with a determiner to denote an argument, and hence count nouns cannot occur in their bare singular form. Chierchia proposes Chinese is an argumental language, where the nouns have the

setting of [+argument, -predicate]. This means nouns can be mapped onto denotations at the argument type but not at the predicate type. Chierchia assumes that in a language with this setting, nouns and their phrasal projections are mass nouns that uniformly denote kinds. (We refer to Chierchia (1998b: 355-357) for the detailed discussion of each type of language.)

With this assumption, Chierchia makes the following predictions concerning properties of nouns in argumental languages like Chinese:

(i)   There is no plural marker;[9]

(ii)   Bare nouns cannot be modified by numerals without the assistance of classifiers;

(iii)   There is no indefinite article.

These three morphosyntactic predictions are born out in Chinese. However, this by itself does not entail Chierchia's assumption that Chinese nouns denote kinds.

In what follows, we use the tests of generic contexts (Section 2.1), appositives (Section 2.2) and scope behaviors (Section 2.3 and 2.4), to examine the nature of bare nouns. As we will see, these tests provide evidence for Chierchia's hypothesis that Chinese bare nouns denote kind terms.

2.1 Strong kind-inducing contexts

Kind-reference generic sentences express properties that are true of kinds, species or classes of objects, but not of individual objects (Krifka *et al* 1995). In English, bare plural nominals and definite singular nominals have kind interpretations. They can take kind-level properties denoted by kind-level predicates, such as *being extinct*, as exemplified in (5.a-b):

(5)   a. Dodos are extinct.

         b. The dodo is extinct.

In contrast, indefinite singular nominals are individual-denoting only, and cannot take kind-level predicates, as in (5.c).[10]

---

[9] Note that in Chinese, there is a seeming plural marker –*men* (A. Li 1999). However, this marker is not exactly the same as the English plural morpheme –*s*. Firstly, it carries definiteness; secondly, it can only be attached to Ns denoting humans. According to Iljic (1994), it is a collective marker but not a plural maker. Though A. Li (1999) argues -*men* in Mandarin Chinese is best analyzed as a plural marker, she accepts the difference between the Chinese –*men* and the English –*s* . She assumes that -*men* is realized on an element in D, in contrast to plurality on N, which is what we find in English. We thus do not think that Chinese –*men* can be treated as a true plural marker.

[10] The indefinite singular nominals can have a subkind reading. On the subkind reading, *a dodo* means a subkind of dodos. We ignore this reading for the time being.

c. * A dodo is extinct.

In Mandarin Chinese, there is neither a plural marker nor are there articles, so we cannot find expressions like bare plurals or (in)definite singulars headed by articles. The closest we can come to English bare plurals is with Chinese bare nouns, and the closest we can come to the singular definite is with the Chinese Demonstrative+N construction, while the closest we can come to singular indefinites is with Chinese "one+CL+N".[11] As (6) shows, only Chinese bare nouns can be used as subjects of kind-level predicates in kind reference generics (6.a), while demonstratives phrases (6.b) and indefinite singular phrases (6.c) cannot:

(6) a. jing   kuai   jue-zhong   le.
        whale   soon   vanish-kind   Part
        'Whales will soon be extinct.'
     b.# na   jing   kuai jue-zhong   le.
         that whale   soon vanish-kind Part
         Intended: 'That whale will soon be extinct.'
     c.# you   yi   tiao   jin   kuai   juezhong   le.
         there-be one Cl_{-tail} whale soon   vanish-kind   Part
         Intended: 'A whale will soon be extinct.'

The predicate of *jue-zhong* 'be extinct' in (6.a) is literarily translated as *jue-zhong* 'vanish-kind' in Chinese, so it clearly is a kind-level predicate. It requires a kind term to be its argument, so the bare noun in (6.a) is interpreted as: *the whale kind*. The examples of (6.b) and (6.c) show that this kind-level predicate cannot take as argument a nominal phrase that refers to individuals, such as *na jing* 'that (individual) whale' or *yi tiao jing* 'an (individual) whale'.

A second point is the following. Chinese bare nouns can occur in the post-copula position as a kind-level predicate. The sentence, in that case, is a generic sentence, as in (7.a).

---

[11] In Mandarin, demonstratives can either be used in the construction of Dem+Cl+N or in Dem+Cl. But Dem-Cl is usually found in preverbal positions, e.g. the subject position, and not in postverbal positions, e.g. object positions. Note that Dem-Cl can only have an object-level interpretation and not a kind-level interpretation. For example, *zhe yu* 'this fish' means 'this individual fish' and not 'this kind of fish'.

(7) a. haitun   he   lanjing   dou   shi   **jing**.

       Dolphin and   blue whales   all   be   whale

       'Both dolphins and blue whales are whales.'

   b. haitun   he   lanjing   shi   **liang zhong   jing**.

       dolphin and   blue whale be   two   Cl$_{-kind}$ whale

       'Dolphins and blue whales are two kinds of whales.'

   c.* haitun he   lanjing   shi   **liang tiao   jing**.

       dolphin and   blue whale be   two   Cl$_{-tail}$ whale

       'Dolphins and blue whales are two (individual) whales.'

(7.a) expresses a taxonomic relation between the kind of entities denoted by the subject, i.e. *haitun he lanjing* 'dolphins and blue whales', and the denotation of the post-copula NP, i.e. *jing* 'whales'. That is, the kind Dolphin and the kind Blue Whale stand in a subkind relation to the kind Whale. The subkind relation can be overtly realized by the kind classifier, *zhong* 'kind' as shown in (7.b); the sentence is infelicitous with the individual classifier *tiao* 'tail', as in (7.c)"

     The use of bare nouns in Chinese to refer to kinds has been neglected in Chinese linguistics, despite attested examples like the following in (8) from high school textbooks used in mainland China. These examples illustrate strong kind-inducing contexts, such as discussions of biology, invention, taxonomy. The kind terms are given in boldface.

(8) a. **niao** shi you   **konglong** jinhua   lai   de.

      bird   be   from   dinosaur   evolve come Part

      'Birds evolved from dinosaurs.'

  b. aidisheng   faming   le   **dianhuaji**.

      Edison   invent   Perf   telephone

      'Edison invented the telephone.'

  c. **tie**   shuyu   **jinshu**.

      Iron belong metal

      'Iron belongs to the class of metal.'

2.2 Appositives

In this section we discuss appositives as a test for the kind referring nature of Chinese bare nouns. Bare nouns easily take appositives. In kind-reference generics, the appositive phrase can

be a kind ClP, headed by the kind classifier *zhong* 'kind', as in (9), not an individual ClPs headed by individual classifiers such as *zhi* or *ge,* 'individual unit', as in (10).

(9) a. niao, zhe zhong dongwu, you konglong, na zhong dongwu jinhua er lai.
      bird this Cl_{-kind} animal from dinosaur that Cl_{-kind} animal evolve thus come
      'Birds, this kind of animal, evolved from dinosaurs, that kind of animal.'
   b. aidisheng faming le dianhuaji zhe zhong shebei.
     Edison invent Perf telephone this Cl_{-kind} equipment
    'Edison invented the telephone, this kind of equipment.'

(10) a.* niao, zhe zhi dongwu, you konglong, na zhi dongwu jinhua er lai.
       bird this Cl animal from dinosaur that Cl animal evolve thus come
      'The bird, this individual animal, evolved from the dinosaur, this individual animal.'
   b.* aidisheng faming le dianhuaji zhe ge shebei.
      Edison invent Perf telephone this Cl equipment
     'Edison invented the telephone, this equipment.'

The verbs of *iinhua* 'evolve' in (9.a) and *faming* 'invent' in (9.b) can only take kind terms as arguments, so the arguments only allow kind classifier phrase as appositive phrases, as in (9) and not individual classifier phrases, as in (10).

     Kind ClPs can even function as appositive phrases of bare nouns in episodic sentences, and then they force a kind reading of the bare noun. Consider (11).

(11) a. wo chi le liulian, zhe zhong /* ge shuiguo.
     I eat Perf durian this Cl_{-kind} / Cl fruit
     'I ate durians, this kind of fruit.'
   b. wo kan-guo jing zhe zhong /* zhi dongwu.
     I see-Exp whale this Cl_{-kind} / Cl animal
     'I have seen whales, this kind of animal.'
   c. wo xihuan jing zhe zhong /* zhi dongwu.
     I like whale this Cl_{-kind}/ Cl animal
     'I like whales, this kind of animal.'

Take (11.a) for instance. Without the appositive phrase, the sentence of *wo chi le liulian* can either mean that 'I ate the durian(s)' or 'I ate some durian(s)', where the bare noun *durian* has a definite or an indefinite reading, but not a kind reading. However, with an appositive like *zhe zhong shuiguo* 'this kind of fruit', the bare noun *liulian* 'durian' is interpreted as a kind term, referring to the kind Durian. As a result, (11.a) means that I had a durian-eating experience. (Note that the phrase *zhe ge shuiguo* 'this Cl fruit' can never be used as an appositive on the bare noun, regardless of whether the bare noun *liulian* is kind or individual denoting.)

2.3 Scope w.r.t opacity

In this section, we will use Carlson's (1977) scope tests in opacity contexts to investigate the scope behavior of Chinese bare nouns.

Carlson (1977) shows that in English, in opaque contexts, indefinite singular NPs like *a policeman* are ambiguous between an opaque and a transparent reading (12.a). On the transparent reading of (12.a), there is some particular person that Paul is looking for, who happens to be a policeman (a fact that Paul may be unaware of). On the opaque reading, Paul is not looking for a particular person, but would be satisfied by anyone who can show him his Police Badge. Indefinite plural NPs, like *some policemen* in (12.b), show the same ambiguity. However, as Carlson argues, bare plural NPs, like *policemen* in (12.c), only have the opaque reading.

(12) a. Paul is looking for a policeman.   (opaque or transparent)
    b. Paul is looking for some policemen.   (opaque or transparent)
    c. Paul is looking for policemen.   (opaque)

The opaque and transparent readings of indefinite phrases, such as *a policeman* and *some policemen*, have the following two semantic structures associated with them (following Zimmermann 1993 for the intensional one), in (13). On the opaque reading, *look for* relates Paul to the property Policeman, meaning that he is trying to find an instantiation of that property in the real world. On the transparent reading, *look for* relates Paul to an individual x, meaning that he is trying to find that person x, and x happens to have the property of being a policeman.

(13) a. look for (paul, ^policeman)   (opaque)

    b. $\exists$x[policeman(x) $\wedge$ look for (paul, x)   (transparent)

Carlson (1977) argues that if the bare noun is ambiguous between a kind reading and an indefinite reading, the bare plural in (12.c) should have the opaque and transparent readings as the indefinites (12.a) and (12.b), which they don't.

      Carlson (1977) argues that English bare plurals only denote kinds and that the existential reading of the bare noun is derived from the basic kind reading by a type-shifting operation on the verb or predicate which introduces an instantiation relation between the kind and its individual instances. Thus, even if the intensional context allows an existential reading, the existential quantifier is introduced locally by the type shifting operation, i.e. in the scope of the intensional operator: no transparent readings are generated. Thus, we can interpret (13.a) as (13.c), meaning: Paul tries to bring himself into a world where he has found an instantiation of the kind Policeman.

    c. Try(paul, λw.$\exists$x[INSTANTIATE(x,Policeman,w) $\wedge$ FIND(paul,x,w)])   (opaque)

As mentioned above, "one+Cl+N" is the closest we can come in Chinese to English indefinite singulars and Chinese bare nouns are the closest we can come to English bare plurals. In what follows, we will check whether Carlson's observation about the contrast between English bare plural NPs and indefinite singular NPs in (12) carries over to bare nouns and "one+Cl+N" in Mandarin:

(14) a. ta   zai   zhao yi   ge baomu.
        He   Prog seek one   Cl maid
        'He is looking for a maid.'   (opaque or transparent readings)
    b. ta   zai   zhao baomu.
      He   Prog   seek   maid
      'He is looking for a maid/maids.'   (opaque reading)
   OR 'He is looking for the maid(s).'   (definite reading)

In (14.a), the singular phrase of *yi ge baomu* either refers to anyone who has the property of being a maid, which leads to an opaque reading, or refers to a particular maid, in which case we get a transparent reading. In (14.b), the bare noun *baomu* either refers to anyone who is a

maid/are maids, and the reading we get is the opaque reading, or it refers to the maid(s) familiar to the subject, in which case the sentence gets a definite reading.

In short, "one+Cl+N" patterns with English indefinite singular NPs, and (14.a) is ambiguous between an opaque reading and a transparent reading. Chinese bare nouns, like English bare plurals allow an opaque reading, but not a transparent indefinite reading.

However, Chinese bare nouns have an extra reading, a definite reading, which English bare plurals do not have. The extra reading was observed by R. Yang (2001:26-28), who argues that it should be distinguished from the transparent reading and is a phenomenon unique to Chinese. Yang's arguments for distinguishing transparent and definite readings will be discussed in Section 2.4.

We here discuss a different test which distinguishes definite from transparent readings: the test of relative clauses.

Chinese relative clauses (RCs) are left-branching, so NumPs, like "Num+Cl+N", can either have a ClP-internal RC, in the form of "Num+Cl+RC+N", or a ClP-external RC, in the form of "RC+Num+Cl+". We use our examples in (15) to illustrate. (15.a) has the form of Num-Cl-RC-N and (15.b) has the form of RC-Num-Cl-N.

(15) a. ta   zai   zhao yi   ge [$_{RC}$ ta bu   renshi de] baomu.   [trans/opaque]
         he Prog seek one Cl   he not know Mod maid
         'There is a maid that he is not familiar with that he is looking for.'
          'He is looking for an maid [and wants her to be one] that he is not familiar with.'
     b. ta zai   zhao [$_{RC}$ ta bu   renshi de] yi   ge   baomu. [transparent]
         he Prog seek   he not know Mod one Cl maid
         There is a maid that he is not familiar with that he is looking for.

Zhang (2006) claims that Num-Cl-RC-N is ambiguous in specificity, whereas RC-Num-Cl-N is unambiguously specific, and that this contrast results from the difference in scope possibilities. We agree with Zhang's observation about the correlation between the modification of relative clauses and specificity of numeral classifier phrases. We suggest that (15.a) either means that there is a certain maid that the subject is not familiar with, and she is the one that is being looked for, which is a transparent reading, or that he is looking for a maid and anyone will be fine, as long as he is not familiar with her, which is an opaque reading. (15.b) only has the transparent reading. The relative clause—*that he is not familiar with*—specifies the property of the

individual denoted by the ClP, which helps to identify the individual and thus makes the transparent reading more salient.

Now, when we replace the numeral-classifier phrase in (15) by a bare noun, and modify it with the same relative clause as the one used, we only get an opaque reading, as in (16). (Note that strictly speaking, wide-scope and specificity are independent phenomena, but the difference is not relevant here, what is important is that only the opaque reading is available.)

(16) ta   zai   zhao [RC ta   bu   renshi de]   baomu.   [opaque]
     he Prog seek   he not know Mod   maid
     'He is looking for maids [and wants them to be ones] that he is not familiar with.'

It is impossible in (16) to get a transparent reading. The interpretational variability of the modified N in (16) parallels neither that of (15.a) nor of (15.b). This strongly suggests that the indefinite readings of bare nouns must be distinguished from the scopally active indefinite readings of "Num+Cl+N".

Now, we would like to know why the second definite reading that is available in (14.b) is not available in (16). According to Lyons (1999), in English, definiteness presupposes 'familiarity' and implicates 'uniqueness'. Li & Bisang (2010) argue that definiteness in Chinese is characterized by 'familiarity' or 'identifiablity' and does not presuppose 'uniqueness'. This means that the referent of a Chinese definite phrase is an individual that is familiar to the interlocutors or identifiable in a relevant context, but it may not be a unique individual (see Li & Bisang 2010 for details). Now, in (16) the semantic content of the relative clause expresses unfamiliarity, which causes an obvious clash with the presupposition of familiarity associated with bare noun on the definite reading. We assume that the lexical content in this case overrides the presupposition. That is why the definite reading is not available in this case. If we change the relative clause to '*that I am familiar with*', the definite reading comes back, (17) is ambiguous:

(17) ta   zai   zhao [RC ta   renshi de]   baomu.   [definite/opaque]
     he Prog seek   he know   Mod maid
     'He is looking for the maids that he is familiar with.'

The stone of the relative clause kills two birds in one. First, it shows that the indefinite reading of bare nouns is not to that of true indefinite NP like "one+Cl+N". Secondly, it shows that Chinese bare nouns indeed can get opaque or definite readings, but not transparent readings. When the definite reading is unavailable for independent reasons, the opaque reading is the only possible interpretation available.

With Carlson (1977) and Chierchia (1998), we assume that this means that the default reading of Chinese bare nouns is the kind reading, and their indefinite reading is derived.

2.4 Scope w.r.t. quantifiers

Carlson (1977:11) shows that English bare plurals and indefinite singulars also behave differently with respect to the scope of quantified noun phrases like everyone. While indefinites can take wide and narrow scopes, bare plurals have narrow scope only:

(18) a. Everybody is reading a book about giraffes.   [∀> books OR ∀ < books]

    b. Everybody is reading books about giraffes.   [∀ > books]

The indefinite phrase *a book on giraffes* in (18.a) can have wide scope over the universal quantifier everybody, meaning that there is a book about giraffes that everybody is reading. It can also have a narrow scope with respect to *everybody,* meaning that everybody is reading a book about giraffes, possibly different books. In contrast, the bare plural *books about giraffes* in (18.b) can only have a narrow scope reading: everybody is reading a book about giraffes, possibly different books.

In Chinese, both indefinite singulars and bare nouns are ambiguous. As in English, the indefinite singular is ambiguous between a narrow scope and a wide scope reading with respect to the universal quantifier as in (19.a). The Chinese bare noun is also ambiguous, but between a narrow scope reading and a definite reading, as in (19.b).

(19) a. mei-ge   ren   dou zai kan   yi   feng guanyu jiaxin   de   shu.
        every-Cl man   all   Prog read one Cl   about   add-salary Mod   book
        'Everybody is reading a letter about raising salaries.'   [∀ >xin OR xin>∀]
    b. mei-ge   ren   dou zai kan   guanyu jiaxin   de   xin.
        every-Cl man   all   Prog read   about   add-wage   Mod   letter
        'Everybody is reading letters about raising salaries.'   [∀ > xin]
    OR 'Everybody is reading the letter about raising salaries.'   [definite]

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(19.a) either means that everyone has a different letter about salary-raises to read or that there is a letter about salary-raises that everyone reads. A natural scenario for the first reading is one where each employee gets a different raise, and hence they all read different letters. A natural scenario for the second reading is where they all get a 5% raise and the accounting department sends a standard letter to all. (19.b) has the same narrow scope reading, but the definite reading is different from the wide scope reading in (19.a): on the definite reading, there is one and only one letter involved in the situation and everyone reads it. It can be the case that a letter is pasted next to the entrance to the office, so everyone reads it when entering the office.

R. Yang (2001) suggests the following scope test to support the argument that the definite reading for Chinese bare nouns is different from the transparent reading. Look at the examples in (20).

(20)a. dabufeng xuezhe dou kanguo mei-ge   [jiejue **na-ge wenti**   de] fenxi   fangfa.
       most   scholar all read   every-Cl solve that-Cl problem Mod analysis method
      'Most scholars have looked at every analysis that solves that problem.'
   b. dabufeng xuezhe dou kanguo mei-ge   [jiejue **mou-ge wenti**   de] fenxi   fangfa.
      most   scholar all   read every-Cl   solve certain-Cl problem Mod analysis method
      'Most scholars have looked at every analysis that solves a certain problem.'
   c. dabufeng xuezhe dou kanguo mei-ge   [jiejue **wenti**   de] fenxi   fangfa.
       most   scholars all read every-Cl solve problem Mod   analysis method
      'Most scholars have looked at every analysis that solves problems.'
   OR 'Most scholars have looked at every analysis that solves the problem.'

Following Reinhart (1987), R. Yang (2001) argues that the definite NP, such as *na-ge weiti* 'that problem' as in (20.a), takes highest scope relative to other scope operators, i.e. it scopes over both the universal quantifier *meige* 'every' and the quantifier *dabufeng* 'most'. (20.a) means that there is a particular problem for most scholars and they have looked at every analysis to solve that problem.

In contrast, the specific indefinite NP, such as *mou-ge wenti* 'a certain question' in (20.b), not only has a wide scope reading, but also allows for intermediate scope. On the intermediate reading, *mou-ge* 'a certain' scopes over the universal quantifier *meige* 'every' but remains in the scope of quantifier *dabufen* 'most'. So (20.b) means that for most scholars, there is a problem such that he/she has looked at every analysis that solves that problem, possibly different problems for different scholars.

Now, when we look at the bare noun, such as *wenti* 'problem' in (20.c), we observe that there is no intermediate reading: (20c) has only a narrowest scope meaning or a widest scope meaning, i.e. *"anything that is problem"* or *"a particular problem that is known to both the speaker and the listener"*. The first reading is derived from the kind interpretation of the bare noun (which is equivalent to the narrow scope indefinite reading), while the second is a definite reading, where definiteness is defined in terms of familiarity in Mandarin Chinese. This definite reading gives the semantic effect of a **widest** scope reading.

We see that definite readings are to be distinguished from transparent readings, and the scope behavior of the bare noun with respect to quantifiers is similar to the scope behavior with respect to opaque contexts.

To summarize so far, we have discussed two pieces of evidence to prove that Chinese bare nouns are kind denoting. We showed that bare nouns appear naturally in kind-referring sentences. We demonstrated that Chinese bare nouns do not have the same scope behavior as true indefinites. Chinese bare nouns allow a definite reading which is independent of the scopal readings we are here concerned with. Ignoring the definite reading, bare nouns always have narrow scope with respect to quantifiers and opacity and cannot get intermediate or wide scope readings. The data discussed here strongly supports Chierchia's (1998b) assumption that Chinese bare nouns are kind referring.

2.5 Semantics of bare nouns

We now specify the interpretation of Chinese bare nouns.

Link (1983) proposes that there is a structural difference between the denotation of count nouns and that of mass nouns in English. Count nouns have their denotation in an atomic Boolean domain and mass nouns have their denotation in a non-atomic Boolean domain. So mass nouns denote different kinds of objects from count nouns. In contrast to this, Chierchia (1998a, b) argues that all the nominals are interpreted with respect to an atomic Boolean algebra. We follow Chierchia (1998a, b) and assume that all nominals are interpreted in a complete atomic Boolean domain D, generated by a partially vague set of atoms. We assume a 'part-of' relation $\sqsubseteq_D$ and a sum operation $\sqcup_D$ such that for every $X \subseteq D$: $\sqcup_D X \in D$. $\sqcup_D$ is the operation of complete join with respect to $\sqsubseteq_D$, which means that for every $X \subseteq D$: $\sqcup_D X$ is the smallest element of D such that for all $d \in X$: $d \sqsubseteq_D \sqcup_D X$.

For example, a domain with three individuals has the structure in (21). A singular noun denotes a set of atoms, where atoms are the individuals at the bottom of the structure, a, b, and

c; the other entities are pluralities, which are derived from the atoms via the sum operation ⊔. A plural noun denotes the closure of a set of atoms under sum. From singular noun interpretation {a, b, c} we get plural noun interpretation: {a, b, c, a⊔b, b⊔c, a⊔c, a⊔b⊔c}.

(21)   a⊔b⊔c

a⊔b   a⊔c   b⊔c

a   b   c
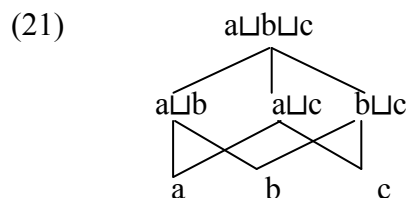
Crucially, Chierchia (1998a) argues that count nouns distinguish lexically between the set of atoms and the set of plural elements in the Boolean algebra, while mass nouns do not. He suggests that mass nouns are grammatically singular but lexically plural: 'mass nouns come out of the lexicon with plurality already built in, and… that is the only way they differ from count nouns' (Chierchia 1998a: 53). So for Chierchia, a grammatically singular count noun denotes a set of atomic individuals, the plural of a count noun denotes the closure of that set of atoms under the sum operation, minus the set of atoms, while the grammatically singular mass noun denotes just the closure under sum.

If there are three dogs in our world, including Fido, Barky and Spotty, the singular noun *dog* will be true of them, i.e. *dog* denotes the set {Fido, Barky, Spotty}. The plural noun dogs will be true of Fido and Barky, Barky and Spotty, and any other plural combination of these three individual dogs, i.e. *dogs* denotes the set: {Fido⊔Barky, Barky⊔Spotty, Fodo⊔Spotty, Fido⊔Barky⊔Spotty}. However, a mass noun like *furniture* will not differentiate between singular pieces of furniture and plural pieces of furniture. The denotation of *furniture* is lexically plural and it includes all the possible instantiations of furniture, both singularities and pluralities.

Chierchia (1998a, b) maintains that mass nouns differ from count nouns in that the former do not have access to the basic atoms at the bottom of the Boolean structure, while latter do. According to Chierchia, the atoms in the denotation of the mass noun are vague or underdetermined for mass nouns, but the atoms in the count noun denotation are specified or determined.

Extending this work to genericity, Chierchia (1998b) further argues that mass nouns denote kinds. Kinds are defined via the maximal entity in the denotation of mass nouns in each world. Chierchia (1998b:349) assumes that we can model kinds as individual concepts of a certain sort: functions from worlds (or situations) into the maximal entity in P, i.e. the sum

of all instances of the kind in each world. Kind terms are thus expressions denoting individual entities of type k.

(22) For any property P associated with the kind and the world of evaluation w

$\quad$ $^\cap$P=λw.$\sqcup_D$(P$_w$)

Since we will look only at extensional contexts, we can assume that the denotation of a kind term is: $^\cap$P, i.e. $\sqcup_D$P.

$\quad$ In Chapter 2, we showed that there is no evidence to show that there is a mass/count distinction in Chinese, and that all nouns behave morpho-syntacially like mass nouns. Earlier in this Chapter, we argued that Chinese bare nouns directly denote kinds in various contexts. We now propose that Chinese bare nouns are interpreted in the same way as English mass nouns: both denote kinds. Following Chierchia's semantics for English mass nouns, we propose the following semantics for the bare noun *jing* 'whale':

(23) a. jing $\quad$ kuai $\quad$ juezhong $\quad$ le.

$\quad$ Whale $\quad$ soon $\quad$ vanish-kind $\quad$ Part

$\quad$ 'Whales will soon be extinct.'

$\quad$ b. ||*jing*||= $^\cap$whale

$\quad\quad\quad$ =$\sqcup_D$(whale) $\quad\quad\quad\quad\quad\quad\quad\quad$ [Kind]

$\quad$ c. ||*juezhong*||=$\lambda$$k$.be extinct($k$) $\quad\quad\quad\quad$ [Predicate of kinds]

$\quad$ d. ||*juezhong*||(||*jing*||)=$\lambda$$k$.be extinct($k$)($^\cap$whale)

$\quad\quad\quad\quad$ =be extinct ($^\cap$whale)

The bare noun *jing* 'whale' denotes the kind Whale, which can (ignoring intensionality) be modeled as sum of all the individual whales. This kind term can be directly taken as argument of a kind-level predicate like *juezhong* 'be extinct', in (23.c), giving the predication in (23.d).

3. Bare predication

Besides kind interpretations, Chinese bare nouns allow object-level interpretations, both indefinite and definite. In this section, we will focus on predicative uses of Chinese bare nouns, e.g. their uses in post-copula positions.

The first goal of this section is to study the interpretational variability of bare nouns in predicative positions. We will make a distinction among three types of interpretations of the bare noun *jing* 'whale' in a post-copula position:

-the bare noun can denote a set of individuals (24.a)

-the bare noun can denote a set of subkinds (24.b)

-the bare noun can denote a kind (24.c).

(24) a. Moby Dick   shi   jing.   [Individual-denoting]

      Moby Dick   be   whale

   'Moby Dick is a whale.'

  b. Lanjing   shi   jing.   [Subkind-denoting]

      blue whale   be   whale

    'Blue whales are whales.'

  c. jing   shi   jing.   [Kind denoting]

      whale   be   whale

    'Whales are whales.'

The second goal of this section is to specify the semantics of predicative bare nouns on the kind reading and the set reading and specify the derivational relation between them. Since we have argued that the kind interpretation is basic, we will derive the set interpretations from it. In Section 3.1, we discuss some basic properties of copula clauses. In Sections 3.2-3.4 we discuss the three types of Chinese copula sentences.

3.1 Some analyses of copula clauses
3.1.1 Ambiguous BEs

While analyzing pseudoclefts like (25), Higgins (1973) argues that there are at least two copulas in English: predicational BE and specificational BE.

(25) What John is is unusual.

On one reading, (25) is a "predicational" pseudocleft: it predicates the property of *being unusual* to the referent of *what John is*. If what John is is a scuba diver, then being a scuba driver is unusual. On the other reading, (25) is a "specificational" pseudocleft. It identifies the property of *being unusual* as the referent of *what John is*. Higgins points to the "list-like"

quality of specificational sentences and offers the following paraphrase: John is the following: *being unusual*.

       Higgins (1973:264) extends the study of pseudoclefts to copula clauses in general and identifies two more types of copulas. All together he identifies four types of copula sentences, as shown in table 3-1:

Sentence types	Subject	Predicate
Predicational	Referential	Predicational
Superscriptional	Superscriptional	Specificational
Identificational	Referential	Identificational
Identity	Referential	Referential

Table 3-1 Classification of copula sentences

According to Table 3-1, the copula BE is at least four-way ambiguous:

Predicational sentences: the subject is usually referential, and the predicate is predicational. In other words, a particular object is picked out by the referential NP and this object is ascribed the property expressed by the predicate (Higgins 1973:212).

       For example, in (26.a), the entity I am pointing at has the property of "cathood". On this reading, one can conjoin the predicate with another predicational predicate, e.g. "What I am pointing at is a cat and is called Jemima."

(26) a. What I am pointing at is a cat.

    b. That is heavy.

    c. He is a student.

Superscriptional sentences: neither the subject nor the predicate is referential. The subject merely delimits a domain and the predicate identifies a particular member of that domain (Higgins 1973:213). Look at (27).

(27) a. What I am pointing at is a cat.

    b. What John is is unusual.

For example, on the superscriptional reading of (27.a), *a cat* is one of the items that I am pointing at. (27.a) has the interpretation that 'what I am pointing at is the following: a cat'. In this case, it is impossible to coordinate the predicate 'is a cat', with other predicates, such as

"is called Jemima". But we can add other items to the list, e.g. 'what I am pointing at is a cat and a dog.'

Identificational sentences: the subject is usually *that* on its "common gender" use (in contrast to its "inanimate uses"). And *that* can usually be replaced with 'that N'. The predicate is usually realized as proper name. This construction is typically used for teaching the names of people or of things. See (28).

(28) a. That (man) is Joe Smith.

    b. That (building) is the house that I mentioned.

    c. That (metal) is alumina.

Identity sentences: Identity sentences are close to identificational sentences. But the subject and the predicate of identity sentences are both referential and both make 'genuine references'. The copula BE expresses a relation of equation between the two referents.

      In (29.a), the individual that the name 'Cicero' refers to is identified as the same as what the name 'Tully' refers to.

(29) a. Cicero is Tully.

    b. Hesperus is Phosphorus.

In the following section, we will focus on predicational and identity uses of the copula.

3.1.2 Unambiguous BE

In contrast to Higgins, Partee (1986) argues for an analysis of *be* on which it is not ambiguous. Partee suggests that the copula *be* is not ambiguous, and that it is always predicational, meaning that its complement is required to be a predicate. Other analyses along these lines are those by Williams (1983), Rothstein (2001), and some others. The question for these analyses is how to treat identificational sentences like (28) and identity sentences like (29)?

      Partee's unambiguous analysis of *be* is built upon her theory of "type-shifting principles". Partee (1986) argues that NPs have interpretations at a family of semantic types rather than at a single type, and that natural type-shifting operations map between these types. (Note that she does not distinguish between DP and NP, and uses NP to cover all nominal projections.) She proposes that NPs have three basic semantics types: d (referential), <d,t>

(predicative) and <<d, t>,t> (quantificational). Those basic types are lexically assigned to different NPs, but following the general type-shifting principles, NPs may be shifted from the basic types to others.

Figure 1 gives a schematic representation of a number of type-shifting principles and their interrelation. In the figure, the circles represent the three model-theoretical domain D_d, $D_{<d,t>}$ and $D_{<<d,t>t>}$ and the arrows represent mapping relations between these domains.
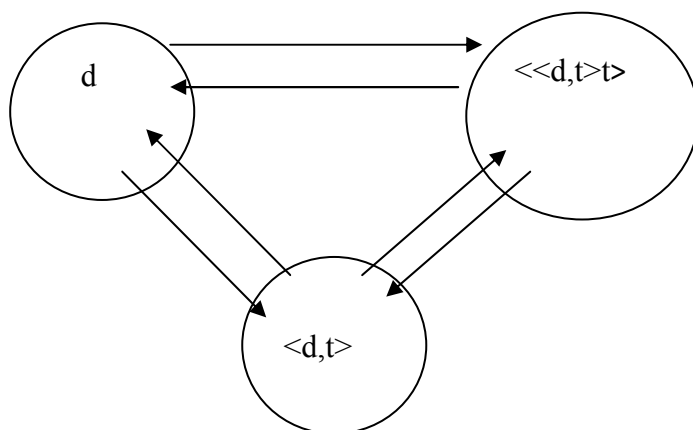
Figure 1

We refer readers to Partee (1986/2004:193) for details about how these type-shifting principles work exactly. Here, I give an illustration of the central type shifting principle used in Partee's analysis of unambiguous *be*: the principle shifting entities of type d to entities of type <d,t>. The basic type for proper names is type d. In order to occur in predicative position, like post-copula position, proper names must be type-shifted from d to <d,t>. Thus, the copula itself doesn't do anything semantically, it can be treated as the identity function on predicates: λP.P of type <<d,t>,<d,t>>. The requirement that its complement is of type <d,t> triggers the type -shifting operation which lifts the DP from type d to <d,t>.

Partee proposes the type shifting operation IDENT: IDENT(a)=λx.x=a. Namely, IDENT maps each entity a of type d onto the set of entities identical to a, that is, the singleton set {a} (or the property of being a). Look at the derivation in (30):

(30) a. Cicero is Tully.

    b. $\|Tully\|$= tully, $\|Cicero\|$= cicero, $\|be\|$= $\lambda P.P$

    c. $IDENT(tully)=\lambda x.(x=tully)$

    d. $\|be\ Tully\|=\|be\|(\ IDENT(\|Tully\|)\ )$

$$= \lambda P.P(\ \lambda x.(x=tully)\ )$$

$$=\lambda x.(x=tully)$$

    e. $\|Cicero\ is\ Tully\|=\|be\ Tully\|(\|Cicero\|)$

$$=\lambda x.(x=tully)\ (Cicero)$$

$$=(cicero=tully)$$

(30) illustrates how identity sentences can be treated as predicational constructions, where definite NPs are assigned predicative readings through type lifting.

According to Partee (1986), specificational *be* can be treated in the same way as the "identity *be*". She assumes that specificational sentences are some kind of 'identity sentence' in the sense that specificational sentences like (27.b) "perhaps assert identity of properties: the property that is *what John is* is the property of *being unusual*"(Partee 1986/2004: 198).

In short, on Partee's account, there is a single *be*, predicational *be*, which takes two arguments, one of type d and one type <d,t>. The examples of identificational *be* in (28) and identity *be* in (29) both involve the *be* of predication, but one of the argument is shifted from its basic entity-denoting interpretation to an "identity predicate" of the form $\lambda x.(x=a)$ (cf. Partee 1998:370).

In sections 3.2 to 3.4, we will discuss three types of copula sentences in terms of the denotation of the post-copula nominal: sets of individuals, sets of subkind entities, and kinds.

3.2 Post-copula bare nouns as predicates of individuals

In the first type of copula clauses, the subject must denote an individual of type e, which can be a proper name, a pronoun or a demonstrative, and the post-copula bare noun is predicative and denotes a set of individuals, as in (31).

(31) a. Xiaowang   shi   zhongguo-ren.

   Xiaowang   be   Chinese-man

   'Xiaowang is a Chinese.'

   b. tamen   shi   xuesheng

   they   be   student

   'They are students.'

   c. zhe-xie   shi   xiangjiao.

   those   be   banana

   'Those are bananas.'

In (31.a), the bare noun *zhongguo-ren* 'Chinese-man' does not denote the kind 'Chinese' but the property of being an individual Chinese person. (31.a) means that the individual Xiaowang has the property of being a Chinese, i.e. an instantiation of the kind Chinese. The bare nouns in (31.b) and (31.c) can be interpreted in a similar way.

We can unproblematically coordinate predicates denoting properties of individuals, such as *hen nianqing* 'very young' or *hen reqing* 'very enthusiastic', with these bare noun predicates:

(32) a. Xiaowang   shi   zhongguo-ren   erqie   hen   nianqing. .

   Xiaowang   be   Chinese   and   very   young

   'Xiaowang is a Chinese and very young.'

   b. tamen   shi   xuesheng   erqie   hen   reqing.

   They   be   student   and   very   enthusiastic

   'They are students and very enthusiastic.'

Chinese bare nouns can be taken as complement by a classifier, and the classifier phrase of Num+Cl+N can be used as predicate in the copula clause. However, in this case, the bare noun can only be the complement of an individual classifier and not of a kind classifier, as shown by the contrast between (33.a) and (33.b).

(33) a. Xiaowang   shi   yi   ge   zhongguo-ren.

      Xiaowang   be   one   Cl   Chinese

      'Xiaowang is a Chinese.'

   b.* Xiaowang   shi   yi   zhong   zhongguo-ren.

      Xiaowang   be   one Cl_{-kind} Chinese

As (33.a) and (33.b) show, bare nouns in predicative positions in (31) denote sets of individuals, not kind terms or sets of subkind entities.

However, the fact that (31.a) and (33.a) are synonomous, does not mean that the bare noun has a classifier predicate as part of its structure. We argued in Section 2 that bare nouns with an indefinite interpretation should be distinguished from true indefinite phrases such as NumPs, because they exhibit different scope behavior with respect to intensional operators and quantifiers.

We now show another difference between bare nouns with an indefinite interpretation and true NumPs, a difference which shows up in predicative position. According to Aoun & Li (2003), two bare nouns can be conjoined to become a complex bare predicate expressing a complex property of individuals, whereas two NumPs cannot be coordinated to form a complex predicate. The examples in (34) are from Aoun & Li (2003).

(34) a. Laowang   shi   fu-xiaozhang   jian   mishu.

      Laowang   be   vice-President   and   secretary

      'Laowang is vice President and secretary.'

   b.*Laowang   shi   yi   ge   fu-xiaozhang   jian   mishu.

      Laowang   be   one   Cl   vice-President   and   secretary

      Intended: 'Laowang is a vice president and secretary.'

   c.*Laowang   shi   yi   ge   fu-xiaozhang   jian   yi   ge   mishu.

      Laowang   be   one   Cl   vice-President   and   one   Cl   secretary

      Intended: 'Laowang is a vice President and a secretary.'

In (34.a), the subject *Laowang* has the property of both being a vice President and being a secretary. In other words, a single individual instantiates two different properties or two different roles at the same time. However, such dual properties or dual-roles cannot be expressed by coordinating two NumPs (34.b) or coordinating a NumP with a bare noun (34.c).

Aoun & Li (2003:143) propose that the connective *jian* 'and' can only coordinate "property-denoting nominals".

We show now that the copula *shi* 'be' in Mandarin is of type <<d,t>, <d,t>>, which requires a predicative interpretation of bare nouns, e.g. an interpretation at type <d, t>.

When taking a broad look at Chinese copular constructions, one observes that Chinese copula *shi* 'be' can not only take nouns as complements, as in (35), but also adjectives, as in (36.a). In these cases, we cannot omit the copula.

(35) a. Moby Dick   *(shi)   jing.
      Moby Dick   be   whale
    b. Moby Dick   *(shi)   yi   tiao   jing.
      Moby Dick   be   one   Cl   whale
  Both: 'Moby Dick is a whale.'

(36) a. tian   *(shi)   lan-de.
       sky   be   blue
     'The sky is blue.'

In contrast with (36.a), adjectives can appear in predicative positions without the copula if they are modified by degree modifier, such as *hen* 'very', as in (36.b).

    b. tian   hen   lan.
       sky   very   blue
       'The sky is blue.'

The difference between (36.a) and (36.b) with respect to the presence of the copula does not concern us here. The fact in (36a), in connection with the other facts, suggests that the interpretation of the copula *shi* 'be' is like that of *be* in English: the identity functiuon λP.P of type <<d,t>,<d,t>>. Given that the copula *shi* is of type <<d,t>, <d,t>> and that Chinese bare nouns denote kind terms, we suggest that the bare noun, when it occurs in post-copula position must be type-shifted from its basic kind reading at type ***k*** to the predicative reading, at type <d, t>, to fit into the predicative position in copula clauses.

According to Chierchia (1998a, b), the kind denotation of nouns has a corresponding predicative counterpart. Chierchia's (1998a, b) argues that this predicate is recoverable from

the kind via a version of the Carlsonian instantiation relation. He proposes that the predicate formation operation $^{\cup}$ maps each kind onto a denotation of type $\langle d,t \rangle$: the set of instantiations of the kind. Chierchia (1998b) defines the $^{\cup}$ operator as follows:

(37) $^{\cup}$ is the function from kinds to sets of individuals, such that for every kind

$$^{\cup}(^{\cap}P_w) = \{x: x \sqsubseteq_D P_w\}$$
$$= P_w$$

Let $\textbf{\textit{k}}$ be a kind. Then $^{\cup}\textbf{\textit{k}} = \lambda x.x \sqsubseteq \textbf{\textit{k}}$. This means that $^{\cup}\textbf{\textit{k}}$ is the set of parts of $\textbf{\textit{k}}$. Since the kind $^{\cap}P$ is identified with the maximal entity in P_w: $^{\cup\cap}P_w$ is the set of parts of $\sqcup_D Pw$, $\lambda x.x \sqsubseteq_D \sqcup_D Pw$, which is just P_w. Hence, $^{\cup\cap}P_w = P_w$.

Kinds and predicates can be seen as two modes of packaging the same information. The working of $^{\cup}$ and $^{\cap}$ is visualized in the picture below. We assume that the property is interpreted in the actual world w.

(38)   Properties   Kinds
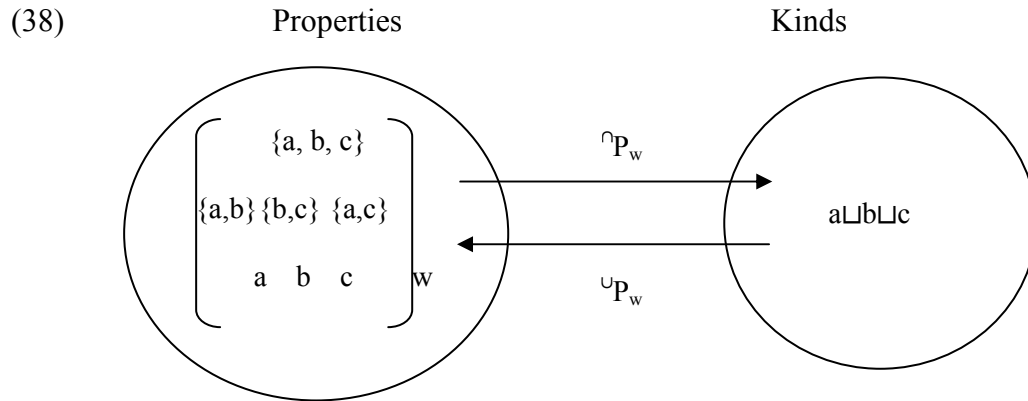
Following Chierchia (1998b), we propose that the type shifting operation $^{\lceil}$ is used to shift kind denoting bare nouns in post-copula positions from the kind denotation to the predicative interpretation, as the set of instantiations of the kind.

(39) a. Moby Dick   shi   jing:

   Moby Dick   be   whale

   'Moby Dick is a whale.'

   b. ∥*jing*∥= ∩whale   [kind interpretation]

     ∥*Moby-Dick*∥= moby-dick

   c. SHIFT(∥*jing*∥)= ∪∩whale   [Shifted predicative reading]

                  =λx. x ⊑ ⊔(WHALE$_{<d,t>}$)

                  =WHALE$_{<d,t>}$

   d. ∥*shi*∥(SHIFT(∥*jing*∥)) = λP.P(WHALE)

                     =WHALE

   e. ∥*shi*∥(SHIFT(∥*jing*∥)) (∥*Moby-Dick*∥)=WHALE(moby-dick)

3.3 Post-copula bare nouns as predicates of subkinds

We now discuss the second type of copula clauses, in which the post-copula bare noun denotes a set of subkinds and its subject denotes a kind.

The characteristic feature of this type of copula clause is that the subject and the predicate stand in a taxonomic relation, as exemplified in (40).

(40) a. haitun   shi   jing.

   dolphin   be   whale

   'Dolphins are whales.'

   b. jing   shi   dongwu.

   whale   be   animal

   'Whales are animals.'

In a biological taxonomy, the kind Dolphin is a subkind of the kind Whale. The kind whale includes different subkinds of whales, like Blue Whales, Dolphins, Sperm Whales, Porpoises etc. So the kind Dolphin instantiates a subkind of Whales (also see Krifka et al 1995). We propose that (40.a) expresses this kind of instantiation relation, where the predicative noun *jing* denotes a set of subkinds of whales and the dolphin kind expressed by the subject *haitun* is a member of that set. In other words, the whale kind is instantiated by the *haitun* , which represents itself as a subkind of whale.

The subkind instantiation interpretation of (40) is further supported by the contrast in (41), where the bare noun can only be preceded by a kind classifier *zhong* 'kind' but not an individual classifier, *tiao* 'tail'.

(41) a. haitun   shi   yi   zhong   jing.

       dolphin   be   one Cl_{-kind} whale

       'Dolphins are whales.'

    b.* haitun   shi   yi   tiao   jing.

       dolphin   be   one   Cl   whale

Again, we do not assume that the bare noun *jing* 'whale' in (40.a) includes a null classifier phrase as part of its structure, we are just concerned with evidence for the subkind instantiation relation, and use the synonymy between (40.a) and (41.a) and the ungrammaticality of (41.b) as evidence for that.

This type of copula clauses is in many respects like the first type, discussed above. Both types can be characterized as "predicational sentences" according to Higgins's (1973) classification. In other words, in both types, bare nouns express properties of the entity referred to by the subject. What is different is that in the first type, the subject denotes an individual and the post-copula bare noun denotes a set of individuals of type <d, t>, while in the second type the subject denotes a subkind in a taxonomic classification, and the post-copula bare nouns denote sets of subkinds of a kind of type <**k**, t>.

Above we gave Chierchia's predicate formation operation $^{\cup}$ which maps a kind $^{\cap}P_w$ of type **k**, onto the set of individual instantiations of the kind of type <d, t>, i.e. $^{\cup\cap}P_w$, which is P_w. We propose that the subkind predicate interpretations are derived through a similar operation $^{\sqcup}$ mapping a kind $^{\cap}P_w$ of type **k**, onto the set of subkinds of type < **k**, t>, i.e. $^{\sqcup\cap}P_w$. To put explicitly, we propose that the set of subkinds denoted by a bare noun is derived via the $^{\sqcup}$ operator from non-overlapping subsets of P_w. (This means that we are here only dealing with relating a kind to a single level of non-overlapping subkinds.)

Let $\pi(P_w)$ be a partition of the set of atoms in P_w. In the case of natural kinds like *whales*, we assume that π is derived from real world knowledge about biology. We let $SK_\pi(^{\cap}P_w)=\{\sqcup_D X : X \in \pi(P_w)\}$, the set of sums of the blocks of the partition π. These sums are (extensionally) the subkinds of $^{\cap}P_w$, as illustrated in (42).

(42) $^{\sqcup\cap}P_w = SK_\pi(^\cap P_w)$

Thus, $^\sqcup$ applies to a kind $^\cap P$ and gives you the set of subkinds of $^\cap P$ according to partition π. Note that by the partition, any two subkinds $\textbf{k}$ and $\textbf{k'}$ in the set $^{\sqcup\cap}P$ are non-overlapping. We can introduce the subkind relation itself, as given in (43):

(43) $\textbf{k}_1 \sqsubseteq_\pi \textbf{k}_2$ iff $\textbf{k}_1 \in SK_\pi(\textbf{k}_2)$

(44) illustrates the derivation of the subkind predicative interpretation.

(44) a. haitun   shi   jing.

     dolphin   be   whale

     'Dolphins are whales.'

   b. $\|jing\| = ^\cap$whale   [kind interpretation]

     $\|haitun\| = ^\cap$dolphin

   c. $SHIFT(\|jing\|) = ^{\sqcup\cap}$whale   [subkind shifted predicative reading]

              $= SK_\pi(^\cap$whale$)$

              $= \lambda\textbf{k}.\textbf{k} \sqsubseteq_\pi {}^\cap$whale

   d. $\|shi\|(SHIFT(\|jing\|)) = \lambda P.P(\lambda\textbf{k}.\textbf{k} \sqsubseteq_\pi {}^\cap$whale$)$

                 $= \lambda\textbf{k}.\textbf{k} \sqsubseteq_\pi {}^\cap$whale

   e. $\|shi\|(SHIFT(\|jing\|))(\|haitun\|) = \lambda\textbf{k}.\textbf{k} \sqsubseteq_\pi {}^\cap$whale $(^\cap$dolphin$)$

                     $= ^\cap$dolphin $\sqsubseteq_\pi {}^\cap$whale

3.4 Post-copula bare nouns as predicates of kinds

We now proceed to the third type of copula clauses, where both the subject and the post-copula bare noun are interpreted as kind terms, as shown in (45).

(45) a. xihongshi   jiu   shi   fanqie,

     love apple   Foc   be   tomato

     'Love apples are tomatoes.'

   b. fanqie   jiu   shi   xihongshi..

     tomato   Foc   be   love apples.

     'Tomates are love apples.'

This type of copula sentence is unlike the types of the copula clauses that were discussed above. The post-copula bare noun neither denotes a set of individuals, nor a set of subkinds of entities. To see the difference, note that in this case we can neither insert an individual classifier nor a kind classifier before the post-copula bare noun:

(46) a.* xihongshi   shi   yi   zhong   fanqie,

      love apple   be   one   Cl$_{kind}$ tomato

    b.* xihongshi   shi   yi   ge   fanqie.

      Love apple   be   one   Cl   tomato

We claim that copula clauses like in (45) are identity sentences, in which the copula *shi* 'be' takes two kind terms as arguments, i.e. $\textbf{\textit{k}}_1 = \textbf{\textit{k}}_2$. As Wiggins (1965) says, "for a sentence to express an identity, 'is' or '=' must stand between two noun-phrases which, if they are distinct, are serving independently of one another to make genuine references" (see Higgins 1973/1979:262). By this criterion, 'the evening star is the morning star' and 'Hesperus is Phosphorus' do express genuine identities. Along this line, we suggest that kind terms, being names of kind entities, are also able to make genuine references and to establish an equational relation.

The question is how the kind term at type $\textbf{\textit{k}}$ can fit into a predicative position, i.e. the post-copula position. As we saw above, Partee (1987) discusses proper names in copula sentences and proposes lifting with the type shifting rule: IDENT: d→<d,t>, where IDENT[α]=λx.(x=α).

In our case we are dealing with bare nouns of type $\textbf{\textit{k}}$. The only assumption we need to make is the plausible assumption that IDENT can lift expressions from type $\textbf{\textit{k}}$ to type <$\textbf{\textit{k}}$, t>. Namely, IDENT: $\textbf{\textit{k}} \rightarrow$ <$\textbf{\textit{k}}$,t>, where IDENT[α] = λx$_{\textbf{\textit{k}}}$.(x$_{\textbf{\textit{k}}}$=α).

In this case we assume that the copula is λP.P of type << $\textbf{\textit{k}}$, t>,< $\textbf{\textit{k}}$, t>>.

(47) a. xihongshi   jiu   shi   fanqie.

      love apple   Foc   be   tomato.

      'Love apples are tomatoes.'

    b. $\| fanqie \| = {}^{\cap}$tomato, $\| xihongsi \| = {}^{\cap}$love-apple, $\| shi \| = \lambda P.P$

    c. $\text{IDENT}({}^{\cap}\text{tomato}) = \lambda x_{\boldsymbol{k}}.(x_{\boldsymbol{k}} = {}^{\cap}\text{tomato})$

    d. $\| shi\, fanqui \| = \| shi \| (\text{IDENT}(\| fangui \|))$

$$= \lambda P.P(\lambda x_{\boldsymbol{k}}.(x_{\boldsymbol{k}} = {}^{\cap}\text{tomato}))$$

$$= \lambda x_{\boldsymbol{k}}.(x_{\boldsymbol{k}} = {}^{\cap}\text{tomato})$$

    e. $\| shi\, fanqui \| (\| \text{xihongshi}) = \lambda x_{\boldsymbol{k}}.(x_{\boldsymbol{k}} = {}^{\cap}\text{tomato}) ({}^{\cap}\text{love-apple})$

$$= ({}^{\cap}\text{love-apple} = {}^{\cap}\text{tomato})$$

(47) expresses that the kind *love apple* is identical to the kind *tomato*. It is an identity sentence, where the copula *shi* 'be' connects two kind terms. The two bare nouns are interchangeable with each other: the kind *love apple* is identified with the kind *tomato* in (45.a) and the kind *tomato* with the kind *love apple* in (45.b). This type of copula clauses is usually used to introduce new things or new names of entities to people who do not know them. For example, people may know what *fanqie* is but they do not know *xihongshi*, so by saying (45.a), the two are identified.

      To summarize so far, in this section, we have examined the interpretational variability of Chinese bare nouns in post-copula positions. They have at least three different interpretations: sets of individuals, sets of subkinds or kinds. We argued that the kind reading is the basic reading of Chinese bare nouns, and that in all three cases, predicative interpretations are derived from the kind interpretation by natural type-shifting operations. We formulated these three operations. The copula *shi* is just interpreted as the identity function. Its only semantic function is to trigger the appropriate type shifting operation.

4. Definite bare nouns

In Sections 2 and 3, we discussed the kind reading and the predicative use of bare nouns. We now move on to the third reading of bare nouns discussed above, the definite reading. We will not offer a semantic analysis of definite readings of bare nouns because this would take us too far beyond the research questions we are dealing with in this dissertation, namely, the semantics of classifiers. But to complete our survey of bare noun readings, we will try and show that definite readings of bare nouns are contextually determined. They occur in topic

positions and in canonical object position, where, for example, they can have an anaphora use or an immediate situation use. We will suggest that definite readings of Chinese bare nouns are derived by intersecting a predicate derived from the kind term with a contextually determined predicate C, which expresses familiarity.

4.1 Topic-hood and definiteness

The definite reading of Chinese bare nouns has been discussed extensively by Chinese linguists in the past decades, including Chao 1968, Li & Thompson 1976, 1981, Paris 1981, D.X. Zhu 1982, Huang 1982, L. D. Li 1985, D.X. Shi 1992, Tsai 1994, Yuan 1996, Xu & Liu 1997, Cheng & Sybesma 1999, R. Yang 2001, Y.Z. Shi 2002 and many others. It is beyond the scope of the dissertation to review all the relevant literature. In what follows, we will synthesize some of the findings made by those linguists to give us some idea under what condition or in what contexts the definite reading of bare nouns is available.

Assuming that the grammatical meaning of subject and predicate in a Chinese sentence is topic and comment, Chao (1968:76) claims that "there is a very strong tendency for the subject to have a definite reference and the object to have an indefinite reference". "Since the subject sets the topic of the talk and the predicate gives the information by adding something new, the subject is likely to represent the known while the predicate introduces something unknown…" (ibid). The following pattern in (48) is noted by Chao (1968: 76).

(48) a. wo   yao   qing   ke.
      I   want   invite   guest
      'I want to invite guests.'

   a'. ke   lai   le.
      guest   come   Part
      'The guest has come. / The guests have come.'

   b. nar   you   shu?
      where there-be   book
      'Where are there books? / where is there a book?'

   b'. shu   zai   nar?
      book   at   where
      'Where are the books?/ where is the book?'

As we can see from (48.a) and (48.b), when the bare noun is a postverbal position, it has an indefinite reading, but when the bare noun is in a preverbal position, it has a definite reading, as in (48.a') and (48.b').

Li & Thompson (1981:86) argue that "nouns that are unmarked for definiteness are always interpreted as definite or generic when they are topics..."

In (49), the bare noun *gou* 'dog' is the syntactic object of the verb *kan* 'see', and it is also the topic of the whole sentence. It can either have a definite reading (49.a) or a kind reading (49.b), but not an indefinite reading (49.c).

(49) gou   wo   kan   guo   le.

     dog   I   see   Exp   Part

     a. The dog I have already seen.

     b. Dogs (generic) I have already seen.

     c. Impossible: A dog I have already seen.

Note that Chao's notions of topic and subject are different from Li & Thompson's. For Chao (1968), most Chinese sentences consist of a subject (the first NP) and a predicate, but the *meaning* or the *function* of the 'subject' and the 'predicate' is 'topic' and 'comment' respectively. According to Li & Thompson, subject and topic are two distinctive syntactic elements in a sentence, though subjects are in many cases topics (see Li & Thompson 1981:94).

We adopt Li & Thomson's uses of the notions topic and subject, and we consider them to be two different syntactic positions in a sentence (cf. (49). Accordingly, in Chao's examples, the topic position happens to be the subject position of the sentence. So the first nominal phrase in (48.a') and (48.b') are not only subjects but also topics, where the bare noun has a definite reading. Therefore, the definite reading of the subject can be attributed to its topic use. In Li & Thompson's examples in (49), the first NP is the sentential topic but it is the object, and not the subject of the sentence, and it also has a definite reading.

The definite reading of bare nouns is not restricted to default sentential topic position. It is also available in secondary topic positions, as in (50) and in *ba*-constructions as in (51), examples from Y.Z. Shi (2002:27).

(50) a. shu   yijing   kanwan   le.

     I   book   already   read-finish   Part

     'I have finished reading the book.'

b. ta   yifu   yijin   maidao   le.

     she   clothes   already   buy   Part

     'She has already bought the clothes.'

c. women   fan   yijin   zhunbei   hao   le.

     we   meal   already   prepare   well   Part

     'We have prepared the meal.'

The first nominal phrase in the examples in (50), *wo* 'I', *ta* 'she' and *women* 'we' are the subjects of the sentences. If we assume that the sentential initial element is the topic, then the subjects in (50) are also the default topics of the sentences. The nominal phrase immediately following the subject, *shu* 'book', *yifu* 'clothes' and *fan* 'meal', are objects of the sentence, but they move from their base-generated postverbal object positions to preverbal positions. This movement is a form of topicalization of the object. Semantically, these objects are presupposed by the interlocutors to be known and they have a definite interpretation. For example, the bare nouns *shu*, *yifu* and *fan* in (50) mean 'the book', 'the clothes' and 'the meal' respectively. These expressions are called 'secondary topics', which stand in a certain relation with the 'primary topic', like a possessive relation.

     The examples in (51) illustrate the *ba*-construction in Mandarin Chinese, where bare nouns following *ba* have a definite reading.

(51) a. ta   yijin   ba   zuoye   zuowan   le.

     she   already   OM   homework   finish   Part

     'She has finished her homework.'

b. ta   you   ba   yifu   maidiao   le.

     she   again   OM   clothes   sell   Part

     'She sold her clothes again.'

c. women   yijin   ba   fan   zuohao   le.

     we   already   OM   meal   make   Part

     'We have made the meal.'

The *ba*-construction is a construction found in Mandarin Chinese (similar constructions are found in other Chinese languages). Chinese is a SVO language, in which objects usually follow the verb. Sometimes, if the sentence expresses a causative meaning and the object is definite, the object can be preposed to a preverbal position and marked by the object maker *ba*, which originally means 'take' or 'hold'. For example, the objects after *ba* in (51), *zuoye*, *yifu* and *fan* mean *the homework*, *the clothes* and *the meal* respectively. The *ba*- construction is similar to the construction shown in (50), in which the preposed object functions like a secondary topic (Li & Thompson 1981).

We thus can make the following generalization: when a bare noun in Chinese functions as a primary topic (sentential initial position) or secondary topic (including BA constructions), it always has a definite reading.

4.2 Definite bare nouns in object positions

Even though definite bare nouns are frequently found in the (secondary) topic positions, it is also possible to find definite bare nouns in canonical object positions, where they are not topics or secondary topics.

For example, as we saw in (18) (repeated as in (52)), the bare noun *xin* is the object of the verb *kan* 'read' and can be interpreted either as "letters" or "the letter".

(52) mei-ge   ren   dou   zai   kan   guanyu   jiaxin   de   xin.

     every-Cl   man   all   Prog   read   about   add-wage   Mod letter

     'Everybody is reading letters about raising the salary.'   [∀> xin]

OR 'Everybody is reading the letter about raising the salary.'   [definite]

Some more examples of definite bare nouns are given in (53).

(53) a. wo   yijin   xie   le   xin   le.

     I   already   write   Perf   letter   Part

     'I wrote the letter already.'

   b. ta   he-wan   yao   le.

     he   drink-finish   medicine   Part

     'He finished drinking the (Chinese herb) medicine.'

According to Li & Thompson (1981:86), "nouns that are unmarked for definiteness are always interpreted as definite or generic when they are topics..." and definite bare nouns in object position in (52) and (53) are a marked case. In contrast, we assume that there are two types of definiteness involved here, or rather the definiteness of bare nouns comes from two different sources. We propose that the definiteness of bare nouns in topic positions is due to their topic status (a syntactic position for R. Yang 2001), where they refer to the entity to be talked about or commented on. As definite objects, the bare nouns usually refer to entities that are (perceptually) visible in an immediate situation or particularly salient or familiar in the discourse context. For example, the definite interpretation of (52) would be appropriate if the bare object *xin* 'letter' is used to refer to some particular letter, which is particularly salient in the local context, or which had been the topic of previous discourse. The English equivalent might be "Did you see/write that letter", using the demonstrative. Here *that letter* has an almost anaphoric use.

We think that it is important to distinguish these two types of definite bare nouns, i.e. definite bare nouns as topics vs. definite bare nouns in canonical object positions. In the case of topics, the definiteness follows because the topic is assumed to be part of the background knowledge of the discourse participants, and in the less frequent case of direct objects, the definiteness relies on the discourse or perceptual salience in the immediate situation. We thus propose that in both cases, the bare noun on the definite reading refers to a familiar and salient individual under discussion in the context.

4.3 Semantics of definite bare nouns

In this chapter, we have proposed that Mandarin bare nouns denote kinds. Their indefinite readings in object/predicative position are derived from a local Carlsonian-type shift reading, as shown by the scope facts in Section 2.3 and 2.4. We have just showed that Mandarin bare nouns also have a definite reading, when they denote a specific, salient and contextually familiar entity. This occurs mainly when a bare NP is in topic position, as we saw in Section 4.1 and occasionally when it occurs in direct object position in as we saw in Section 4.2. However, we have not discussed how these readings are derived, nor will we do so in any detail, because the whole issue of the definite interpretation of bare noun phrases, and in fact definiteness in Chinese, is too complex to discuss within the framework of this dissertation.

In Chapter 6, we will discuss definite uses of bare classifier phrases of Cl+N. We will argue, following Li and Bisang (2010), that definite interpretations of Cl+NP in Chinese

are not entities postulated to be unique, but are 'familiar entities' approximately in the sense of Roberts's (2003) theory of "weak familiarity". We will argue there that the "Cl+N" in Wu and Cantonese, on the definite reading, denotes a generalized quantifier with existential force, à la Landman (2004).

We assume that the definite interpretation of bare nouns is derived in more or less the same way. We assume here that on their definite interpretation, bare nouns shift from the kind denotation to an indefinite interpretation in the normal way, but that discourse constraints on NPs in topic positions or NPs used anaphorically/situationally force a familiarity constraint on the interpretation of the bare noun, which leads to the definite or familiar interpretation. Thus the predicate interpretation of the N is not merely a set of instantiations of the N-kind, but a set of contextually familiar and salient instantiations of the kind denoted by N.

This is supported by R. Yang's observation about definite and indefinite interpretations of bare nouns in subject position. She claims that bare nouns in subject position usually have a definite interpretation, because subject position is usually also topic position, and topics are required to be salient or familiar. However, if subject position is a position which cannot be topic, the indefinite reading 'peeks out', that is, it is available when the definite reading is not induced. She offers the following as examples.

Firstly, indefinite readings become immediately available for preverbal bare NPs, once they occur in the context of left peripheral *locatives*, as shown in (54):

(54)   waimian / yuanchu   gou   zai-jiao.
         outside   far-away   dog   Prog-bark
    a. 'Outside/Far away, dogs are barking.'
    b. 'Outside/Far away, the dog(s) is/are barking.'

Secondly, indefinite readings seem to 'peek out' in the context of left-peripheral temporal phrases or adverbs, in addition to a definite reading, as shown in (55):

(55) a. jintian   jingcha   zhua   ren   le.
          today   cop   arrest   man   Part
     i. 'Today cops arrested some people.'
     ii. 'Today the cop(s) arrested some people.'

b. haoxiang   jingcha zhua   ren   le.

   apparently   cop   arrest man   Part

   i. 'Apparently cops arrested some people.'

   ii. 'Apparently the cop(s) arrested some people.'

Thirdly, as shown in (56), if we put our earlier example sentence (54) in the context of a universal quantifier 'in everyone's backyard', the subject bare NP 'dog' unambiguously gets an indefinite reading:

(56) gou zai   meigeren-de   houyuan-li   jiao.

    dog   at   everyone-Mod backyard-inside   bark

  a. 'Dogs are barking in everyone's backyard.'

  b. # 'The dog is barking in everyone's backyard.'

In Yang's account of the distribution of definite and indefinite readings in subject position, the definite reading is induced by topic position and the indefinite reading is possible only when the definite reading is not induced. This is predicted by our tentative suggestion that definiteness is induced via a contextually introduced salience-and-familiarity constraint on the interpretation of the N: when context does not introduce this constraint, a pure indefinite interpretation is possible. Within the scope of this dissertation, we are not going to take the issue any further, and we leave further discussion of definite interpretations of bare nouns for further research.

5.   Three kinds of expressions referring to kinds: bare N, N-*lei* and kind ClPs

Bare nouns are not the only means to make reference to kinds in Chinese. There are two other frequently used ways: kind classifier phrases and bare nouns suffixed with the morpheme -*lei* 'kind', N-*lei* 'N-kind'. In this section, we will compare these three types of kind referring expressions. We will examine their distributional and interpretational differences in the context of generic sentences.

5.1 Bare nouns in generic sentences

We summarize some of the things we have seen about the kind interpretations of bare nouns.

We have argued that Chierchia (1998b) was right in assuming that Chinese bare nouns are born as arguments and make reference to kinds. We showed bare nouns with a kind

interpretation are most naturally used in generic sentences. Bare noun subjects in generic sentences allow kind-level predicates, as in (57a), and characterizing predicates as in (57b):

(57) a. **jing**   kuai   jue-zhong   le.

whale   soon   vanish-kind   Part

'Whales will be soon extinct.'

b. **jing**   hen   changjian.

whale   very   common

'Whales are very common.'

Kind-level predicates like *juzhong* 'being extinct' and characterizing predicates like *changjian* 'being common' can only be predicated of subjects denoting kinds, such as *jing* 'whales' in (57) and not of those denoting individuals, such as *Moby Dick* in (58).

(58) a.* **Moby Dick**   kuai   jue-zhong   le.

Moby Dick   soon   vanish-kind   Part

b.* **Moby Dick**   hen   changjian.

Moby Dick   very   common

In characterizing sentences, bare nouns, such as *jing* 'whale' in (59), don't not refer to some specific individual whales. In (59.a), the property *jiti chumo* 'appear and disappear together' is true if there are enough instantiations of the whale kind that appear and disappear in groups. (59.b) means that individual whales have the property of being ferocious.

(59) a. **jing**   jinchang   jiti   chu-mo.

whale   always   collectively   appear-disappear

'Whales always swim in a group.'

b. **jing**   hen   xiongcan.

whale   very   cruel

'Whales are very ferocious.'

Bare nouns can also be used in predicative position, like the post-copula position, to form various types of kind level predicates. (60) and (61) illustrate two types of kind-level predicates: identity sentences and taxonomic sentences respectively.

(60.a) is an identity sentence. The post-copula NP *fanqie* is interpreted as the kind Tomato. It must be type-shifted from type **k** to <**k**,t> to fit into the predicate position. (60.a) means that the kind love apple is the same kind as the kind tomato. The kind-denoting nature of bare noun is shown by the contrast between (60.b) and (60.c), where the bare nouns, *xihongshi and fanqi* 'love apples and tomato' can act as antecedent of the pronoun *tamen* 'they', of which a kind ClP can be predicated, but not an individual ClP.

(60) a. xihongshi   jiu   shi   **fanqie**.

     love apple   Foc   be   tomato

     'Love apples are tomatoes.'

   b. xihongshi   jiu   shi   **fanqie**, tamen shi   tong   yi   zhong   shuiguo.

     love apple   Foc   be   tomato   they   be   same   one   Cl$_{-kind}$ fruit

     'Love apples are tomatoes. They are the same kind of fruit.'

   c.# xihongshi   jiu   shi   **fanqie**, tamen shi   tong   yi   ge   shuiguo.

     love apple   Foc   be   tomato   they   be   same one   Cl$_{ind}$ fruit

The examples in (61) are taxonomic sentences. The post-copula NP *jing* 'whale' in (61.a) denotes a set of kinds of whales of type <**k**, t>. (61.a) means that the kind Blue Whale stands in a subkind relation to the kind Whale and this relation is overtly expressed by the kind classifier *zhong* 'kind' (61.b), but cannot be expressed by the individual classifier *tiao* (61.c).

(61) a. lanjing   shi   **jing**.

     blue-whale   be   whale

     'Blue whales are whales.'

   b. lan-jing   shi   yi   zhong   **jing**.

     blue whale   be   one   Cl$_{-kind}$ whale

     'Blue whales are a kind of whales.'

   c.* lan-jing   shi   yi   tiao   **jing**.

     blue whale   be   one   Cl$_{-tail}$ whale

5.2 Kind classifier phrases in generic sentences

The second type of kind expressions are kind classifier phrases. Like bare nouns, kind ClPs can act as arguments of kind-level predicates like *jue-zhong* 'be extinct' as in (62.a). Kind ClPs

can also take predicates expressing characterizing properties, properties of instantiations of kinds, jiti *zisha* 'commit suicide together', as in (62.b).

(62) a. you   **yi**   **zhong**   **jing**   kuai   jue-zhong   le.
         there-be   one   Cl_{-kind}   whale   soon   vanish-kind   Part
         'A kind of whales will soon be extinct.'
     b. you   **yi**   **zhong**   **jing**   jingchang   jiti   zisha.
         there-be   one   Cl_{-kind}   whale   always   collectively   suicide
         'A kind of whales always commits suicide together.'

It is important to point out that kind ClPs must be accompanied by existential *you* 'there be', when they are used as subjects. Compare (63.a) and (63.b).

(63) a.* **yi**   **zhong**   **jing**   kuai   jue-zhong   le.
          one   Cl_{-kind}   whale   soon   vanish-kind   Part
     b.* **yi**   **zhong**   **jing**   jingchang   jiti   zisha.
          one   Cl_{-kind}   whale   always   collectively   suicide

The ungrammaticality of the examples in (63) tells us that kind ClPs are no different from other classifier phrases in Chinese, e.g. (non-)individual ClPs. They all must satisfy the 'definiteness constraint' of subjects, which says that in Chinese, indefinite NPs are disallowed as subjects, unless they are introduced by existential *you* 'there be'.[12] *You* is argued to be an existential quantifier, which is able to provide existential closure of the indefinite NPs in subject position (see Huang 1987, Cheng 1991). We refer readers to Tsai (1994) for a recent syntactic account for why Chinese does not allow indefinite subjects.

      All classifier phrases in Mandarin, including kind ClPs and (non)individual ClPs, are property denoting indefinites which must be lexically governed. Given that the complement of Mandarin copula *shi* 'be' is a predicative position, kind ClPs are expected to be felicitous in post-copula positions. This prediction is born out by (64). The kind classifier *zhong* 'kind' in (64.a) expresses the subkind relation:

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[12] The examples discussed in A. Li (1998) are immune to this constraint. For example, *si ge ren chi bu wan yi guo fan*, 'four people cannot finish a bowl of rice'.

(64) a. lanjing   shi   **yi zhong jing**.

      blue whale   be   one   Cl$_{-kind}$ whale

      'Blue whales are a kind of whale.'

   b. lanjing   he   haitun   shi   **liang zhong jing**.

      whale   and   dolphin   be   two   Cl$_{-kind}$ whale

      'Whales and dolphins are two kinds of whales.'

Note that kind classifiers are not exclusively found in classifier languages. They are also available in other languages, such as *kind* in English, *-art* in German and *sorte* in French. Krifka et al (1995:74-77), call kind classifier phrases, of the form of 'Det+(kind)+N', **taxonomic** NPs which express a subkind relation. In English, the kind classifier does not have to show up overtly. The following examples are from Krifka et al (1995:74). [13]

(65) a. The dolphin is *a whale*.

   b. *One whale*, namely the blue whale, is nearly extinct.

   c. *This whale*, namely the blue whale, is nearly extinct.

   d. *Every whale*, from the pygmy whale to the blue whale, is protected by law.

The noun *whale* is used as a predicate applying to the sub-kind of the kind *Cetacean*, which includes the blue whale, the sperm whale and the dolphin. As taxonomic NPs, the nouns in (65) don't refer to individual whales, but to kinds of whales.

      In the same spirit, we propose that kind ClPs denote sets of well-established subkinds and that the denotation of the kind ClP must be associated with an appropriate taxonomic hierarchy. In Section 3.3, we have argued that bare nouns can have a predicative interpretation on which they denote sets of subkinds of a kind. Recall the examples in (44), where we argued that the subkind reading of bare nouns is derived by the $^{\sqcup}$shift operation which maps a kind $^{\cap}P_w$ onto $^{\sqcup \cap}P_w$, which is $SK_\pi(^{\cap}P_w)$ the set of sums of the blocks of the taxonomic partition π, the subkinds of $^{\cap}P_w$.

      We propose that the kind classifier *zhong* 'kind' is an overt lexical realization of the operation $^{\sqcup}$.

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(66) ||*zhong*|| ($^{\cap}P_w$) = $^{\sqcup\cap}P_w$

That is, the kind classifier *zhong* 'kind' applies to a kind term with interpretation $^{\cap}P$ and gives you an expression that denotes the set of subkinds of $^{\cap}P$.

      This analysis predicts that kind ClPs cannot denote properties of individuals. This prediction is born out: to *Moby Dick,* the name of an individual, we can only apply individual ClP predicates (67.b), not kind ClP predicates (67.a).

(67) a.* Moby Dick   shi   yi   zhong   jing.

       Moby Dock   be   one Cl$_{-kind}$ whale

    b. Moby Dick   shi yi   tiao   jing.

       Moby Dick   be one   Cl$_{ind}$ whale

    'Moby Dick is a whale.'

A further fact is that the subkinds must be well-established kinds in their own right. This is, of course, a constraint on the partition π. Example (68) is infelicitous, despite the fact that there is an existential quantifier *you* 'there be' before the kind ClP in subject position. When applying the kind classifier *zhong* to the noun *dodo*, we expect to get a set of subkinds of Dodo. However, if we take it to be a piece of well established biological knowledge that the kind *dodo* doesn't have any biological subkinds (it is so to say one of a kind), the example is infelicitous:

(68) * you   yi   zhong dodo-niao jue-zhong   le.

    there-be one Cl$_{-kind}$ dodo-bird   vanish-kind Part

    Intended: 'A kind of dodo is extinct.'

So there is a genuine constraint on the partition π that kind ClPs denotes sets of well-established kinds of the same 'genre'. In taxonomic sentences, where the predicate is a kind ClP and the subject denotes a plurality of kinds the atomic parts of the plurality (chosen by π) must belong to the same taxonomic hierarchical level. This point is illustrated by the examples in (70).

      Look at the hierarchical taxonomic relations in (69). For example, we know that there are two basic types of whales—Toothed Whales and Baleen Whales and that latter includes dolphins, blue whales, sperm whales etc. The hierarchical relation is illustrated below.

(69)

```
                        Whales
              ┌───────────┴───────────┐
       Toothed whales          Baleen whales
              │                ┌──────┴──────┐
         Dolphins … Blue whales …      Sperm whales
```
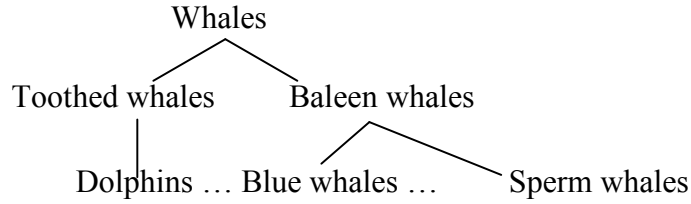
As shown in (70), we can coordinate *toothed whales* with *baleen whales* or *blue whales* with *dolphins* and ascribe to them the property of being two kinds of whales, but we cannot coordinate *blue whales* and *toothed whales* in this context.

(70) a. chi-jing   he   xu-jing   shi   liang   zhong   jing.
        tooth-whale   and   baleen-whale   be   two Cl_{kind} whale
        'Toothed whales and Baleen whales are two kinds of whales.'

   b. lan-jing   he   haitun   shi   liang   zhong   jing.
        blue whale   and   dolphin   be   two Cl_{kind} whale
        'Blue whales and dolphins are two kinds of whales.'

   c.# lan-jing   he   chi-jing   shi   liang   zhong   jing.
        blue-whale   and   tooth-whale   be   two Cl_{kind} whale
        'Blue whales and toothed whales are two kinds of whales.'

This means that there are additional constraints on the partition π which is used in deriving sets of subkinds: the blocks of the partition must be elements at the same level of the taxonomic hierarchy of subkinds.

5.3 N-*lei* in generic sentences

A third way of making reference to kinds is by suffixing bare nouns with *lei* 'kind/species', as in the form of N-*lei*, as in *jing-lei* 'whale-kind' or *yu-lei*, 'fish-kind', *niao-lei* 'bird-kind'. We gloss N-*lei* as the plural 'N kinds'. We will argue later that this gloss is appropriate.

     N-*lei* can be used as the subject of a generic sentence, but it seems that it allows only kind-level predicates, not characterizing predicates expressing properties about individual instantiations. See the contrast between (71) and (72).

(71) a. **niao-lei**   kuai   jue-zhong   le.

bird-kind   soon   vanish-kind   Part

'Bird kinds will be soon extinct.'

b. **yu-lei**   shenghuo zai   shui   li.

fish-kind   live   at   water   in

'Fish kinds live under the water.'

(72) a.# **gou-lei**   wang-wang   jiao.

dog-kind   woof-woof   bark

'Dog kinds bark.'

b.# **gou-lei**   you   si   tiao   tui.

dog-kind   have   four   Cl   leg

'Dog kinds have four legs.'

Like the other types of kind expressions, N-*lei* can also be used in predicative position. Copula sentences with N-*lei* as the predicate must have a kind-denoting subject as in (73.a-b), and cannot have an individual-denoting subject as in (73.c). (Recall what we saw in (67.b) where only individual level predicates can be predicated of Moby Dick.) The examples in (73) suggest that the denotation of N-*lei* can only be instantiated by subkind entities such as *blue whales* or *dolphins*, but not individuals like *Moby Dick*.

(73) a. lan-jing   shi   **jing-lei**.

blue whale   be   whale-kind

'Blue whales are the whale kind.'

b. lan-jing   he   haitun   shi   **jing-lei**

blue whale   and   dolphin   be   whale-kind

'Blue whales and dolphin are the whale kind.'

c. *Moby Dick   shi   **jing-lei**.

Moby Dick   be   whale-kind

We see that both bare nouns and N-*lei* denote kinds, but allow different types of instantiations. Bare nouns can either be instantiated by individuals or by subkinds, while N-*lei* can only be instantiated by subkinds. (74) is another example showing their interpretational difference:

(74) a. **niao-lei**   kuai   jue-zhong   le.

   bird-kind   soon   vanish-kind   Part

   'Bird kinds will soon be extinct.'

 b. **niao**   kuai   jue-zhong   le.

   bird   soon   vanish-kind   Part

   'Birds will soon be extinct.'

Both examples in (74) mean that birds are dying out. But (74.a) mean that there are a few subkinds of birds left, while (74.b) either means the same, that there are a few subkinds of birds left, or it means that that there are a few individual birds left. Suppose that there are 10 subkinds of birds in the world, and each subkind has 10000 birds. Suppose that the number of birds reduces to 200 for each subkind, but there are still 10 subkinds.   Suppose we say that there are few birds left. If we do this with *niao-lei* bird-kind, we are making a statement that is ot true, because there are surpisingy many bird-kinds left, given how few birds there are per kind. We can use the bare kind nountruthfully in this case, because we can ude it to express that there are few birds left in the kind *bird*.

    If we change the scenario to one where there are only 2 subkinds of birds left, but each subkind numbers 9000, then both bare nouns and N-*lei* are appropriate, because both can be used to express that the number of bird kinds is very small. Before, we took the subkinds to be (extensionally) the sums of the blocks in the partition π. This means that each such sum as a subkind is still the sum of the individuals instantiating the kind. In the semantics of –*lei*, we want the relation to the individuals individuating the kind to be inaccessible. We do this by using the group-formation operation $\uparrow$ of Link 1984 and Landman 1989, which maps sums onto atoms. We define the kind $^{\sqcap}P_w$ as follows:

$$^{\sqcap}P_w = \sqcup_D(\{\uparrow(\sqcup_D(X): X \in \pi^*(^{\sqcap}P_w)\}$$

The difference between $^{\sqcap}$whale and $^{\sqcap}$whale is the following: both are the sum of their subkinds (according to a relevant partition). But $^{\sqcap}$whale ultimately is the sum of its individual instantiations: the atoms below $^{\sqcap}$whale are individuals, while $^{\sqcap}$whale is only the sum of the subkinds, the atoms below $^{\sqcap}$whale are kinds.

(75) a. ||*niao*|| = $^\cap$bird

    b. ||*niao-lei*|| = $^\sqcap$bird, the kind which corresponds to the sum of the relevant subkinds of the kind *bird* according to partition π*.

This proposal correctly predicts that N-*lei* in subject position only allows only predicates of kinds: the predicate in (71.a), *be extinct,* is a kind predicate, that in (71.b), *live under water*, can be interpreted as a kind predicate, and N-*lei* is felicitous. The predicates in (72) can only be interpreted as properties of individuals, and N-*lei* is infelicitous.

      A second prediction is that N-*lei* cannot be modified by individual classifiers. The reason is that the atoms below the kind which is the denotation of N-*lei* are subkinds and not individuals. In other words, the denotation of N-*lei* does not provide access to individuals, so we cannot use individual classifiers. For the kind classifiers, we derive the result that kind classifiers cannot be used with N-*lei* from a stipulation that the operation $^\cup$ used in the meaning of the classifier is defined for kinds like $^\cap P_w$ which are built from individual instances, but not for kinds like $^\sqcap P_w$, which are only built from subkinds.

(76) a.# haitun   shi   yi   zhong / tiao   jing-lei.

      dolphin   be   one   Cl$_{-kind}$ / Cl   whale-kind

     'Dolphins are a kind of whale kinds.' / 'Dolphins are an individual whale kind.'

    b.# Moby Dick   shi   yi   zhong / tiao jing-lei.

      Moby Dick   be   one   Cl$_{-kind}$/ Cl   whale-kind

     'Moby Dick is a kind of whale kinds.' / 'Moby Dick is a whale kind.'

A third prediction we make is that if the denotation of a noun has no well-established subkinds as instantiation, it cannot be suffixed with *lei*. For example, it is natural to put *lei* after the noun *bird* or *migratory bird*, but rather odd to suffix *dodo* with *lei*, as in (77).

(77) # Dodo-lei   jue-zhong   le.

     dodo kind   vanish-kind   Part

     'The dodo kind is extinct.'

When the suffix –*lei* is added to a noun, a certain (biological) taxonomic hierarchy has to be activated and different subkinds of entities are associated with the denotation of N-*lei*. The

noun *dodo* refers to a specific kind of bird with no well-established subkinds. Thus it is weird to suffix *dodo* with *-lei*.

Finally, there are differences in meaning between the kind classifier-noun combination and N-lei in predicate position. $^{\sqcup\cap}P_w$ denotes the set of subkinds of $^\cap P_w$ according to π, while $^{\cup\cap}P_w$ denotes the set of subkinds of $^\cap P_w$ according to π^*. What we observe is that when N-*lei* is used in predicative position, the entities in conjunctive subject do not not have to be strictly at the same hierarchical level, as they had to be for the subkind interpretation with the kind classifier discussed earlier. Compare (78) with the (70.c).

(78) Haitun   he   xu-jing   shi   jing-lei.

     dolphin   and   baleen-whale   be   whale-kind

     'Dolphins and baleen whales are whale kinds.'

We assume that the kind classifier and *–lei* involve different partition π and π^* and that the first involves a taxonomical hierarchy level constraint that the second does not have.

To sum up: the three kinds of kind expression have different denotations. Both bare NPs and N-*lei* are kind terms, but bare NPs can be instantiated by individuals or subkinds, while *lei*-NPs can only be instantiated by subkinds. In contrast to them, kind ClPs are predicates denoting sets of subkinds.

6. Conclusion

This Chapter discussed the interpretation of bare nouns in Mandarin Chinese. We showed with various pieces of evidence that Chierchia's (1998b) hypothesis that bare nouns in Chinese denote kinds is correct. Following Carlson and Chierchia, we argued that object-level interpretations of bare nouns are derived from the kind reading.

In the second part of the chapter, we were concerned with the distinction of three types of kind expressions in Mandarin, bare nouns, kind ClPs and N-*lei,* in the context of generic sentences. We showed that, while the semantics of each of these expressions crucially involves kinds, they do not have the same semantics. We argued that bare nouns denote kinds, N-*lei* denote kinds with only subkinds as instantiations, and kind classifier phrases denote sets of subkinds.

CHAPTER 4 SEMANTICS OF CLASSIFIERS: COUNTING AND MEASURE

1. Introduction

In this chapter, we discuss the semantics of classifiers in Chinese. We are not concerned with the lexical meanings of different classifiers, but with the properties that characterize the interpretation of classifiers as a class, or put differently, the interpretative function of classifiers as an independent category. Concerning the semantics of classifiers, we develop two arguments. First, we propose that classifiers have two basic functions, counting and measuring. Secondly, we claim that the counting function and the measure function of classifiers are distinguishable at the level of syntax in Chinese. In the literature we find lexical classifications of classifiers, e.g. a distinction between classifiers and measure words (Tai & Tang 1990), between sortal and mensural classifiers (Lyons 1977, Tang 2005), and between count and mass classifiers (Cheng & Sybesma 1998). We argue here that the semantic distinction between the counting use and the measure use of classifiers is a more crucial and fundamental distinction within the Chinese classifier system.

Previous lexical analyses of classifiers in Chinese assumed that it is the semantic role of **all** classifiers to make explicit a set of relevant units in the denotation of the noun in terms of which to count. In this, two groups of classifiers are distinguished, based on two different ways in which those units are determined: count classifiers or sortal classifiers are assumed to pick out a set of units based on the inherent properties of the entities in the noun denotation; mass classifiers or mensural classifiers are assumed to impose a unit structure on the noun denotation (for discussion, see the literature cited above).

Against this, we assume, following Rothstein (2009, 2010), that counting and measuring are two very different semantic operations, associated with two different syntactic structures, and that the crucial distinction between classifiers is which of the operations they naturally take part in. This distinction cuts across the lexical subclasses of classifiers, although it is not unrelated to that classification, since some lexical classes of classifiers have primarily the counting use, others have by default the measure use, some have both, and some (namely the kind classifiers that we already discussed in Chapter 3) have neither.

To our knowledge, Krifka 1995 is the only published paper discussing the formal semantics of classifiers in Chinese in a detailed way.

Krifka (1995:400) proposes that Chinese classifiers denote functions that map a kind onto a measure which measures the quantity of specimens of that kind by counting them. Using the rule of functional application, he represents the semantics of classifiers as follows,

For Krifka, a classifier is a measure expression M which denotes a function that applies to a number (the denotation of a Num phrase) to form the interpretation of a measure phrase MP:

(i) $\|[_{MP}[_{Num}\alpha][_M\beta]]\| = \|[_M\beta]\|$ $(\|[_{Num}\alpha]\|)$

The measure phrase applies to a noun to form a noun phrase:

(ii) $\|[_{NP}[_{MP}\alpha][_N\beta]]\| = \|[_{MP}\alpha]\|$ $(\|[_N\beta]\|)$.

Hence, on this analysis, the classifier combines first with the number to yield a Measure Phrase, and then in stage two, the Measure Phrase, Num+ Cl, applies to the Noun. Thus, in *san tou daxiang* 'three heads of elephants', the classifier *tou* 'head' is a measure head which combine first with the number *san* 'three' to give the measure phase *san tou* 'three head', which then combines with the nominal head *daxiang* 'elephant', to give 'three head of elephants'. On this analysis, counting is a special kind of measuring, and classifiers are unambiguously measures.

In this thesis, we will argue for a semantics on which counting and measuring are different semantic functions of classifiers. Rothstein (2010) proposes that English count nouns are derived from root nouns N_{root} via an operation $COUNT_k$, which maps N_{root} onto a set of atomic entities of type d×k , which count as one in the context k. We propose that Chinese classifiers, on the counting interpretation, are the lexical realization of the operation $COUNT_k$. For the measure reading, we will use the work of Krifka (1995), Chierchia (1998a) and Landman (2004) to formulate a semantics of measures in which measures are functions from kinds to sets of instantiations of the kinds that have a certain measure value.

We take the features [±Counting] and [±Measure] as features constraining the default interpretations of classifiers. Four types of classifiers can be distinguished:

[+C, -M] are classifiers that are by default counting operators;

[-C, +M] are classifiers that are by default measuring operators;

[+C, +M] are classifiers that can naturally be used as either operation;

[-C, -M] are kind classifiers, whose interpretation falls outside the operations of counting and measuring in the domain of individuals.

In this chapter, these features are still purely classificatory. Later in the dissertation we will see that the features reflect information in the lexical entry of the classifier.

In Section 2 of this chapter, we will discuss the different lexical approaches to classifiers classifications found in the literature. In Section 3, we discuss the evidence for a syntactic distinction between counting and measure functions of classifiers in Chinese. In Section 4, we propose the feature system [±Counting, ±Measure] for classifiers. Section 5 gives the semantics of the counting and measure functions of Chinese classifiers.

2. Classifications of classifiers

Classifiers are the elements that appear between Num and N in Chinese. The class includes several lexically different types of classifiers, such as individual classifiers, container classifiers, partition classifiers, group classifiers, temporary classifiers, measure words and kind classifiers, etc. Many attempts have been made to base the classification of these types of classifiers on some syntactic or semantic criterion. There are at least three basic strategies: the uniform approach (Chao 1968, Li & Thompson 1981), the dichotomy approach (Tai & Wang 1990, Cheng & Sybesma 1998, Tang 2005), and the approach of four-way classification (T'sou 1976, Bisang 1993). I will discuss the first two approaches briefly and the last more extensively, since it is more relevant to the feature analysis of classifiers we will propose in section 4.

2.1 A unified treatment of classifiers

In earlier research, classifiers are often treated uniformly under one single framework of analysis. For example, Chao (1968:584) treats all classifiers as "measures" in the sense that "a measure is a bound morpheme which forms a Determinative-Measure compound", where the Determinative includes demonstratives, numerals, or quantifiers. In contrast, Li & Thompson (1981) subsume measures under classifiers and say that "any measure word can be a classifier." Thus, both for Chao and Li & Thompson, phrases like *yi bang rou* 'a pound of meat', *liang ping shui* 'two bottles of water', *san ge xuesheng* 'three Cl students' fall under one unified analysis, measure phrases for Chao (1968), classifier phrases for Li & Thompson (1981). These two studies are descriptive-oriented, and do not provide a worked-out syntactic or semantic analysis. It is certainly possible to analyze classifiers syntactically within a uniform framework: as we argued in Chapter 2, Chinese classifiers constitute an independent category and are syntactically projected as the head of ClPs (also see Tang 1990).

However, the fact that classifiers constitute an independent category does not mean that there are no distinguishable semantic subtypes of classifiers. Chao (1968) categorizes "measures" ("classifiers" in our term) into nine subclasses, according to their lexical

properties: seven types of nominal measures and two types of verbal measures. We will here only concentrate on six types of nominal measures: individual measures, group measures, partition measures, container measures, temporary measures and standard measures. See the illustration in Table 4-1.[14] The second column in the table shows the number of classifiers that belong to the type in question.

	Measures	Number	Examples
A	Individual measures	51	*ge* (general classifier), *ben* 'volume', *tou* 'head'…
B	Group measures	46	*qun* 'group', *lie* 'series', *kun* 'bundle', *zhong* 'kind'…
C	Partition measures	39	*pian* 'piece', *jie* 'section', *si* 'slice', *di* 'drop' …
D	Container measures	36	*he* 'box', *hu* 'kettle', *wan* 'bowl', *shao* 'spoon' …
E	Temporary measures	14	*shen* 'body', *lian* 'face', *di* 'floor'…
F	Standard measures	46	*mi* 'meter', *shen* 'liter'…

Table 4-1: Chao's (1968) classification of nominal measures

Most types of classifiers listed in the table can also be found in non-classifiers languages like English.[15] The only exception is the type of individual classifiers, which are exclusive to classifier languages. We illustrate each type of classifier with a brief definition and with some examples in (1) to (6) (from Chao 1968).

(1) **Individual measures:** "modify nouns according to the entity's shape, or other properties"

    a. yi   pi   ma
       one   Cl   horse
       'a horse'

    b. liang ke   shu
       two   Cl   tree
       'two trees'

---

[14] We ignore the seventh class, i.e. quasi-measure expressions, because they behave more like nouns than like classifiers.
[15] In Chapter 1 we defined non-classifier languages as languages that have no productive individual classifiers. But we did not rule out the possibility of them having non-individual classifiers.

(2) **Group measures:** "used for a group or collection of individuals"

    a. yi   qun   xuesheng

       one   Cl$_{group}$ student

       'a group of students'

    b. yi   ba   mi

       one   Cl$_{handful}$ rice

       'a handful of rice'

(3) **Partition measures:** "represent portions of things"

    a. yi   jie   shengzi

       one   Cl$_{-section}$ rope

       'a section of rope'

    b. yi   pian   dangao

       one   Cl$_{-piece}$ cake

       'a piece of cake'

(4) **Container measures:** "container nouns used as measures"

    a. yi   ping   shui

       one   Cl$_{-bottle}$ water

       'a bottle of water'

    b. san   che   chengke

       three   Cl$_{bus}$ passenger

       'three busloads of passengers'

(5) **Temporary measures:** "use the outside extent of objects to measure quantity"

    a. yi   shen   xue

       one   Cl$_{-body}$ snow

       'a bodyful of snow'

    b. yi   bizi   hui

      one   Cl$_{-nose}$ dust

      Lit:'a noseful of dust'   An idiom meaning: 'bad luck/being refused'

(6) **Standard measures: "**they are measures proper"

    a. wu   mi   bu

       five Cl_{meter} cloth

       'five meters of cloth'

    b. liang   gongjin   pingguo

       two Cl_{kilo} apple

       'two kilos of apples'

There are a few things to be noted. Firstly, in Chao's (1968) framework, kind classifiers like *zhong* 'kind', *lei* 'sort' etc. are considered to be group classifiers. As we will see below, in T'sou's (1976) system, kind classifiers form an independent subclass. We will follow T'sou. Secondly, the numbers in the table concern the number of the most commonly used classifiers of each type: as argued in Chapter 2, Chinese classifiers are productive, the classifier category is an open category. Thirdly, a classification of classifiers based on lexical properties of classifiers indicates rich lexical meanings of individual classifiers.

2.2 Dichotomies of classifiers

In more recent research (e.g. Tai & Wang 1990, Croft 1994, Cheng & Sybesma 1998, Tang 2005), it is realized that not all classifiers have the same syntactic and semantic properties. Here we find divisions into two types of classifiers: classifiers vs. measure words (Tai & Wang 1990), classifiers vs. massifiers (Cheng & Sybesma 1998), sortal classifier vs. non-sortal classifiers (Tang 2005, due to Lyons 1977). Note that Tai & Wang (1990) and Cheng & Sybemsa (1998) use the term *classifier* in a narrow sense, referring exclusively to individual classifiers.

2.2.1A functional distinction between classifiers and measure words

In a cognition-based study of classifiers, Tai & Wang (1998) divide classifiers into two types: classifiers, by which they mean individual classifiers, and measure words. Tai & Wang suggest that the distinction between 'permanent' and 'temporary' properties of entities can be used as a cognitive basis for distinguishing between classifiers and measure words: "a classifier categorizes a class of nouns by picking out some salient perceptual properties, either physically or functionally based, which are permanently associated with the entities named by the class of nouns; a measure word does not categorize but denotes the quantity of the entity named by a noun" (Tai & Wang 1998:38). For them, words like *tiao* 'branch', *kuai* 'piece', *ge*

(the general classifier) are classifiers which categorize objects, while elements like *bang* 'pound', *wan* 'bowl' are measure words, which simply measure objects.

What Tai & Wang seem to mean by "categorization" is that classifiers have lexical meanings which express properties like shape, so classifiers modify only nouns whose referents have the shape expressed by the classifier. For example, the classifier *tiao* originally means 'branch', and it usually modifies long-shaped entities, which vary from long-shaped three dimensional entities (as in 7) to long-shaped two-dimensional entities (as in 8). Under certain circumstances, the classifier can be used 'metaphorically' to characterize abstract entities which can be in some sense understood as 'long', as shown in (9). Based on the semantic network of *tiao* as exhibited in (7)–(9), Tai & Wang (1990:50) assume that the classifier *tiao* "represent some type of human categorization based on an imputed salient perceptual property of extension in length".

(7) a. yi   tiao   yu
     one   Cl   fish
     'a tail of fish'

    b. yi   tiao   chuan
     one   Cl   boat
     'a boat'

(8) a. yi   tiao   lu
     one   Cl   road
     'a road'

    b. yi   tiao   he
     one   Cl   river
     'a river'

(9) a. yi   tiao   liyou
     one   Cl   reason
     'a reason'

    b. yi   tiao   renming
     one   Cl   life
     'a life'

It is surely true that classifiers have lexical meanings and are able to "categorize". However, this kind of categorization only reflects the selectional restrictions induced by lexical meanings, and doesn't reflect the basic function of classifiers. On our approach, the categorization function (which we later call the "topological requirement") is a prerequisite to be satisfied in the context of counting, or a lexical property that is predicated of the entities being counted. Such a prerequisite does not have to be satisfied when classifiers are used with their measure reading. We will discuss the notion of "categorization" in Section 6.3.1.

2.2.2 A syntactic distinction between mass and count classifiers

Cheng & Sybesma (1998) propose that there are two syntactically distinctive types of classifiers in Chinese, "count classifiers" and "mass classifiers" and that the distinction between mass and count classifiers is a reflection of the mass/count distinction of the nominal phrase in Chinese. They suggest that count classifiers modify count nouns and mass classifiers modify mass nouns. Such a claim implies that there are two lexically different types of nouns and two lexically different types of classifiers.

Cheng & Sybesma (1998) give the following definitions: "count classifiers simply name the unit in which the entities denoted by the noun come naturally and mass classifiers create a unit of measure".

We discussed Cheng & Sybesma's (1998) arguments in Chapter 2 and concluded that the case for a syntactic distinction between count and mass classifiers is not made. As we saw, the two diagnostics that were supposed to distinguish mass classifiers from count classifiers, in reality cut across the classes of classifiers that they call mass and count.

2.3 A four-way distinction of classifiers

T'sou (1976: 1217) proposes an account of classifiers in terms of the features [±exactness] and [±entity] (see also Bisang 1993 for a more recent account). [±exact] indicates whether the quantity of the object to be determined by the numerative is exactly defined or not. [±entity] refers to the countablity or discreteness of the object. (cf. Bisang 1993). With these two features, four types of classifiers can be distinguished, as illustrated in (10) - (13). Note that, like Chao (1968), T'sou calls what we call classifier phrases "measure phrases".

[+exact, +entity]: "the measure refers to an exact quantity and involves discrete physical entities".

(10) yi   zhi   ji
     one   Cl   chick
     'one unit of chick'

[+exact, -entity]: "the measure is exact but it refers to no discrete physical entity".

(11) yi   jin   ji[16]
     one   Cl$_{pound}$ chicken
     'a pound of chicken'

[-exact, +entity]: "there is a finite sense of a well-defined physical entity or entities, but the quantity is not exact by sign or by convention".

(12) yi   qun   ji
     one   Cl$_{brood}$ chicken
     'a brood of   chickens'

[-exact, -entity]: "the measure is neither exact nor does refer to a discrete physical entity. It characterizes mainly abstract nouns".

(13) yi   zhong   ji
     one   Cl$_{kind}$ chicken
     'a kind of chicken'

According to the definitions and the features, the first type refers to individual classifiers, such as the classifier for animals *zhi*; the second refers to standard measure words, such as *jin* 'pound', *mi* 'meter', *sheng* 'liter' etc; the third refers to collective classifiers, including *qun* 'group', *ping* 'bottle', *dui* 'pile' etc; and the fourth refers to kind classifiers, including *zhong* 'kind'/'sort'.

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[16] Note that *jin* 'pound' is a metric pound, i.e. 500 grams.

This four-way distinction has many significant implications for the semantics of classifiers. Firstly, it implies that classifiers marked [+entity] have an "individuation" function, which allows you to pull out atomic entities, while those marked by [-entity] do not have an "individuation" function, and cannot make reference to entities, but express quantities or kinds. Secondly, the feature [±exact] implies that classifiers (except for kind classifiers) have the basic function of denoting quantities of entities. T'sou's analysis here differs dramatically from that of Tai & Wang's (1990), in that for T'sou, the classifier has the basic function of denoting different kinds of quantities (counting or measure entities), while for Tai & Wang, the categorizing function is the basic function for classifiers.

While T'sou's four-way distinction is illuminating, the two features are not defined very well.

Let us first look at the feature of [±exact]. As T'sou (1976) expresses, classifiers either express exact or inexact quantities of entities referred to by the noun. And this holds for individual ClPs, such as *yi zhi ji* 'a Cl chick' in (10), and standard measure phrases, like *yi jin ji* 'a pound of chicken' in (11). But it is clear that individual classifiers and standard measures express different kinds of exactness. For individual classifiers it is the number of entities which is exact, and hence exactness is concerned with the countability of entities, while the exactness in measures concerns exactness of quantities of the entities, as given by the unit given by the classifier. In other words, the exactness of (10) is directly related to the counting function of classifiers and that of (11) to the measure function of classifiers. We think it is important to distinguish these two types of "exactness", and we think that the distinction ultimately relies on the distinction between counting and measure uses of classifiers.

A related problem is that the notion of [±exact] cannot accommodate the standard use of collective classifiers. According to T'sou's system, container classifiers are [-exact, +entity], which makes them a subclass of collective classifiers. In other words, container classifiers express inexact quantity of entities. However, as is well known, some container classifiers have been standardized or conventionalized to express exact or precise values. For example, *a bottle of wine* expresses the exact quantity of 750 ml and *a (US) cup of flour* refers to 120 grams of flour and *a barrel of oil* refers to an exact value of 42 US gallons. From these examples, we can see that the values expressed by those container classifiers are as exact as those expressed by standard measure words. So if container classifiers can express exactness, we will have to assume that container classifiers can either be [+exact, +entity] or [-exact, +entity], depending on whether or not they are associated with standardized units. This complicates T'sou's classification.

Thirdly, on the quantity interpretation, the containers do not have to be present physically, and the classifiers are interpreted as abstract measure units. Hence, there is no "finite sense of a well-defined physical entity or entities" or discrete atomic entity, as T'sou requires, and this is independent of which feature combination we assign to the container classifier. We argue in Section 4 that the distinguishing feature is not exactness or inexactness.

Concerning the feature [±entity], T'sou (1976) first uses it to separate individual classifiers and collective classifiers from kind classifiers and measure words. The former are characterized with [+entity], and the latter are characterized as [-entity]. Later in the same paper, he used the same feature [±entity] to distinguish two types of nouns: "entity nouns", such as *nanhai* 'boy' and "non-entity nouns, such as *shui* 'water'. The former are inherently [+entity], the latter are inherent [-entity]. In other words, the feature of [±entity] has two functions in the system, one for classifiers and one for lexical nouns. This complicates the picture dramatically, and increases the complexity of the system, because the feature expresses two different things in its two different uses: [±entity] for classifiers means that the classifier can be divided into atomic entities or not; whereas for nouns the distinction [±entity] is more an ontological distinction between discrete and homogenous entities.

To sum up, the central points of T'sou's (1976) analysis are:
(i) Classifiers are to be classified in terms of their measure/counting function ([+entity] vs. [-entity]);
(ii) group classifiers, partition classifiers and container classifiers are treated as a single class, [-exact, +entity] classifiers, including collective classifiers;
(iii) kind classifiers are treated as a separate class.

Questions raised by T'sou' analysis are: What is the proper interpretation of T'sou's features? And how does this interpretation relate to the lexical properties of classifiers? In Section 5, we will propose a different feature system for classifiers based on the features of [±Counting, ±Measure] which captures T'sou's inportant intuitions, but answers the difficulties and questions raised above.

3. Counting and measure readings as a grammatically relevant phenomenon

This section discusses the two basic functions of classifiers, counting and measuring. We will show that the distinction between counting and measure readings of (container) classifiers is a grammatically relevant phenomenon cross-linguistically. In Section 3.1, we use English and Hebrew data to illustrate the contrast. In Section 3.2, we discuss container classifiers in

Chinese and present different pieces of syntactic evidence to show that the distinction shows up with Chinese container classifiers. In Section 3.3, we postulate two different syntactic structures for Chinese container classifiers on the counting and measure readings.

3.1 Counting and measure readings crosslingistically

Many scholars (e.g. Doetjes 1997, Chierchia 1998b, Borschev & Partee 2004, Landman 2004, Rothstein 2009) have observed that container classifier phrases, such as *three bottles of water* in English, are ambiguous between an individuating reading ('a counting reading' in our term) and a measure reading. For example, Landman (2004) argues that on the counting reading, the word *bottle* in (14) refers to concrete bottles, while on the measure reading, *bottle* denotes an abstract measure unit and the concrete container does not have be present:

(14) a. John carried three bottles of water home.   [Counting]

       b. I poured three bottles of water into the soup.   [Measure]

The verb *carry* in the example of (14.a) forces a counting reading: carrying requires the water to be carried in something, a container, hence (14a) involves three concrete bottles, which are filled with water. On the other hand, the preferred reading of (14.b) is a measure reading, where what is poured in the soup is not three bottles, but a quantity of water amounting to three bottles, and it is irrelevant whether the pouring is done from three concrete bottles of water or whether the same amount is poured from a jug.

Rothstein (2009) argues that, even though there is no grammatical encoding of the distinction between counting and measure readings in English, it is a real semantic distinction. She (2009: 110-111) provides the following evidence for the distinction to be grammaticized.

Measure suffix: On the measure reading, the suffix *–ful* can often be added to the classifier; with the suffix, the classifier cannot express an individuating reading.

(15) a. Add two cup(ful)s of wine to the soup.

       b. Bring two cup(#ful)s of wine for our guests.

       c. We needed three bucket(ful)s of cement to build that wall.

       d. Three bucket(#ful)s of mud were standing in a row against the wall.

Pronominalisation: Plural individuating classifiers can naturally be antecedents for individuating pronouns; measure classifiers cannot:

(16) There are two cups of wine on this tray.
      a. They are blue.
      b. They (each) contain 100 milliliters.
      c. They (each) cost 2 Euros.

(17) There are two cups of wine in this soup.
      a. #They are blue.
      b. #They (each) contain 100 milliliters.
      c. #They (each) cost 2 Euros.
      d. It adds flavour/??They add flavour.

Distributivity: distributive operator *each* can distribute to the individuals in the denotation of individuating classifier expressions, but are infelicitous with measure phrases.

(18) a. Two packs of flour cost 2 euros each.
      b. #Two kilos of flour cost 2 euros each.
      c. The two cups of wine (#in this soup) cost 2 euros each.

These contrasts are found cross-linguistically, e.g. Rothstein 2009 discusses evidence from Modern Hebrew, Dutch, and Brazilian Portuguese. In some languages, this distinction is even syntactically encoded. For example, Rothstein (2009) argues that the counting and measure readings are expressed by two different constructions in Modern Hebrew. The Free Genitive construction only has a counting reading (as in 19.a), while the Construct State construction is ambiguous between a counting reading and a measure reading (19.b).

(19) a. (šaloš)   kosot   šel   mayim   [Free Genitive: Counting]
       (three)   cup(f.pl.)   of   water
      b. (šaloš)   kosot   mayim   [Construct Strate: Counting or Measure]
       (three)   cup(f.pl.)   water
       Both: "three cup s of water"

As Rothstein argues, if only the the measure reading is appropriate, only the construct state construction can be used. Thus in recipes, where only the measure reading is appropriate, the free genitive construction with *šel/of* is impossible:

(20) mosifim   štey kosot   (#šel) kemax ve- šaloš kapiot   (#šel) sukar

add   2-f cup(f.pl.) (#of) flour   and 3(f) teaspoon(f.pl) (#of) sugar

l-a-batzeku-mear-be-vim.

to-DEF-dough-and-mix

'Add two cups of flour and three teaspoons of sugar to the dough and mix.'

To sum up, the semantic distinction between counting and measure readings of classifiers is attested across a wide spectrum of typologically different languages, which obviously can differ considerably in how the distinction is reflected in the language.

3.2 Counting and measure readings of container classifiers in Chinese

We now discuss container classifiers in classifier languages like Chinese. We show that container classifiers in Chinese also express both counting and measure readings in different contexts.   Look at (21):

(21) a. wo ling   le   liang ping   jiu, zuoshou yi   ping,   you shou yi ping.

I   lift   Perf two Cl$_{bottle}$ wine left hand one   Cl$_{bottle}$ right hand   one Cl$_{bottle}$

'I carried two bottles of wine, one in the left hand and the other in the right hand.'

b. ta-de   jiuliang   shi   liang ping   hongjiu.

his   drinking-capacity   be   two   Cl$_{bottle}$ red wine

'His drinking-capacity is two bottles of red wine.'

The classifier phrase *liang ping jiu* 'two bottles of wine' in (21.a) has a counting reading which involves two concrete bottles, one in the left hand and one in the right. In contrast, in (21.b), *liang ping jiu* can only be interpreted with a measure reading, which means that the maximal amount of red wine that he can drink is two bottles. It means that he can drink 1500ml of red wine if we assume each bottle is 750 ml.   In this case, the real bottles are not required to be present and the counting reading is not available.

The two readings of container ClPs are sensitive to different syntactic contexts in Chinese. In other words, in some contexts some classifiers strongly prefer one reading over

the other and different classifiers in some syntactic contexts prefer to have one reading over another. We discuss four kinds of syntactic contexts.

First, the 'Cl+N" construction is the construction where the classifier-noun phrase is used without a numerical. In this construction the classifier can have a counting interpretation, but not a measure interpretation. Yip (2008) uses this test to distinguish classifier like *ge* from true measure words like *mi* 'meter'. We extend Yip's argument to distinguish between the counting and the measure reading of [+C,+M] classifiers. In Mandarin, the "Cl+N" construction can only be used in postverbal position and has an indefinite reading:

(22) a. wo   mai   le   ping   jiu.   [Mandarin]
        I   buy   Perf Cl_bottle wine
        'I bought a bottle of wine.'
      b.* ta-de jiuliang   shi   ping   hong-jiu.
         his   drinking-capacity be   Cl_bottle   red wine
         Intended: 'His drinking capacity is a bottle of red wine.'

In some Chinese languages, the "Cl+N" construction can have a definite interpretation (see Shi & Liu 1985, Li & Bisang 2010 for Wu; Cheung 1972, Cheng & Sybesma 1998 for Cantonese). The data from Wu in (23) show that the definite "Cl+N" construction is possible only when container classifiers have a counting reading and not on a measure reading. This holds for the Cl+N construction in Cantonese (Yip 2008).

(23) a. ŋo tɕʰiʔ koʔ pʰiŋ   tɕiu iŋ-kuo   tɕinkʰiu koʔ.   [Wu: Fuyang]
        I eat Mod Cl_bottle wine England import   Part
        'The bottle of wine that I drank was imported from England.'
     b.* ŋo   tɕʰi ko? pʰiŋ   tɕiu te-le uɛ-li   ta   sao   la.
        I   eat Mod Cl_bottle wine at   stomach-in Prog burn Part
        Intended: 'The bottle of wine that I drank is burning in my stomach.'

Chapter 6 contains more discussion of the definite and indefinite "Cl+N" constructions.

The second context concerns the the modifier *duo* 'more'. If *duo* occurs between the the numeral and the classifier, as in "Num+*duo*+Cl+N", the classifier can have both a counting and a measure reading; if *duo* occurs between the classifier and the noun, as in "Num +Cl+*duo* +N", the classifier only has a measure interpretation.

The observation that *duo* can follow either the numeral or the classifier was made in Lü (1980/1999). The construction where *duo* precedes the classifier prefers the numeral to express a round number like *shi* 'ten', *bai* 'hundred', *qian* 'thousand' etc, as in (24.a). In the construction where *duo* follows the classifier, the classifier is usually a container classifier, a standard measure, and it is preferable for the numeral to be a cardinal below *ten*, as in (24.b) (Lü 1980/1999: 184, also see Zhu 1984).

(24)   a. shi   duo   feng   xin
          ten   more   Cl   letter
           'more than ten letters'
       b. liu   chi   duo   bu
          six   Cl-inch   more   cloth
           'more than six inches of cloth'

(25) shows that when *duo* comes between the numeral and the classifier, the counting and the measure readings are equally available for the classifier phrase, as in (25.a) and (25.b) respectively. (26) shows that when *duo* follows the classifier, the sentence strongly prefers a measure reading:

(25)   a. ta   ling   le   shi duo   ping   hongijiu.   [counting]
          he   carry   Perf ten more   Cl-bottle red wine.
           'He carried more than ten bottles of red wine.'
       b. ta   zhishao neng   he-xia   shi   duo   ping   hongijiu. [measure]
          his   at least can   drink-down   ten   more   Cl-bottle red wine
           'He can at least drink more than ten bottles of red wine.'

(26)   a. ta jinwan   zonggong   he   le   you   san ping duo hongjiu.   [measure]
          he tonight altogether   drink Perf   have   three Cl-bottle more red wine
           'Tonight, he drank more than three bottles of red wine.'
       b. # ta   ling   le   shi   ping   duo   hongjiu.
            he   carry   Perf   ten   Cl-bottle more   red wine
            Intended: 'He carried more than ten bottles of red wine.'

In (25.a), *duo* expresses that the number of individual bottles (filled with red wine) is more than ten, i.e. (25a) has a counting reading. (25.b) has a measure reading: it expresses that the overall quantity of wine that his stomach can hold is more than ten bottles: here *ping* is understood to mean *bottleful*, i.e. it has a measure reading.

In (26.a), the most natural reading is the measure reading: (26a) means that the overall quantity of wine is larger than a certain value, e.g. *three bottles*. The concrete bottles are irrelevant. Similarly, (26.b) is infelicitous unless you force it into the measure reading: pour the wine in a big container and then carry it. Thus Cl *duo* N forces a measure interpretation on the classifier phrase.

The third context concerns the particle *de*. While Num-Cl-N can be ambiguous between a counting and a measure (as in 27.a), the particle *de* can induce a measure reading for some classifiers, in particular container classifiers, as Cheng & Sybesma (1998) argue (as in 27.b).

(27)   a. san   ping   shui   [Counting or Measure: our observation]
           three   Cl$_{-bottle}$ water
           'Three bottles of water'
       b. san   ping   de   shui   [Measure: Cheng & Sybesma 1998]
           three   Cl$_{-bottle}$ DE   water
           'three bottles of water'
       c.* san   de   ping   shui
           three   DE   Cl$_{-bottle}$ water

Thus in (27b) Num-Cl-*de*-N is unambiguous and only has a measure reading (27.b).[17] Note that the particle *de* can not occur between Num and Cl, as (27.c) shows.

The fourth context concerns reduplication of the container classifier. In Chinese the container classifier can be reduplicated on the counting reading, as in (28), but not on the measure reading, as in (29).

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[17] We agree with Cheng & Sybesma (1998) that the particle *de* triggers a measure reading for container classifiers, but we disagree with their argument that *de* is a marker for mass classifiers or for the measure reading. More discussion can be found in Chapter 5.

(28) a. wo mai le   liang ping   jiu, **ping-ping**   dou hen   gui.

I buy Perf two Cl-bottle wine Cl-bottle-Cl-bottle all   very expensive

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

b. wo he   le   liang ping   jiu, **ping-ping**   dou hen   haohe.

I drink Perf   two Cl-bottle wine Cl-bottle-Cl-bottle all very delicious

'I drank two bottles of wine, each of which tastes good.'

(29) a.* zhe ge   tong zhuang le san ping   jiu, **ping ping**   dou hen   gui.

this Cl   bucket contain Perf three Cl-bottle wine Cl-bottle Cl-bottle all   very   expensive

'This bucket holds three bottles of wine, each of which is expensive.'

b.* zhe ge   tong zhuang le san ping jiu, **ping ping**   dou hen   haohe.

this Cl   bucket contain Per three Cl-bottle wine Cl-bottle Cl-bottle all very delicious

'This bucket contains three bottles of wine, each of which tastes good.'

As often noted in the literature, reduplicated classifiers in Chinese of the form of Cl-Cl have distributive readings; they are usually translated as "each" or "every". Reduplicated classifiers obligatorily occur with the distributive marker *dou* "all" (J. Lin 1996, Cheng 2009). The reduplicated classifier, *ping-ping* 'bottle-bottle', is co-referential with the classifier phrase in the preceding clause. This means that in (28) the antecedent ClP *ling ping jiu* 'two bottles wine' must refer to concrete bottles of wine. As a result, the distributive predicate, *hen gui* 'very expensive' in (28.a) and *hen hao-he* 'taste good' in (28.b), applies to each bottle of wine.[18] In the measure context of (29), the plural classifier phrase cannot act as an antecedent for the reduplicated classifier, since the plural classifier phrase on the measure reading expresses quantities of entities, and does not refer to a sum of atomic entities.

We see then that the distinction between counting and measure readings is a grammatically relevant phenomenon in Chinese, which shows up in a variety of different syntactic environments.

3.3 The syntax of counting and measure readings

In this subsection, we will argue that the syntactic structures assumed in Landman (2004) and Rothstein's (2009) for counting and measure readings of classifiers in English are appropriate

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[18] Schwarzschild (2006) and Rothstein (2010) independently point out that predicates like *expensive*, *big* denote properties that disallow collective readings. Schwarzchild calls these 'stubbornly distributive predicates'.

for Chinese classifier constructions as well. We will argue that on the counting reading, Chinese container classifier phrases have the structure [Num[Cl+N]], and on the measure reading, they have the structure [Num+Cl[N]].

Rothstein (2009) argues that the counting reading and the measure reading of classifier phrases in English have different syntactic structures. She follows Landman (2004) in assuming that (30.a) is the correct structure for the counting reading and (30.b) is the correct structure for the measure reading.

(30)   a. Counting reading   b. Measure reading

```
         DP                                      DP
        /  \                                      |
       D    NumP                                  NP
     three_i  / \                                / \
          Num    NP                          MeasP   N
           t_i   / \                         /  \    |
                N    NP                    Num   N_Meas  water
          bottles (of)  water            three  bottles (of)
```
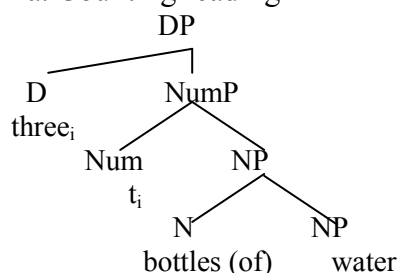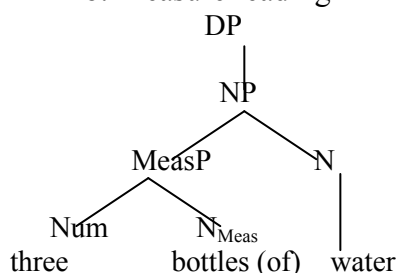
Of insertion is presumed to be a late phenomenon taking place to satisfy surface constraints and projecting no PP node.

As reflected in the different syntactic structures for counting and measure readings in (30), Rothstein (2009) explicitly argues that on the counting reading, *bottles* is a relational noun which denotes a relation between entities which are bottles and the substance they contain. So the classifier *bottles* is the head of the NP and it takes the noun *water* as its complement; the whole structure is the complement of the numerical Num, as in (30.a). In contrast, on the measure reading in (30.b), *bottles* is a modifier which combines with the numerical *three* to form a complex modifier *three bottles*, which then modifies the nominal head *water*.

We propose to adopt the same analysis for the counting and measure readings of Chinese classifier phrases. What came out of the discussion of the different contexts in the previous section is that on the counting readings Num and Cl behave like a single constituent, while they do not on the measure reading. Hence we propose the following two structures for the counting and the measure reading for Chinese ClPs:

(31)   a. Counting reading   b. Measure reading

```
              NumP                                              NP
             /    \                                            /    \
          Num      ClP                                      ClP       N
        san 'three' /  \                                   /    \      |
              Cl-Counting  NP                            Num    Cl-Measure  shui 'water'
            ping 'bottles'  shui 'water'              san 'three'  ping 'bottle'
```
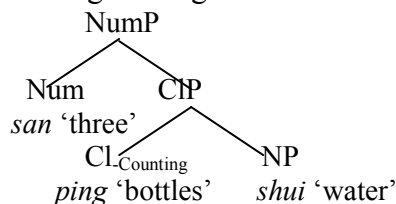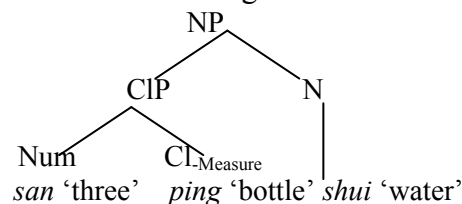
There are two differences between our structure in (31) and those in (30).

Firstly, we do not analyize *ping* 'bottle' as a noun but as a classifier. In Chapter 2, we argued that Chinese classifiers constitute a category separate from NP, and that they have an independent projection of ClP. In this, Chinese classifiers differ from English ones which still retain nominal features. Hence, in Chinese, the classifier always projects into be the head of ClPs, both in the counting and in the measuring structure.

Secondly, we do not posit a DP structure for Numeral Classifier phrases in Chinese. There are obvious syntactic differences in NumPs between English and Chinese. Chinese NumPs cannot be used in argument positions like the subject position, while English NumPs occur unproblematically in subject position (cf. the discussion in Chapter 3):

(32)   a. Three bottles of water stand on the table.

    b.* san   ping   shui   zai   zhuo   shang.

    three   Cl-bottle   water   at   table   on

    Intended: 'Three bottles of water are on the table.'

The ill-formed sentence (32.b) can be made grammatical by inserting an existential quantifier *you* 'there be' at the beginning of the sentence, as in (32.c):

    c. you   san   ping   shui   zai   zhuo   shang.

    there-be   three   Cl-bottle   water   at   table   on

    'There are three bottles of water on the table.'

In view of these differences, we propose that NumPs in Chinese are always predicates, while NumPs in English can be arguments or predicates.   This means that it is possible for English NumPs but not Chinese NumPs to have a DP level.

We now show how these two different structures in (31) are justified by the four contexts we presented in Section 3.2.

The first fact presented was that in the Cl+N" construction, the classifer could only have a counting interpretation (as illustrated by the examples in (22) and (23)). The structure in (31) accounts for this fact, because on the counting reading the classifier heads the projection of ClP, which can then be a complement of a higher functional projection of NumP.

But the functional projection does not have to be projected in all cases. (We will argue in Section 5 of Chapter 6, that the indefinite phrase "Cl+N" has a maximal projection ClP and has no NumP above it.)   In this case, the cluster Cl+N is interpreted as semantically atomic, and the singularity is implied by the semantics of the cluster and not by an explicit number.

In contrast, on the measure reading, the numeral is part of the complex modifier of Num-Cl; it is impossible to drop any internal element of the complex modifier, and the whole constituent including the lexically realized Num is adjoined to NP. Num +Cl modify the NP, thus a string containing "Cl+N" as a constituent cannot be a realization of the measure structure.

The second fact is that Num+*duo*+Cl+N has both counting and the measure readings, while Num+Cl+*duo*+N has measure reading only, as shown in (25)-(26).

The structures proposed readily provide an account for these facts. The modifier *duo* is a quantity modifier which means "more" and can only modify constituents that express quantity. Numbers are obviously quantity expressions, but classifiers express units of counting or measuring and do not themselves express quantity. NPs do not express quantity either. We assume that this means that *duo* can be adjoined to Num in both counting and measuring readings. Thus, when the word order is Num+*duo*+Cl+N, with *duo* as a modifier of the Num, we can treat Num-*duo* as the head of a counting structure: [[$_{Num}$ Num-*duo*] [Cl+N]], which leads to a counting reading. Alternatively, we can let Num-*duo* form a modifier with the classifier: [[[$_{Num}$ Num-*duo*] +Cl] N], which leads to a measure reading.

When *duo* occurs after the classifier, that is when the word order is Num+Cl+*duo*+N it can only be interpreted as a modifier of the complex NumP [$_{NumP}$ Num Cl], since by assumption it cannot modify the classifier, and anyway nothing can intervene between the classifier and its complement. Hence, only the measure structure allows *duo* to be realized in this position: [[$_{NupP}$[Num+Cl] *duo*] N].

The third fact was that Num-Cl-N is ambiguous between a counting and a measure reading, while Num-Cl-*de*-N only has a measure reading (as discussed in (27)). The explanation is similar to the previous case.   The Mandarin modification marker *de* can, as

the descriptive name suggests, only occur with modifiers, not with other syntactic constituents. If so, it follows that *de* can occur after the classifier in the measure structure (31.b), since there the classifier is part of a modifier phrase, but not in (31.a), because there the classifier is not part of a modifier phrase. Hence when *de* is inserted, only the measure structure is available. The fourth fact discussed was that classifiers can be reduplicated on the counting reading, but not on the measure reading (as shown in (28)-(29).

We point out here a releated fact. The measure classifier cannot be reduplicated and have an anaphoric relation to antecedent Num-Cl-N, as repeated in (33.a). But if the reduplicated classifier is followed by the noun, then the acceptablity of the sentence is improved, as in (33.b). [19]

(33) a.* zhe ge   tong   zhuang le   san   ping   jiu,   **ping ping**   dou   hen   gui.
    this Cl   bucket hold   Perf three $Cl_{-bottle}$ wine $Cl_{-bottle}$ $Cl_{-bottle}$ all   very   expensive
    'This bucket holds three bottles of wine, each of which is expensive.'
   b. zhe ge   tong   zhuang le   san   ping   jiu,   **ping ping**   **jiu**   dou hen gui.
    this Cl   bucket hold   Per three $Cl_{-bottle}$ wine $Cl_{-bottle}$ $Cl_{-bottle}$ wine all very expensive
    'This bucket holds three bottles of wine, each of which is expensive.'

The contrast between (33.a) and (33.b) suggests that the real generalization is that if the antecedent of the reduplicated classifier has a measure reading, the sentence is felicitous if the reduplicated classifier is followed by a NP, while if the antecedent of the reduplicated classifier has a counting reading, adding an NP after the classifier is not necessary.

This difference can be explained in terms of the structures in (31). In the counting structure of (31.a), the NP is the complement of the ClP and can be easily deleted as an instance of NP ellipsis. In the measure structure of (31.b), the NP is the head of the structure and the ClP is its specifier, and a similar deletion is impossible.

In sum, the two syntactic structures we propose for counting and measure classifiers in (31) elegantly account for the differences discussed.

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[19] This observation is due to Victor Pan (p.c.).

4. A feature analysis of classifiers: [±Counting, ±Measure]

Container classifiers allow us to observe the two different uses of classifiers, since they move easily between a measure use and a counting use. Chinese, as a classifier language, has other types of classifiers, though. According to Chao 1968's classification, Chinese classifiers at least include the following subclasses: individual classifiers, container classifiers, group classifiers, partition classifiers, standard measures, temporary measures (see Table 4-1 and (1)-(6) in Section 2). In this section, we analyze Chinese classifiers in terms of the availability of counting and measure readings. We show that not all classifiers easily allow both counting and measure readings and we propose a feature analysis of classifiers in terms of the availability of these two functions.

Assuming that counting and measure are the two basic functions of classifiers, we propose to take [±Counting] and [±Measure] as features constraining the way classifiers can be interpreted and syntactically realized. With these two features, we predict four types of classifiers: [+C, -M] classifiers are by default counting classifiers, [-C, +M] classifiers, which are by default measure classifiers, [+C, +M] classifiers for which measure and counting readings are equally available, and [-C, -M] classifiers, which can neither count nor measure individuals. We show that all the four types of classifiers are instantiated in the language.

4.1 Four types of classifiers

4.1.1 Type 1: [+C, -M] classifiers

[+C, -M] classifiers have by default only a counting reading, no measure reading. We can call them **counting classifiers**. The core instances of [+C, -M] classifiers are the so-called 'individual classifiers' as a lexical class. Individual classifiers are those classifiers whose complements are nouns denoting naturally discrete entities. The class includes the general classifier *ge*, the classifier for individual animals *zhi*, and *duo* 'blossom' etc.

We propose that on their core use, [+C, -M] classifiers spell out the inherent counting unit intrinsic to sets of discrete entities (see also Allan 1977, Tai & Wang 1990, Cheng & Sybesma 1998). For example, *hua* 'flowers' are counted as *duo* 'blossoms', *mi* 'rice' is counted as *li* 'grains', and *shu* 'book' are counted as *ben* 'volumes':

(34) a. san   duo   hua
        three   Cl$_{-blossom}$ flower
        'three blossoms of flower'

    b. yi   li   mi
        one   Cl$_{-grain}$ rice
        'a grain of rice'

    c. liang   ben   shu
        two   Cl$_{-volume}$ book
        'a volume of book'

In these classifier phrases, the classifier and the noun stand in a relation that is constrained by selectional restrictions. The property expressed by the classifier, e.g. shape, dimension etc., must be semantically compatible with the shape of entities in the denotation of N. We suggest that the classifiers make available the atomic structure of the entities in the denotation of the N and specify a natural counting unit for these entities.

This idea about the semantics of [+C, -M] classifiers is close to the function of what Lyons 1976 calls "sortal" classifiers (Lyons 1976), or classifiers that go with counting or atomic predicates. It is important to stress, however, that on the present account the [+C, -M] feature characterizes the semantic function of the classifier, and not the kind of noun it combines with. Although nouns denoting discrete atomic entities naturally occur as the complements of [+C,-M] classifiers, the classifier does not require the noun complement to denote a set of discrete entities. Thus, individual classifiers can also take as complements abstract nouns, or nouns denoting homogeneous entities. In this case, the classifier picks out a set of contextually relevant minimal entities which instantiate the kind denoted by the noun.

For instance, the classifier *duo* 'blossom' can not only modify nouns like *hua* 'flower', but also nouns which have some flower-like characteristics like *yun* 'cloud' or *mogu* 'mushroom':

(35) a. yi   duo   yun
        one   Cl$_{-blossom}$ cloud
        'a blossom of cloud'

    b. yi   duo   mogu
        one   Cl$_{-blossom}$ mushroom
        'a blossom of mushroom'

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The noun *cloud* is homogeneous in the sense that it does not have an inherent unit of counting associated with it. For speakers of English, the idea that a noun like *cloud* may be homogeneous is perhaps counterintuitive, since in English, *cloud* is a count noun, and we are used to think of singular count nouns in English as denoting sets of inherently atomic entities. However, as Rothstein (1998, 2010) argues, there are many count nouns, such as *fence*, *wall*, which are homogeneous. Thus, in contrast to nouns like *boy*, where what counts as an individual boy is given independently of context, a *fence* can have proper parts which in an alternative context can count as atomic fences. Similarly, the fact that *cloud* is a count noun in English does not imply that the noun denotes a set of inherently individuable atomic clouds, which can be directly counted. The boundaries of clouds are often not clearly defined, and there will be no absolute agreement as to how they are to be counted. In Rothstein's terms, a context-dependent decision must be made as to what counts as one cloud before they can be counted one by one. The interpretation of the plural form *clouds* is dependent on the choice of the denotation of the singular. Rothstein (2010) calls nouns like *boy* 'naturally atomic', and nouns like *fence* and *cloud* 'non-naturally atomic' and stresses that the naturally atomic/non-naturally atomic distinction is orthogonal to the count/mass distinction. Thus, *boy* and *furniture* are both naturally atomic nouns, although the first is count and the second is mass, while *fence* and *mud* are neither naturally atomic, although again, the first is count and the second is mass. Rothstein (2010) shows that the apparent atomicity of nouns like *fence* (and *cloud*) is context dependent. We will return to the formal details of the theory later in the chapte.

What is important here is that [+C, -M] classifiers combine with non-naturally atomic predicates like *yun* 'cloud'. Furthermore, when the noun is non-naturally atomic, a range of different classifiers is possible, depending on what the context dependent choice of atoms is. We give two examples of the interaction of non-naturally atomic nouns with classifiers *yun* 'cloud' and *qiang* 'wall' respectively.

Let's now go back to the *yun* 'cloud' example first. As we just said, clouds exist in our world in various shapes. If we assume that the Chinese bare noun *yun* is a kind term (see relevant arguments in Chapter 2), then the set of its instantiations includes all the possible instantiations of clouds in our world. In the expression *yi duo yun* 'a blossom of cloud' as it occurs in (35.a) (repeated in (36.a)), the function of the classifier *duo* 'blossom' is to pick out the set of pieces of cloud that have the blossom shape. In other words, the classifier *duo* picks out in context **as atoms** cloud formations that have a blossom shape. In this way the classifier

duo can adequately act as an individual classifier for *cloud* entities (which are instantiations of the kind *cloud*), and provides a counting unit for them in the context.

However, *duo* 'blossom' is not the only individual classifier for *yun* 'cloud'. Clouds of different shapes can be individuated by using different classifiers. Crucially, the choice of atoms varies depending on which classifier is used. As shown in (36.b), it is also possible to use *pian* 'piece' to modify *yun*. *Pian yun* usually denotes a set of small and light chunks of clouds.

(36)   a. yi   duo   yun
          one   Cl-blossom   cloud
          'a blossom of cloud'
       b. yi   pian   yun
          one   Cl-piece   cloud
          'a piece of cloud'

There are also cases where the boundaries of individual clouds are not clear enough so that they cannot be easily indiviudated. In these contexts, it is conventional to use group classifiers such as *tuan* 'lump' to refer to the group entity of clouds, as in (36.c). In fact, it is more natural to use the classifier *tuan* to refer to *wuyun* 'black/dark clouds' that we often see before raining, as in (36.d). We will elaborate on the counting function of group classifiers in Section 4.1.3.

(36) c. yi   tuan   yun
         one   Cl-lump   cloud
         'a lump of clouds'
      d. yi   tuan   wuyun
         one   Cl-lump   blackcloud
         'a lump of black clouds'

It is not uncommon in Mandarin that one noun can be modified by different individual classifiers, picking out different types of atoms. The noun *qiang* 'wall' can have two different classifiers, *mian* 'face/side' and *du* (with a more general meaning):

(37)   a. yi   mian   qiang

          one   Cl-face   wall

        'a side of wall'

     b. yi   du   qiang

         one   Cl   wall

        'a wall'

W*all* is count noun in English, but as Rothstein 1998 points out, how to decide which walls or which parts of a wall to count as *one wall* is context dependent. In our case, the individual classifier *du* has a very general meaning, though it is a specifc classifier for *wall*. Therefore, when saying *yi du qiang* 'one wall' (37.b), we rely more on contextual information in order to decide how to individuate a wall. On the other hand, *mian* 'face/side' in (37.a) presents a clearer picture about individuating walls. The lexical meaning of the classifier *mian* 'face' requires the walls to be counted to have façades and clear-cut boundaries. Look at the following example:
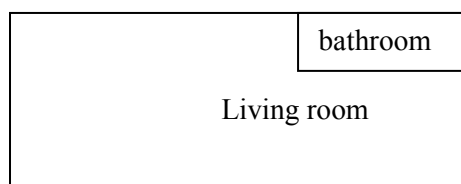
Suppose we build a square bathroom in one corner of our living room. As shown in the picture, we actually only built two walls in our living room—a long one and a short one. There are several expressions to describe the wall(s) of the bathroom:

(38)   In order to make a bathroom in our living room,

     a. women   zao   le   liang du   qiang / yi   du   qiang.

        We   build   Perf   two   Cl   wall   one   Cl   wall

        'We build two walls/one wall.'

     b. women   zao   le   liang mian   qiang / # yi   mian   qiang.

        We   build   Perf   two   Cl-side   wall   one   Cl-side   wall

         'We built two sides of walls/#one side of wall.'

When using the classifier *du*, we can count the long wall and the short wall either as two different walls or one single wall. In contrast, when we use the classifier *mian*, the long wall

and the short wall can only be seen as two different sides of wall. It is infelicitous to count them as one single side of wall.

These examples show that the individuation function of [+C, -M] classifiers are crucially derived from the semantics of the classifier itself, and not from the structural properties of the denotation of the complement noun.

Note also that on the individuating or counting function, the classifier does not imply any information about the quantity, weight, length or volume of the entities it counts. We do not know how heavy a blossom of cloud is when we say *yi pian yun* 'a piece of cloud'. We do not know how long the wall is when we say *yi mian qiang* 'one side of wall'. Thus [+C, -M] classifiers simply provide a counting unit, and make available a set of atomic countable entities, but do not give a way of measuring them along any other dimension. Even when they combine with homogeneous expressions, these classifiers allow us to say "how many" but not "how much".

As we will see later, [+C,-M] classifiers can occur in some measure contexts. But these cases are highly restricted, mainly recipe contexts. We regard such uses as highly context-dependent, non-default uses. We discuss them in Section 4.3 and in Chapter 5.

4.1.2 Type 2: [-C, +M] classifiers

[-C, +M] classifiers only have by default a measure reading, not a counting reading. This category includes only the classifiers that are pure measure words. This group of classifiers includes standard measures and temporary measures in Chao's system.

As Chierchia (1998a) points out, standard measure words like *kilo*, *pound*, *meter* do not impose any atomic structure on entities, and they simply measure the quantity of entities along a certain dimension, e.g. weight, length. Chinese standard measure words, such as *gongjin* 'kilo', *mi* 'meter', behave semantically like their counterparts in English.

For example, *liang bang tang* 'two pounds of sugar' does not imply that there are two distinctive packs of sugar, each of which weighs exactly one pound. It can be the case that there are four packs of sugar, and each of them weighs half pound. This is exactly the opposite of what we find for individual classifiers.

Another type of measure words are temporary classifiers like *shen* 'body', *lian* 'face', *di* 'floor'. There are two differences between standard measure words and temporary measure words. First, unlike container classifiers, temporary measures are usually realized by body parts or objects that are able to express attachment or spreading relations. For example, in

(39.a), the expression *yi lian hanshui* 'a faceful of sweat' means that one's face is covered with sweat, not that one's face contains sweat:

(39) a. yi   lian   hanshui

      one   Cl-face   sweat

      'a faceful of sweat'

   b. yi   di   mi

      one   Cl-floor   rice

      'a floorful of rice'

   c. yi   shen   xue

      one   Cl-body   snow

      'a bodyful of snow'

Secondly, unlike standard measure words, temporary measures express inaccurate measure values. For instance, *yi lian hanshui* 'a faceful of sweat' in (39.b) doesn't tell you how much sweat there is. This is not only because the measure unit expressed by the classifier itself is vague, but also because the whole classifier phrase is an hyperbole. In this example, the numeral *yi* 'one' does not behave like numbers do in normal classifier phrases. It cannot be replaced by other numerals, such as *liang* 'two', as shown in (40.a). However, it can be replaced by degree modifiers like *man* 'full' or *zheng* 'whole', as shown in (40.b) and (40.c) (as mentioned in Chao (1968). (39.a) expresses in a hyperbolic way that one's face is coverd with sweat (as in the English, *'I was bathing in sweat'*). This interpretation makes degree modifiers natural.

(40) a. * liang   lian   hanshui

      two   Cl-face   sweat

      'two facefuls of sweat'

   b. man   lian   hanshui

      full   Cl-face   sweat

      'a full face of sweat'

   c. zheng   lian   hanshui

      whole   Cl-face   sweat

      'a whole face of sweat'

We see that temporary measure words like *lian* 'face' provide measure units to measure the quantity of entities, in particular, that they emphasize that the measure values involved are big: in (38.b), by its covering meaning the classifier expresses that the quantity of sweat on the face is large.

Temporary measures are by default measuring classifiers. As we will discuss in section 4.3, some measure words can shift their meaning to a counting interpretation, but, as we will see, such interpretations are highly context restricted and conventionalised.

4.1.3 Type 3: [+C, +M] classifiers

The third type of classifiers has both the features of [+C] and [+M]. This means that unlike [+C,-M] or [-C,+M] classifiers, both counting and measure readings are equally available for [+C, +M] classifiers, although context may favor one or the other. [+C, +M] classifiers include container classifiers, group classifiers and partition classifiers.

For example, the container classifier *ping* 'bottle' in (41) can either mean a concrete bottle or an abstract measure unit.

(41) wo   he   le   yi   ping   hongjiu.

    I   drink Perf one   Cl-bottle   red wine

    'I drank a bottle of wine.'

On the counting reading, (41) means that I drank (some of) wine out of a particular bottle. Note that perfective markers in Chinese do not express telicity in the way such markers do in other languages. On the counting reading, the perfective marker *le* (41) does not imply a telic event (see Soh & Kuo 2005): (41) does not express that the bottle of wine got finished.

On the measure reading, I drank the quantity of a bottle, 750 ml of red wine. In this case, the event is a telic event, it doesn't mean that I drank some of 750 ml.

Since we have already discussed the ambiguity of container classifiers in the sections 3.2 and 3.3, we here discuss partition classifiers (as in 42) and group classifiers (as in 43). We show that they too are ambiguous between a counting and a measure interpretation.

(42) a. wo-de bai tixu   shang you   san   di   da-xiao-bu-yi   de   moshui.
        my   white T-shirt   on   there-be three   Cl_drop big-small-not-same Mod   ink
        'There are three spots of ink of different sizes.'

     b. xie   zhe   pian   wenzhang wo yong   le   san   di   moushui.
        write this Cl   article   I use   Perf   three Cl_drop ink
        'I used three drops of ink to write this article.'

(43) a. you   liang   pai   xuesheng   chao   wo   zou-lai,
        there-be   two   Cl_row   student   toward   me   walk-come
        qianmian   yi   pai,   houmian yi   dui.
        front   one   Cl_row   back   one   Cl_row
        'Two rows of students are walking toward me. One in the front and on in the back.'

     b. zhe-ge   jiaoshi   zhi   neng   rongxia   liang   pai   xuesheng.
        this-Cl   classroom   only   can   contain   two   Cl_row student
        'This classroom can only hold two rows of students.'

(42.a) and (43.a) show counting readings of partition classifiers and group classifiers. The classifier *di,* 'drop' partitions the ink into what the modifier *"of different sizes"* requires to be plural entities, so there must be three separate spots of ink on my T-shirt. In (42.a), the expression that *"one on the front and one on the back"* forces a count reading: there must be two distinctive rows of students.

In contrast, (42.b) and (43.b) express the measure reading. For example, (42.b) requires the amount of ink to be as much as three drops, but it is not required that the ink comes in three individuated drops of ink. Similarly, (43.b) only requires the number of students to be as many as two rows, though they may be sitting together.

Hence, container Cls, group Cls and partition Cls indeed are equally open for counting and measure readings in different contexts. On the counting reading, the classifiers indicate how the plural entities or mass entities are packed or accumulated into single units. On the measure reading, they express the quantity of plural entities or mass entities along a certain dimension, e.g. weight or length.

4.1.4 Type 4: [-C, -M] classifiers

At first glance, it looks a bit strange that there could be classifiers that neither count nor measure individuals. But (as we have already seen in Chapter 3) there is such a type of

classifiers, the kind classifiers that denote predicates of subkinds and not of individuals. In Chinese, kind classifiers include *zhong* 'kind' and *lei* 'class':

(44) a. yi zhong yu
   one Cl_{-kind} fish
   'one kind of fish'
  b. san lei   shu
   three Cl_{-class} book
   'three classes of books'

We showed in Chapter 3 that bare nouns in Mandarin denote kinds of type **k** and that the kind classifier denotes a function from the kind denotation to a set of subkinds, of type $<\textbf{k},<\textbf{k}, t>>$. Thus the kind classifier turns the kind into a set of well-established subkinds. This means that kind classifier phrases denote sets of entities of a different type than classifier phrases with other types of classifier: sets of subkinds *versus* sets of individuals. Thus kind classifiers neither count nor measure individuals, which is what makes them [-C, -M].

  In Chapter 3, we proposed that subkinds are plural entities, i.e. sums of the atoms, and that the members of a subkind must share the same natural properties. For example, *yi qun dongwu* 'a group of animals' and *yi zhong dongwu* 'a kind of animal' are both instantiated by individual animals, but the former requires enough instances for the animals to form a group, while the latter, as a subkind, simply requires some instance which is an animal. Consider the examples in (45).

(45) a.#wo kandao le liang qun dongwu, yi zhi mao he yi zhi gou.
   I see Perf two Cl_{-group} animal one Cl cat and one Cl dog
   'I saw two groups of animal: one (individual) cat and one (individual) dog.'
  b. wo kandao le liang zhong dongwu: yi zhi mao he yi zhi gou.
   I see Perf two Cl_{-kind} animal one Cl cat and one Cl dog
   'I saw two kinds of animals: one (individual) cat and one (individual) dog.'

Liang qun dongwu "two groups of animals" in (45.a) postulates the existence of a lot of animals, two different groups, each containing a large enough number of animals. In contrast, (45.b) with *"two kinds of animals"* can be made true by two animals, one of each kind. In other words, kind classifiers are sensitive to the (natural) properties of individuals but not to

their quantity, while other types of classifiers, like group classifiers, are sensitive to quantities as well. The same is seen in (46) and (47):

(46) a. yi   ge   ershi   ke   de   pingguo   [+C, -M]
        one   Cl   twenty gram   DE   apple
        'an apple of twenty grams'
     b. yi   qun   ershi   ge   de   xuesheng   [+C, +M]
        one   Cl-group   twenty Cl   DE   student
        'a group of twenty students'

(47) a.* yi   zhong   ershi   tiao   de   yu
        one   Cl-kind   twenty Cl   DE   fish
        Intended: 'a kind of fish of twenty individuals'
     b.* san   lei   wu   ben   de   shu
        three   Cl-kind five   Cl-volume   DE   book
        Intended: 'three classes of books of five volumes'

As shown in (46), in ClPs with the features of [+C –M] and [+C, +M], we can insert modifiers expressing number or quantity. For example, in (46.a), the apple weighs 20 gram and in (46.b), the group entity is composed of twenty students. However, kind ClPs cannot take such modifiers to specify the numbers or the quantity of the instantiations of the relevant kinds, as shown in (47). Again, kind classifiers are not sensitive to quantity information of individuals: a numeral before the kind classifier can only count the number of subkinds of entities, not the number of individuals constituting the subkind.

4.1.5 Concluding remarks

We categorized classifiers in Chinese into four types in terms of their semantic functions. The present classification differs from previous accounts in the following ways. Previous accounts typically make a distinction between the types of lexical information conveyed by different types of classifiers, like sortal and mensural classifiers, etc. Our classification of classifiers is based on the basic semantic functions of counting and measuring. We think this is a better classification, for the following reasons.

First, mensural classifiers in the traditional sense do not form a unified group in terms of semantic properties. They split into two subtypes, those that have both counting and

measure readings and those that only have a measure reading, and these subtypes have distinct syntactic and semantic properties. The classical dichotomy has nothing to say about this. In our classification these differences in syntactic and semantic behaviour are encoded in the classification.

Secondly, the notion of "individual/sortal classifiers" does not correspond to the class of [+C, -M] classifiers given here. Lyons (1976) defines 'sortal classifiers' not in terms of the property of the classifiers themselves, but in terms of the properties of their complement. We argued in 4.1.1 that the counting function of [+C, -M] classifiers does not depend on the complement being discrete or homogeneous, but on the semantic function of the classifier. While [+C, -M] classifiers naturally modify nouns denoting discrete entities, they can also modify nouns denoting homogeneous entities, such as *yun* 'cloud' or even abstract entities. Again, the our classification encodes this.

Thirdly, the feature system expresses the fact that [+C, +M] classifiers are semantically both like [+C, -M] and [-C, +M] classifiers. Instead of postulating an ambiguity for some classifiers, the classification tells us that the fact that a large group of classifiers falls into both categories is not an exception to be dealt with, but something to be expected.

We will below give a semantic intepretation for the feature combinations. What is left open is how to represent the basic lexical meaning of the classifiers in such a way as to explain why some classifiers have both uses and some have only one. This is not a question we will deal with in this dissertation, but by allowing the general class of [+C,+M] classifiers, we indicate that the question may have an interesting answer.

4.2 Syntactic support for the four-way classification

We have argued so far that there are good semantic reasons for making a classification on the basis of the features of [±Counting, ±Measure]. In this section we discuss some syntactic evidence for the classification.

We already discussed the syntactic differences between [+C, -M] classifiers and [-C, +M] classifiers in section 3.2. We gave four syntactic tests for distinguishing between counting and measure uses of classifiers and we showed that on the analysis given, [+C, -M] classifiers occur only in the counting contexts and [-C, +M] classifiers occur only in the measure contexts. We repeat:

First, the Cl-N construction only allows counting classifiers. This predicts that [+C, -M] classifiers, i.e. individual classifiers, can be used in "Cl+N" construction, as shown

in (48), and that [-C, +M] classifiers, i.e. true measure words, must always be accompanied with a lexically realized Num, as shown in (49).

(48) a. wo   xiang   mai   **ba**   **dao**.   [Mandarin]
         I   want   buy   Cl   knife
         'I want to buy a knife.'

     b. tsəʔ   **kiu**   ti   kunkɔ.   [Wu: Fuyang]
         Cl   dog   Prog   sleep
         'The dog is sleeping.'

(49) a.* wo   xiang   zou   **gongli**   **lu**.   [Mandarin]
         I   want   walk   kilometer   road
         Intended: 'I want to walk one kilometer.'

     b.* **di**   **lu**   ŋo   tsɛu   fəʔ   uan.   [Wu: Fuyang]
         mile   road   I   walk   not   finish
         Intended: 'The mile of road, I cannot walk to the end of it.'

Secondly, in the classifier phrase of [+C, -M] classifiers, the modifier *duo* 'more' can occur between Num and Cl, but not between Cl and N, this is shown in (50); in the classifier phrase [-C, +M] classifiers, the element *duo* 'more' occur either between Num and Cl or between Cl and N, as shown in (51).

(50) a. shi   duo   ge   pingguo
         ten   more   Cl   apple
         'more than ten apples'

     b.*/???shi   ge   duo   pingguo
              ten   Cl   more   apples

(51) a. shi   duo   gongjin   pingguo
         ten   more   Cl$_{-kilo}$ apple
         'more than ten kilos of apples'

     b. san   gongjin   duo   pingguo
         three   Cl$_{-kilo}$ more   apple
         'more than three kilos of apples '

Note that both examples of (51) have the measure reading. Since *gongjin* is a true measure word, the counting reading for Num-*duo*-Cl-N that we observed for container classifiers is impossible in (51.a).

Thirdly, [+C, -M] classifiers cannot be followed by the marker *de*, while [-C, +M] classifiers can be naturally followed by the marker *de*.

(52) a.* you   san   ge   de   pingguo cong   louti   shang gun   xialai.
   there-be three   Cl   DE   apple   from   stair   on   roll   down
   Intended: 'Three apples rolled down from the stairway.'
  b. wo   mai   le   san   gongjin   de   pingguo.
   I   buy   Perf   three   Cl$_{-kilo}$ DE   apple
   'I bought three kilos of apples.'

Fourthly, [+C, -M] classifiers allow reduplicated, as in (53.a), but [-C, +M] do not. This is shown in (53.b).

(53) a. **ge-ge**   pingguo duo   hen   tian.
   Cl-Cl   apple   all   very   sweet
   'Each apple is sweet.'
  b.* **gongjin-gongjin**   pingguo   dou   hen   tian.
   kilo-kilo   apple   all   very sweet
   'Each kilo of apples is sweet.'

Next we look at group classifiers and partition classifiers, and study whether they behave in the same way as container classifiers in the relevant syntactic contexts.

First, group and partition classifiers can be used in the form of "Cl+N" only on the counting reading, not on the measure reading, as shown by the contrasts in (54) and (55):

(54) a. you   **pai**   **xuesheng**   chao   wo   zoulai.   [group Cl]
   there-be   Cl$_{-row}$ student   toward   me   walk.
   'A row of students are walking toward me.'
  b.* zhe-ge   jiaoshi   zhi   neng   rongxia   **pai**   **xuesheng**.
   this-Cl   classroom   only   can   contain   Cl$_{-row}$ student

(55) a. wo-de   bai   tixu   shang   you   **di**   **moshui**.   [partiton Cl]
        my   white   T-shirt   on   there-be   Cl_drop   ink
        'There is a spot of ink on my white T-shirt.'
    b.* xie   zhe   pian   wenzhang   yong   le   wo   **di**   **moshui**.
        write   this   Cl   article   use   Perf   I   Cl_drop   ink
        'It took me one drop of ink to write this article.

Secondly, group and partition classifiers can be reduplicated only when they are interpreted with a counting reading, but not on a measure reading:

(56) a. wo-de   bai   tixu   shang   you   san   di   moshui.
        my   white   T-shirt   on   there-be   three   Cl_drop   ink
        di-di   dou   shi   hei-de.
        Cl-Cl_drop   all   be   black
        'There are three spots of ink of different sizes. Each drop is black.'
    b.* xie   zhe   pian   wenzhang   yong   le   wo   san   di   moshui,
        write   this   Cl   article   use   Perf   me   three   Cl_drop   ink
        di-di   dou   shi   hei-de
        Cl-Cl   all   be   black
        Intended: 'It took me three drops of ink to write this article. Each drop is black.'

(57) a. you   liang   zu   xuesheng   chao   wo   zoulai.   zu-zu   dou   hen   zhengqi.
        there-be two   Cl_group student   toward me walk.   Cl-Cl_row   all   very   in order
        'Two groups of students are walking toward me. Each group is in good order.'
    b.*zhe-ge   jiaoshi   zhi   neng   rongna   liang   zu   xuesheng. zu-zu dou shi shiwu ren.
        this-Cl classroom only can   contain   two Cl student   Cl-Cl all be 15   people
        Intended: 'This classroom can only hold two groups of students. Each group has fifteen people.'

We cannot use the insertion of *de/duo* test for group and partition classifiers, since native speakers don't accept *de/duo* for either interpretation:

(58)a.* yi	qun	de	haizi	[group Cl]
one	Cl-group	DE	children	
b.* yi	kuai	de	xigua	[partition Cl]
one	Cl-piece	DE	watermelon	

(59)a. * yi	qun	duo	haizi	[group Cl]
one	Cl-group	more	children	
b. * yi	kuai	duo	xigua	[partition Cl]
one	Cl-piece	more	watermelon	

There are two different ways to account for these facts. One possibility is that because of the data in (58) and (59), we should treat container classifiers on the one hand and group and partition classifiers on the other as two different types of classifiers. The other possibility is that they are the the same type of classifiers, but that there are extra constraints on the use of *de* and *duo* which mean that they do not occur with group and partition classifiers. We think that the second possibility is more plausible, because of the similarities between all three types of classifiers as shown in (54) to (56).

However, despite these similarities in behaviour, container classifiers nonetheless differ semantically from group and partition classifiers. On the counting function they make use of actual entities in the world to classify (and thus count), while on the measure reading they assume that the volume of the container can be treated as directly analogous to a standard unit of measure such as kilo or liter. We will give interpretations for container classifiers in section 5 below. However, group and partition classifiers are more complex. Group classifiers require constructing abstract entities (see e.g. Landman 1989a, b, and also the discussion in Rothstein 2010) and partition classifiers require doing the inverse, i.e. imposing a part of structure on instantiations of the kind (whether the instantiations are naturally atomic or not). Giving a precise interpretation for these classifiers on both the count and the measure reading is thus considerably more difficult than giving an interpretation for container classifiers. We will not attempt it here, but we do assume that the difficulty of using *de* and *duo* with group and partition classifiers is related to the complexity of their interpretation.

We draw two conclusions:

(i) the counting reading and the measure reading can be distinguished syntactically;

(ii) the tests support the classification which associates [+C,-M] with the default interpretation of counting, [-C, +M] with the default interpretation of measuring, and [+C, +M] with classifiers that allow both counting and measuring interpretations.

Since [-C, -M] classifiers are not associated with counting and measuring interpretations, the present tests are not relevant for this class.

4.3 Semantic shifting between counting and measure readings

In this section we stress that the features of [±Counting, ±Measure] are characterizations of the **default** interpretations of the classifiers. As we will show in Section 5, the features [+C] and [+M] associate lexical entries of different types to the classifiers, hence what the parameter setting indicates is which lexical entries are naturally available. In this, we do not rule out the possibility that some types of classifiers can have derived readings in certain contexts via type-shifting operations. We will discuss this in detail in Chapter 5. In the present section, we show that in appropriate contexts, [+C, -M] classifiers can have a derived measure interpretation and similarly, that [-C, +M] can have a derived counting reading.

On the default use, [+C, -M] classifiers modify nouns denoting individuable entities and spell out the atomic structure of those entities, i.e. they indicate the inherent (or imposed) counting units for these entities. However, in the contexts of recipes or menus, the counting units of [+C, -M] classifiers can be coerced into measure units. Look at (60).

(60) zhe   ge   dangao wo   zonggong   yong   le   yi   ge   pingguo,
      this Cl   cake   I   altogether use   Perf   one   Cl   apple
      ban   ge   zuotian   shengxia de,   ban-ge   shangwu   shengxia   de.
      half Cl   yesterday left Mod   half-Cl   morning   left   Mod
      'To make this cake, I altogether used an apple, half of yesterday's leftover and half of morning's leftover.'

(60) provides a context of measurement, where one is told to use as much as one apple in a cake. A counting reading is not salient in this context, because it is more natural to put chopped apple slices in a cake than a whole apple. We see then that appropriate measure contexts can be constructed, where the [+C, -M] classifiers gets a measure interpretation.

Fractions are another device that triggers measure readings for [+C, -M] classifiers, because they, by their nature, express proportions. Consider (61):

(61) a. ta   meitian   zuiduo zhi neng chi san-fen-zhi-yi ge   xigua.
       he every day at most only can eat one-third   Cl watermelon
      'He only eats at most one third of a watermelon every time.'

    b. zhe   zhi   fengbi wo zhi   yong le   ban-zhi.[20]
       this   Cl   chalk   I   only   use   Perf   half-zhi
      'This chalk, I only used half.'

In (61.a), the classifier phrase specifies the quantity of the watermelon to be 1/3 of a watermelon in the context. It does not matter whether this part of watermelon is cut into small slices or is made into juice. Similarly, the natural reading in (61.b) is a measure reading. The first *zhi* in the Dem-Cl phrase is used as a counting unit which refers to a particular individual piece of   chalk in the context, but the second *zhi* in *half-zhi* refers to the length of the chalk, it tells us that half of the chalk is used, which leads to a measure reading.

        However, not every individual classifier phrase can get a measure reading. The examples in (62) are not felicitous, because it is extremely hard to find a natural context in which entities like people allow a partition that allows the measure reading.

(62) a.# ban   ge   xuesheng
        half   Cl   student
     b.# ban   tai   diannao
        half   Cl   computer

One of the possible contexts in which (62.b) can be used as   a legitimate measure phrase is in (62.c). But, here, *ban tai diannao* 'half a computer' does not denote an object which is half a computer, but measures the quantity of computer that Susan and Fred each owns.

    c. Susan   he Fred yiqi   mai le   yi   tai   diannao.
       Susan   and Fred together buy Perf one   Cl   computer.
       Tamen   meiren   yongyou   ban   tai   diannao.
       they   each   possess   half Cl   computer
      'Susan and Fred bought a computer together. Each of them possesses half of a computer.'

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[20] This example is due to Waltraud Paul (p.c.).

Note that in (60) and (61), we find two different types of coercion into measure readings. In (60), the coercion is triggered by the context, while in (61) the coercion is triggerd by a   type mismatch between numeral and classifier. We will return to these two types of coercion in our discussion of the particle *de* in Chapter 5.

Now we look at shifts of measure words, i.e. [-C, +M] classifiers, into counting classifiers. On their default measure interpretation, measure words measure quantities but do not impose any atomic structure onto the entities they measure.

In some contexts, we can derive a counting reading. For instance, when the quantity expressed by the measure phrase refers to some individuable quantities in the context.

For instance, the standard measure word *jin* 'pound' is a very old and frequently used measure unit. In contrast, *gongjin* 'kilo' is a relatively new measure unit and has been generally accepted in everyday use in some parts of China only in the past two decades. Due to the frequent use of *jin* 'pound' in daily life, it has developed a counting use, in addition to its original measure use. *San jin rou* 'three pounds of meat' can have a counting reading if the meat is individually packaged into 500 gram quantities. In contrast, the new measure unit *gongjin* 'kilo' does not have this use..

If we consider the measure *jin* 'pound' to be able to denote individual packages, then we expect, that on that reading it patterns syntactally with the [+Counting] classifiers, and we expect that in this respect it contrasts with the measure phrase of Num-*gongjin*-N, which doesn't ever have the packaging reading. The examples from (63) to (65) show that this is indeed the case. Note that it does not matter whether the noun denotes entities that are more discrete, such as *apple*, or less discrete, such as *meat*.

(63) a. wo   mai   le   jin   pingguo/rou.   [Mandarin]
        I   buy   Perf   Cl$_{pound}$ apple/meat
        'I bought a pound of apples/meat.'

    b. * wo   mai   le   gongjin   pingguo/rou.
         I   buy   Perf   Cl$_{kilo}$ apple/meat
         Intended: 'I bought a kilo of apples/meat.'

(64) a. jin   jin   pingguo/rou   dou   hen   xinxian.   [Mandarin]

      Cl$_{-pound}$ Cl$_{-pound}$ apple /meat   all   very   fresh

      'Each pound of apples/meat is fresh.'

    b.*gongjin   gongjin   pingguo/rou   dou   hen   xinxian.

      Cl$_{-kilo}$ Cl$_{-kilo}$ apple   meat   all   very   fresh

      Intended: 'Each kilos of apples/meat is fresh.'

(65) a. tɕin   pʰiŋku/n̨io   man   ɕinɕin.   [Wu: Fuyang]

      Cl$_{-pound}$ apple / meat   very   sweet

      'The kilo of apples/meat is fresh.'

    b.* kuŋtɕin   pʰiŋku/rou   man   ɕinɕin.

      Cl$_{-kilo}$ apple/fresh   very   fresh

      Intended: 'The kilo of apples are sweet.'

In (63.a), *jin pingguo/rou* 'pound of apples' implies singularity, i.e. a pound of apples/meat.
In (65.a), *tɕin pʰiŋku/n̨io* 'pounds of apples/meat' refers to a particular pound of apples/meat
that is assumed to be familiar to the interlocutors in the context.

    We summarize the classification of classifiers in the following table.

Classifier types	Default reading	Possible derived reading
[+C, -M] classifiers	Counting	Derived measure reading
[-C, +M] classifiers	Measure	Derived counting reading
[+C, +M] classifiers	Counting or Measure	
[-C, -M] classifiers		

Table 4-2: A four-way distinciton of classifiers: [±Counting, ±Measure]

5. Semantics of classifiers: counting and measure

In this section we formulate a proposal for the semantics of classifiers on the counting
interpretation and on the measure interpretation. There are not many papers in the literature on
the semantics of classifiers, besides Krifka (1995), Chierchia (1998a), Landman (2004) and
Rothstein (2010). Of these Krifka is the only paper that explicitly discusses the semantics of
Chinese classifiers. Krifka proposes that Chinese classifiers map kinds onto measure
functions that measure the number of specimens of that kind. Krifka's analysis treats all

classifiers as measures. In contrast, Chierchia (1998a) and Rothstein (2010) argue for a counting-based approach to classifiers in English. They propose that English classifiers have an 'atomizing' function. Chierchia proposes that classifiers map mass noun denotations onto sets of atoms. Rothstein (2010) proposes that English classifiers such as *unit*, *piece* explicitly denote a $COUNT_k$ function, which applies to root nouns denotations and picks out a context-dependent set of atoms, the set of entities which count as one in the relevant context k.

In what follows, we will review the measure-based approach and the counting-based approach, and then formulate a proposal for the semantics of Chinese classifiers on both the counting and measure readings.

5.1 Krifka's (1995) semantics for Chinese classifiers

Krifka (1995) was one of the first papers to argue that Chinese bare nouns are kind denoting. Krifka assumes that Chinese bare nouns are basically names of kinds, and he assumes that other uses of bare nouns, like the indefinite use or the predicative use, are derived from the kind interpretation.

(66) a. xiong   jue-zhong   le.
         bear   vanish kind   Perf
         'Bears are extinct.'
     b. wo   kanjian   xiong   le.
         I   see   bear   Perf
         'I saw (some) bears.'

According to Krifka, the object-level indefinite interpretation of *xiong* 'bear' in (65.b) is derived from the kind interpretation in (65.a), though an operation R, which is in essence Carlson's (1977) instantiation relation. The operator R applies to a kind term and returns "specimens or individual sums of subspecies of the kind". Krifka's operator R is similar to Chierchia's (1998b) operator '∪', which shifts kinds into properties. The R relation is given in (66.a) and the semantics of the two uses of the bare noun are given in (66.b-c).

(67) a. If x is an individual and **_k_** a kind then R(x, **_k_**) holds if x is an **instantiation** of kind **_k._**
     b. ||*xiong*||=BEAR   [kind denoting]
     c. ||*xiong*||=λx.R(x, BEAR)   [object denoting]

For measure phrases (classifier phrases in our terms) like (67), Krifka (1995) proposes that classifiers are expressions of the lexicalized R operators. The measure words, e.g. *qun* 'group' and *zhi* (individual classifier for animal) take a kind and yield a measure function that measures objects instantiating that kind.

(68) a. san   qun   xiong

      three Cl_{group} bear

      'three groups of bear'

   b. san   zhi   xiong

      three   Cl   bear

      'three (individual) bears'

As we have seen at the beginning of this Chapter, for Krifka a classifier is a measure expression M which combines with a number phrase to form the interpretation of a measure phrase MP:

     (i) $\|[_{MP}[_{Num}\alpha][_{M}\beta]]\| = \|[_{M}\beta]\|$ $(\|[_{Num}\alpha]\|)$

And the measure phrase applies to a noun to form a noun phrase:

     (ii) $\|[_{NP}[_{MP}\alpha][_{N}\beta]]\| = \|[_{MP}\alpha]\|$ $(\|[_{N}\beta]\|)$.

The semantics for the measure phrases in (68.a) and (68.b) are given in (69) and (70) respectively (Note that Krifka gives an intensional semantics, with we have simplified here into an extensional semantics.)

(69) a. $\|qun\| = \lambda n\lambda \mathbf{k}\lambda x.R(x, \mathbf{k}) \wedge herd(x)=n$

    b. $\|san\ qun\| = \lambda \mathbf{k}\lambda x.R(x, \mathbf{k}) \wedge herd(x)=3$

    c. $\|san\ qun\ xiong\| = \lambda x.R(x, BEAR) \wedge herd(x)=3$

(70) a. $\|zhi\| = \lambda n\lambda \mathbf{k}\lambda x.R(x, \mathbf{k}) \wedge NATURAL\text{-}UNIT_{\mathbf{k}}(x)=n$

    b. $\|san\ zhi\| = \lambda x.\ R(x, \mathbf{k}) \wedge NATURAL\text{-}UNIT_{\mathbf{BEAR}}(x)=3$

    c. $\|san\ zhi\ xiong\| = \lambda x.R(x, BEAR) \wedge NATURAL\text{-}UNIT_{\mathbf{BEAR}}(x)=3$

There is a fundamental difference between (69) and (70).

(69) is a straightforward measure reading, where the classifier *n herd* applies to a kind and yields a set of instantiations of the kind which measures *n herds*. On this semantics, (69.c) is true of an object if it is a plurality consisting of three herds of bears.

(70), on the other hand, is the equivalent of our counting reading, in which the classifier counts the number of individual bears. This is encoded by the 'natural unit' operation which takes a kind and yields a measure function that measures the number of specimens of that kind. On this semantics, (70.c), is true of an object if it is a plurality of three individual bears.

Krifka does not discuss the dual functions of classifiers beyond positing the Natural Unit function, nor does he discuss the fact that a single classifier can have both a counting and a measure reading. According to the syntax he adopts and the semantics he proposes in (69) and (70), he treats the counting reading as a particular kind of measure reading.

The structure and interpretation that Krifka gives, where the classifier combines with the Num, and the whole modifies the noun, fits the structure that we are proposing for the measure reading. We have argued, however, that the counting reading of classifiers is built froma different syntactic structure. On the counting reading, the classifier takes the noun as a complement, and this structure is the complement of the NumP.

From this perspective, the analysis in Krifka 1995 cannot account for the syntactic facts that we have discussed in this chapter.

5.2 Rothstein's (2010) semantics for English classifiers

In contrast with Krifka's (1995) measure-based account, Chierchia (1998a) and Rothstein (2010) claim that classifiers have an individuating/atomization function (a "counting function" in our terms). In this section, we will focus on the proposal in Rothstein (2010).

Rothstein (2010) argues that counting is a grammatical operation of putting entities in one-to-one correspondence with the natural numbers, which requires a decision as to what counts as one entity. She assumes that all nouns are interpreted with respect to a domain D, which is a complete atomic Boolean algebra generated by a (possibly vague) set of atoms. All lexical nouns N are associated with an abstract root form N_{root}, the interpretation of which is a subset of D. As predicates, mass have the same interpretation as N_{root}. As kind denoting expressions, the kind interpretation is derived from the interpretation of N_{root} via Chierchia's kind forming operation $\cap$. Thus the denotation of a mass noun, N_{mass}, $MASS(N_{root})=^{\cap}N_{root.}$

For count nouns, Rothstein argues that their interpretation is relativized to a counting context k, which is a subset of D, and taken to be the set of entities that in that context count

as one. We associate with the model a set K of such counting contexts on D. In context k, the set of atomic N-entities is the set $N_{root} \cap k$. Rothstein assumes that in a normal context k, the objects in $N_{root} \cap k$ are non-overlapping: they are the N-entities that count as one in k.

Technically, the non-overlap requirement for normal contexts can be made part of a counting function COUNT:

(71)a. $COUNT_k(N_{root}) = \begin{cases} \{<d,k>: d \in N_{root} \cap k\} & \text{if the objects in } N_{root} \cap k \text{ don't overlap} \\ \\ \text{undefined} & \text{otherwise} \end{cases}$

b. the interpretation of a count noun N_{count} in context k is N_k, where $N_k = COUNT_k(N_{root})$.

As can be seen in (70b), Rothstein assumes that a singular count noun denotes a set N_k, which is a set of ordered pairs, where the first projection of the ordered pairs in N_k are the entities in $N_{root} \cap k$, and the second projection of the ordered pairs is k. So a singular count noun denotes a set of indexed atomic N entities, where the index indicates the context with respect to which the entity counts as atomic. The set $N_{root} \cap k$ is a set of non-overlapping N-entities which count as 1 in context k. Such sets Rothstein calls "semantically atomic sets", which are grammatically accessible and allow to be counted directly by the numerals (Rothstein 2010).

We define the obvious notions of projection:

(72) $\pi_1(N_k) = \{d: <d,k> \in N_k\}$

$\pi_2(N_k) = k$

and:

(73) $\pi_1(<d,k>) = d$

$\pi_2(<d,k>) = k$

Plural count nouns are derived by lifting Link's pluralisation operation from D to the denotations of count noun. Link's plural operation * is defined as follows:

$*(P) = \{d \in D: \exists Y \subseteq P: d = \sqcup Y\}$

Lifting this to the domain $D \times \{k\}$ gives:

(74) $*(P) = \{<d,k> \in D \times \{k\}: d \in *(\pi_1(P)\}$

Hence, the plural of a singular count noun is the set of ordered pairs, where the first projection is an entity in $*(N_{root} \cap k)$, the closure of $N_{root} \cap k$ under sum, and the second element is k.

We see that, according to Rothstein (2010), count nouns are of a different type from mass nouns: mass nouns, as predicates, are of type $<d,t>$, set of individuals, and as kind denoting expressions, they are of type **k**; count nouns are of type $<d \times k, t>$, sets of ordered pairs, objects indexed by k . We will use x as a variable over individuals of type d and **x** (in bold italics) as a variable over objects of type $d \times k$.

Rothstein claims that this way of distinguishing mass nouns from count nouns directly captures the fact that count nouns can be directly modified by numerals, while mass nouns cannot. Count nouns allow direct grammatical counting, since they have been derived via the implicit lexical COUNT operator; mass nouns cannot be directly modified by numerals, since they are derived via COUNT. If we want to count the elements of N_{mass}, we introduce the COUNT operation in the syntax, and this requires a classifier. The most neutral classifiers are *unit of* and *piece of* and they can be thought of as a direct explicit expression of the operation COUNT:

(75) I bought a unit of furniture/ one piece of furniture.

(76) a. $\|unit_{of}\|_k = \lambda P \lambda \boldsymbol{x}.$ $\begin{cases} \pi_1(\boldsymbol{x}) \in (P \cap k) \wedge \pi_2(\boldsymbol{x}) = k \text{ if the objects in} P \cap k \text{ don't overlap} \\ \\ \text{undefined otherwise} \end{cases}$

b. $\|unit_k \, of \, furniture\| = \|unit_k \, of\| (\|furniture\|) = \lambda \boldsymbol{x}.\pi_1(\boldsymbol{x}) \in (\text{FURNITURE} \cap k) \wedge \pi_2(\boldsymbol{x}) = k$

Hence, the interpretation of *unit of* in k is like the function $COUNT_k$, it takes a set like $FURNITURE_{root}$ and maps it onto the set of pairs of objects $<x, k>$, where x is in FURNITURE $\cap$ k, on the assumption that k is a normal context where FURNITURE$\cap$k is a set of non-overlapping objects.

Some classifiers add more lexical information than unit e.g. *strands of hair*, *cups of coffee* and so on. Rothstein assumes that these add further properties specified of the semantic atoms (77) (suppressing the definedness condition).

(77) a. $\|strand_k \, of\| = \lambda P\lambda\boldsymbol{x}.\pi_1(\boldsymbol{x}) \in (P \cap k) \wedge$ LONG-AND-THIN$(\pi_1(\boldsymbol{x})) \wedge \pi_2(\boldsymbol{x})=k$

   b. $\|strand_k \, of \, hair\| = \|strand_k \, of\|(\|hair\|)$

   $= \lambda\boldsymbol{x}.\pi_1(\boldsymbol{x}) \in (\text{HAIR} \cap k) \wedge$ LONG-AND-THIN $(\pi_1(\boldsymbol{x})) \wedge \pi_2(\boldsymbol{x}) = k$

As far as classifiers are concerned, Rothstein (2010) explicitly notes that this account of English count nouns is only relevant for the individuating (counting) function of classifiers: she assumes that measure classifiers will have to be treated differently.[21]

5.3 Semantics of Chinese classifiers

In this section, we will work out the semantics of classifiers in Chinese on their counting reading and on their measure reading. We will extend Rothstein's semantics of English classifiers to the counting function of classifiers in Chinese. Then we will give a semantics for the measure function of Chinese classifiers, following Krifka (1995), Chierchia (1998a), Landman (2004) and Rothstein (2009).

5.3.1 Semantics of classifiers on counting reading

Rothstein's (2010) theory is worked out for classifiers in English. In applying it to Chinese classifiers, we must make a few necessary adaptations to make it reflect the peculiar properties of Chinese bare nouns and classifiers.

First, in Rothstein's analysis, mass nouns are treated as denoting sets, with the same interpretation as root nouns, rather than as kinds.[22] However, as we argued in Chapter 3, Chinese bare nouns are mass nouns that denote kinds. We assume that Chinese classifiers apply directly to a kind denoting expressions, and denote functions from kinds into sets of k-indexed atomic instantiations of the kind, i.e they are functions of type $<\boldsymbol{k},<d\times k, t>>$.

We assume that this difference in interpretation reflects the fundamental difference between English-type classifiers and Chinese-type classifiers: English classifers are essentially nominal, while Chinese classifiers are functional heads which have the function of deriving sets from kinds.

Secondly, for the semantics of classifiers, we want to make explicite how and where the context k comes in. For Rothstein (2010), the COUNT$_k$ function is either realized by an

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[21] Rothstein (2009), discusses the measure function of classifiers in Modern Hebrew.
[22] Rothstein (2010ms) adapts the analysis to an account in which mass nouns denote kinds.

implicit lexical operator, which is applied to root nouns to derive count nouns, or by an overt operator, such as *piece*, *unit* etc, which is applied to root nouns to derive Classifier Phrases.

If we adapt Rothstein's proposal for English directly as an operation of the type we want for Chinese, we can assume the following:

$$\|\text{Classifier (NP)}\|=\|\text{Classifier}\| \,(^{\cup}\|\text{NP}\| \,)= \text{COUNT}_k(^{\cup}\|\text{NP}\|) = \{<d,k>:d\in {}^{\cup}\|\text{NP}\| \cap k\}.$$

The noun denotes a kind; the classifier is interpreted as COUNT_k. Applying the classifier to the noun is the result of applying COUNT_k to the set of instances of the kind.

The classifier applies to the set of instantiations of the kind and gives the set of k-indexed entities which are atomic instances of the kind in context k. However, the classifier system in English is not very productive, and most of the classifiers like *piece* or *unit*, have very general meanings. Specific classifiers like *strand* in *strands of hair* are rare. This makes it difficult to see how the classifier expresses constraints on which elements in the context k are relevant, and, since more than one counting context can be invoked in one background context, which context k is relevant.

Mandarin has a productive classifier system, and most of the classifiers have very specific lexical meanings, like *duo* 'blossom', *ben* 'volume', *tiao* 'branch' etc. With that, Mandarin classifiers are very suited to illustrate what sorts of constraints on contexts classifiers can introduce. Counting context k is a set of entities of D, which will be interpreted as the set of entities that count as atoms in k. The Chinese classifier applies the COUNT function in k, but simultaneously adds information which constrains the choice of the atomic entities in k (and possibly the relevant choice of k).

Let us take the [+Counting] classifier *duo* 'blossom' as an illustration. The classifier *duo* 'blossom' can modify flowers, but also flower-like entities such as *yun* 'cloud', as in *yi duo yun* 'a blossom of cloud'. We know that the referents of *cloud* are homogeneous entities, i.e. they do not come in natural units. On the predicative use, the bare noun *yun* denotes the set of instantiations of the kind *cloud*. In this set, a cloud can have any shape, flower-like, animal-like, blanket-like etc. When we apply the classifier *duo* 'blossom' to the noun *yun* 'cloud', only flower-like clouds are picked out to be included in the set of what will be atomic clouds, as denoted by *duo yun* 'blossom cloud'. In other words, the classifier *duo* 'blossom' adds lexical information, which constrains the set of atomic clouds to be to be those which are in k and flower-like. Pragmatically, this may constrain the choice of relevant context k to be one in which there are enough flower-like atomic clouds, as Rothstein (2010) implies.

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We propose the interpretation schema in (78.a) as the general [+C, -M] classifier interpretation schema. In this schema α is the particular lexical meaning of the classifier. Thus, the meaning of the classifier *duo* is the one given in (78.b):

The template for a semantics for the counting function of a classifier is given in (78.a). As for the semantics of *duo*, we propose to compose the classifier template with the nominal predicate *duo* 'blossom', in the lexicon to construct the classifier, which is then applied to the NP meaning. Remember that $\boldsymbol{k}$ is a variable for kind and k is a variable for context.

(78) a. $\|Cl\|=\lambda\boldsymbol{k}\lambda\boldsymbol{x}.\pi_1(\boldsymbol{x})\in({}^{\cup}\boldsymbol{k}\cap k)\wedge\alpha(\pi_1(\boldsymbol{x}))\wedge\pi_2(\boldsymbol{x})=k$

   b. $\|duo\|=\lambda\boldsymbol{k}\lambda\boldsymbol{x}.\pi_1(\boldsymbol{x})\in({}^{\cup}\boldsymbol{k}\cap k)\wedge\text{Blossom-form}(\pi_1(\boldsymbol{x}))\wedge\pi_2(\boldsymbol{x})=k$

   c. $\|yun\|={}^{\cap}\text{CLOUD})$

   d. $\|duo\;yun\|=\lambda\boldsymbol{x}.\pi_1(\boldsymbol{x})\in({}^{\cup\cap}\text{CLOUD})\cap k)\wedge\text{Blossom-form}(\pi_1(\boldsymbol{x}))\wedge\pi_2(\boldsymbol{x})=k$

We propose that the property that the general classifier *ge* contributies to the interpretation schema is the trivial property pow(D), which means that the restricting conjunct is vacuous. This gives the following semantics to the general classifier:

(79) a. $\|ge\|=\lambda\boldsymbol{k}\;\lambda\boldsymbol{x}.\pi_1(\boldsymbol{x})\in({}^{\cup}\boldsymbol{k}\cap k)\wedge\pi_2(\boldsymbol{x})=k$

   b. $\|ge\|(\|pingguo\|)=\|ge\|({}^{\cap}\text{APPLE})=\lambda\boldsymbol{x}.\pi_1(\boldsymbol{x})\in({}^{\cup\cap}\text{APPLE}\cap k)\wedge\pi_2(\boldsymbol{x})=k$

We illustrate the counting reading of [+C, +M] classifiers with container classifiers. To be honest, their semantics is much easier to specify than that of partition and group classifiers, since the latter involve second order individuation (see Landman 1989a, b, and discussion in Rothstein 2010). We leave the semantics for future research.

The semantics of [+C, +M] works a bit differently from that of [+C, -M] classifiers. We propose that [+C, +M] classifiers impose an external unit on the instantiations of the kind denoted by N, when these instantiations N do not come in inherent atomic units or inherent atomic unit are not relevant.

The difference is the following: in a [+C, -M] case like *ge pinggou*, the noun phrase denotes an atomic set of apples, derived through the COUNT function from k: the only thing you need to do in k is pick out the relevant k entities that are apples. So, the constraint on $\pi_1(\boldsymbol{x})$ is that it belongs to ${}^{\cup\cap}\text{APPLE}\cap k$. With container classifiers, the relevant k-units are

determined by the semantics of the classifier and not by that of the noun. That is, for [+C, +M] ClPs, the semantic atom to be counted by the Num is determined by the lexical property expressed by the classifier. We propose that there is a relation CONTAIN for container classifiers on the counting reading, such as *ping* 'bottle'. We assume here a classifier schema as (80.a), in which the classifier determines what entities will count as atoms, and the kind complement only determines what the container contains:

(80) a. $\|Cl\| = \lambda \boldsymbol{k} \lambda \boldsymbol{x}. \pi_1(\boldsymbol{x}) \in (\alpha \cap k) \wedge CONTAIN(\pi_1(\boldsymbol{x}), \boldsymbol{k}) \wedge \pi_2(\boldsymbol{x}) = k$

   b. $\|ping\| = \lambda \boldsymbol{k} \lambda \boldsymbol{x}. \pi_1(\boldsymbol{x}) \in (BOTTLE \cap k) \wedge CONTAIN(\pi_1(\boldsymbol{x}), \boldsymbol{k}) \wedge \pi_2(\boldsymbol{x}) = k$

   c. $\|ping\ shui\| = \|ping\|(\|shui\|) = \|ping\|(^{\cap}WATER)$
      $= \lambda \boldsymbol{x}. \pi_1(\boldsymbol{x}) \in (BOTTLE \cap k) \wedge CONTAIN(\pi_1(\boldsymbol{x}), ^{\cap}WATER) \wedge \pi_2(\boldsymbol{x}) = k$

(In this, it needs to be specified what CONTAIN(x, $\boldsymbol{k}$) means. We will not be concerned with that here.)

Note that on the counting use, Cl +NP always denotes a set of atomic entities, a set of singularities. As we will discuss in Chapter 6, Cl+NP, like as *duo hua* 'Cl-blossom flower' can indeed only refer to singular flowers, but "Cl+NP" can be modified by a plural numeral, to express a plurality, as in *wu duo hua* 'five Cl-blossom flowers'. Following Rothstein (2010), we assume that the numeral *wu* 'five' denotes a function from count noun denotations into count noun denotations of type <<d×k, t>, <d×k, t>> which requires a semantically plural input:

(81) $\|wu\|(N_k) = \lambda P \lambda \boldsymbol{x}. P(\boldsymbol{x}) \wedge |\pi_1(\boldsymbol{x})|_k = 5$

Wu denotes a function which applies to a count predicate N_k and gives the subset of ordered pairs in N_k, where the first projection of each ordered pair has five parts which count as atoms in k. We assume that this semantics triggers semantic pluralization on the complement of *wu*. We give the semantic derivation of the plural classifier phrase of *wu duo hua* 'five Cl-blossom flowers' in (82) and (83):

(82) a. $\|hua\| = ^{\cap}FLOWER$

   b. $\|duo\| = \lambda \boldsymbol{k} \lambda \boldsymbol{x}. \pi_1(\boldsymbol{x}) \in (^{\cup}\boldsymbol{k} \cap k) \wedge BLOSSOM(\pi_1(\boldsymbol{x})) \wedge \pi_2(\boldsymbol{x}) = k$

   c. $\|duo\ hua\| = \lambda \boldsymbol{x}. \pi_1(\boldsymbol{x}) \in (^{\cup \cap}FLOWER \cap k) \wedge BLOSSOM(\pi_1(\boldsymbol{x})) \wedge \pi_2(\boldsymbol{x}) = k$

The meaning of *wu* should apply, but it cannot since it requires a set of pluralities as input, but (82.c) is a set of atoms in k. This is a mismatch which is resolved by semantic pluralization:

(83) a. *Pluralization applies to the denotation of *duo hua*

$$\|duo\ hua\| = *(\lambda \boldsymbol{x}.\pi_1(\boldsymbol{x}) \in (^{\cup \cap}\text{FLOWER} \cap k) \wedge \text{BLOSSOM}(\pi_1(\boldsymbol{x}))) \wedge \pi_2(\boldsymbol{x}) = k$$

$$= \lambda \boldsymbol{x}.\pi_1(\boldsymbol{x}) \in *(^{\cup \cap}\text{FLOWER} \cap k) \wedge *\text{BLOSSOM}(\pi_1(\boldsymbol{x}))) \wedge \pi_2(\boldsymbol{x}) = k$$

b. $\|wu\ duo\ hua\| = \lambda \boldsymbol{x}.\pi_1(\boldsymbol{x}) \in *(^{\cup \cap}\text{FLOWER} \cap k) \wedge *\text{BLOSSOM}(\pi_1(\boldsymbol{x}))) \wedge |\pi_1(\boldsymbol{x})|_k = 5 \wedge \pi_2(\boldsymbol{x}) = k$

That is, it denotes the set of plural entities in the pluralization of the set $^{\cup \cap}\text{FLOWER} \cap k$ which are blossoms and which have five parts that count as atoms in k.

5.3.2 Semantics for classifiers on the measure reading

We now give a semantics for the measure function of classifiers, including [-C, +M] and [+C, +M] classifiers. Let us first look at the semantics of true measure words, i.e. [-C, +M] classifiers.

Chierchia (1998a) claims that measure words, i.e. [-C, +M] classifiers, do not individuate or atomize entities. For example, *a pound of rice* is not individuated into naturalistic object like piles or packs to be measured.

Krifka (1989, 1995), Chierchia (1998a), and Landman (2004) all treat measure expressions as complex modifiers constructed out of a measure head and a number expression which denotes a number and is of type n. The measure word, e.g. *kilo*, is of type $\langle n, \langle d,t \rangle \rangle$ and combines first with the numeral to form a complex modifier which modifies N (or NP). It expresses the quantity of entities or stuff which is a property of the relevant instantiations of the head noun. Following this approach, Rothstein (2009) proposes the following semantics for measure classifiers:

(84) a. $\|bottle\|_{\langle n, \langle e,t \rangle \rangle} = \lambda n \lambda x.\text{BOTTLE-FUL}(x) = n$

b. $\|one\ bottle\| = \|bottle\|(\|one\|)$

$\qquad = \lambda n \lambda x.\text{BOTTLE-FUL}(x) = 1$

$\qquad = \lambda Q \lambda x.\ Q(x) \wedge \text{BOTTLE-FUL}(x) = 1$ \qquad (modifier interpretation)

c. $\|one\ bottle\|(\|water\|) = \lambda x.\text{WATER}(x) \wedge \text{BOTTLE-FUL}(x) = 1$

The set of quantities of water which equal one bottleful.

Again we need to adapt this to Chinese, since we assume that Chinese measure classifiers are true classifiers and hence take kinds as input. In fact, what we assume is that measures are functions from numbers to classifier interpretations: they map a number and a kind onto a set of instantiations of the kind, the instantiations with a certain measure property. This means that we treat measure classifiers as expressions of type $<n,<k,<d,t>>>$, and measure expressions "Num + Cl" as expressions of type of $<k,<d,t>>$, i.e. functions from kinds into sets of instantiations of the kinds.

For example, in the measure phrase of *thirty kilos of apples*, the measure word *kilo* denotes an expression which combines with the *thirty* to give *thirty kilos*. The modifier *thirty kilos* denotes a function that maps kinds, like the kind *apple*, onto instantiations of the kind, which weigh thirty kilos.

We assume that in Chinese, classifiers with the function of [+Measure] are interpreted as follows. Both [-C, +M] classifiers on the measure reading and [-C, +M] classifiers in Chinese are measure heads, which combines with Num to form a modifier, which in its turn applies to the head noun, a kind-denoting expression.

The semantics of the Chinese measure unit *jin* 'pound' (i.e. 500 grams) in the measure phrase of *yi jin mi* 'a pound of rice' is given as in (85).

(85) a. $\|jin\| = \lambda n \lambda k \lambda x.x \in {}^{\cup}k \wedge \mathrm{POUND}(x)=n$

b. $\|yi\ jin\| = \lambda k \lambda x.x \in {}^{\cup}k \wedge \mathrm{POUND}(x)=1$

c. $\|yi\ jin\ mi\| = \lambda x.x \in {}^{\cup\cap}\mathrm{RICE} \wedge \mathrm{POUND}(x)=1$

Similarly, [+C, +M] classifiers like container classifiers can denote measure functions. For example, the container classifier *ping* 'bottle' can be used in the measure phrase *yi ping jiu* 'a bottle of wine', in which it denotes a measure unit, e.g. *bottleful*, as equivalent to 750 ml.

(86) a. $\|ping\| = \lambda n \lambda k \lambda x.x \in {}^{\cup}k \wedge \mathrm{BOTTLE\text{-}FUL}(x)=n$

b. $\|yi\ ping\| = \lambda k \lambda x.x \in {}^{\cup}k \wedge \mathrm{BOTTLE\text{-}FUL}(x)=1$

c. $\|yi\ ping\ jiu\| = \lambda x.x \in {}^{\cup\cap}\mathrm{WINE} \wedge \mathrm{BOTTLE\text{-}FUL}(x)=1$

6. Conclusion

In this chapter, we showed that classifiers can have a count function or a measure function, according to the classification system [±Counting, ±Measure]. We showed that the measure and the counting functions of classifiers are associated with different syntactic structures. We argued that a Krifka style semantics is appropriate for measure words and classifiers on a measure interpretation, while a Rothstein style semantics is appropriate for counting interpretations. We have modified these analyses to formulate a semantic interpretations for classifiers of the type s [+C, -M] and [-C, +M] and for the container classifiers of type [+C, +M] on both counting and measure readings.

A number of open questions remain:

-We have not yet given a semantics for group and partition classifiers. We assume that the basic principles of counting and measure interpretation apply, but working out the semantics of groups and partitions is beyond the scope of this dissertation.

-We have not shown how non-default interpretations of [+C, -M] and [-C, +M] classifiers come about, i.e. the derived measure interpretation for [+C,-M] and the derived counting interpretation for [+M, -C]. It is quite straightforward to show how the default measure reading can shift into a count reading for [-C, +M] classifiers (Chierchia 1998a proposes an account), but it is more difficult to see how the counting reading shifts back into a measure reading for [+C,-M]. We discuss some aspects of this issue in Chapter 5.

-We have, by the way, given a semantics for [-C,-M] classifiers (i.e. kind classifiers) in Chapter 3.

-We have not discussed how the counting and measure readings of [+C, +M] container classifiers are related to each other.

All these issues must be left for further research.

CHAPTER 5   SEMANTICS OF PRE-CLASSIFIER ADJECTIVES AND POST-CLASSIFIER *de*

1. Introduction

In this chapter, we will address some questions that were raised in Chapter 2. What are the distributional patterns and semantic functions of pre-classifier adjectives and the post-classifier *de*?

In Chapter 2, we showed that Cheng & Sybesma's (1998) two syntactic diagnostics, the presence of pre-classifier adjectives and the optionality of post-classifier *de*, are unable to separate classifiers into the two classes – mass and count – that they propose. In Chapter 4, we argued for a distinction between the counting and measure functions of classifiers. In this chapter, following the discussion in Chapter 4, we propose that it is more appropriate to use the distinction between counting and measure functions of classifiers to account for the distributions and the functions of pre-classifier adjectives and the post-classifier *de*.

We make three points about the distribution and the semantics of pre-classifier adjectives. First, we argue that pre-classifier adjectives appear before classifiers in counting contexts: before [+C, -M] and [+C, +M] classifiers (on their counting interpretation), but not before [-C, +M] or [-C, -M] classifiers. Secondly, we argue that, while pre-classifier adjectives precede the classifier and the noun at surface structure, they do not stand in a direct modification relation to the classifier or the noun. We propose that pre-classifier adjectives modify the complex constituent "Cl+N". Since we argued that there is no Cl+N constituent in measure phrases, this explains naturally why pre-classifier adjectives do not appear in measure expressions.

Thirdly, we argue that pre-classifier adjectives like *da/xiao* 'big/small' have 'expressive' meanings: they express that the speaker regards the atomic entity in the denotation of "Cl+N" to be *big* or *small* from a particular perspective chosen by him or her.

Concerning the post-classifier *de*, we find that the particle *de* is possible both after individual and non-individual classifiers. We claim that Num-Cl-*de*-N always has a measure reading, and that Num-Cl denotes the quantity of entities represented by N. We distinguish two types of measure readings: the *as much as …* type, where the classifier denotes a measure unit, and the *as many as …*type, where the classifier denotes a counting unit. Both of them are used in measure phrases forced by the particle *de*. We argue that the particle *de* subordinates

the constituent Num-Cl to the head noun as a modifier. It shifts Num-Cl from a predicate of type <d, t> to a modifier of type <<d, t> <d, t>>.

The chapter is structured as follows. In Section 2, we examine the distribution and the modification relation of pre-classifier adjectives, and discuss their semantics.   Section 3 examines the distribution of *de* after [+Measure] classifier and [+Counting] classifiers, and propose a measure-based semantics for Num-Cl-*de*-N phrases, in which Num-Cl is a modifier of the head noun.

2. Pre-classifier adjectival modifications

This Section makes a systematic examination of the syntactic and semantic properties of pre-classifier adjectives. We discuss their relevant distribution (Section 2.1), what they modify (Section 2.2), their relevant contexts of use (Section 2.3), their syntax (Section 2.4), and their semantics (Section 2.5).

2.1 Distribution patterns of pre-classifier adjectives

As we saw in chapter 2, Cheng & Sybesma (1998) argue that pre-classifier adjectives are allowed only before a certain group of classifiers, see the contrast in (1) and (2):

(1) a. yi   da   zhang   zhi   [mass classifiers]

      one   big   Cl$_{-piece}$ paper

      'a big piece of paper'

   b. na   yi   xiao   xiang   shu

      that   one   small   Cl$_{-box}$ book

      'that small box of books'

(2) a.* yi   da   wei   laoshi   [count classifiers]

      one   big   Cl   teacher

   b.* yi   da   zhi   gou

      one   big   Cl   dog

Contra Cheng & Sybesma (1998), we showed in Chapter 2 it is possible for pre-classifier adjectives to appear before 'count' classifiers, as in (3) and (4):

(3) a. ta   ziji   ye   gai   le   yi   da   dong   fangzi.

     he   himself also build Perf one   big   Cl   house

     'He also built a big house by himself.'

  b. Xiaoling   chi   le   yi   da   ge   mantou.

     Xiaoling   eat   Perf one   big   Cl   steamed bum

     'Xiaoling ate a big steamed bum.'

(4) a. wumao-qian   mai   le   yi   da   ge   mangguo.

     fifty cents   buy   Perf   one   big   Cl   mango

     'Fifty cents bought a big mango.'

  b. wo   chi   le   yi   da   tiao   huangua.

     I   eat   Perf one   big   Cl   cucumber

     'I ate a big cucumber.'

Our hypothesis is that adjectives can precede classifiers only when the classifiers are interpreted as [+C]:   i.e. pre-classifier adjectives are possible before [+C, -M] and [+C, +M] classifiers in appropriate contexts. Two things follow from this. First, [-C] classifiers, that is measure classifiers, [-C, +M], and kind classifiers, [-C, -M] are not acceptable with pre-classifier adjectives. Confirming this, the examples in (5) and (6) are judged to be completely ungrammatical by the native speakers we consulted.

(5) a.* ta   he   le   yi   da   jing   baijiu.   [-C, +M]

     he   drink Perf one   big Cl_{-pound} liquor

  b.* he   zou   le   yi   da   gongli   lu.

     He   walk   Perf one   big $Cl_{-kilometer}$ road

(6) a.* yi   da   zhong   dongwu   [-C, -M]

     one   big Cl_{-kind} animal

  b.* yi   da   lei   zhiwu[23]

     one   big Cl_{-kind} plant

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[23] Note that the phenomenon we are interested in - the presence of *da/xiao* 'big/small' before kind   - classifiers should be distinguished from the distribution of the lexical noun of *da-lei* 'major kinds'.

Second, we predict that when a [+C, +M] classifier phrase is preceded by pre-classifier adjective, the classifier phrase can only have a counting reading. Look at (7):

(7) ta   he   le   yi   da   ping   kele.
    he   drink Perf one   big   Cl-bottle coke
    'He drank a big bottle of coke.'

(7) expresses that there was one and only one bottle and I drank l large quantity of coke from it. In other words, the classifier *ping* 'bottle' can only have a counting reading, referring to a concrete bottle, which is filled with coke. (7) is not true if you drank the same (large) amount of coke from two different bottles. Thus, (7) cannot have a measure reading.

The examples in (8) and (9) bring out the contrast clearly.

(8) a. ta   shou   shang   na   zhe   yi   ping   futejia.   [Counting]
       He   hand   on   carry Dur   one   Cl-bottle vodka
       'He carried a bottle of vodka in his hand.'

    b. ta   shou   shang   na   zhe   yi   da   ping   futejia.
       he   hand   on   carry Dur   one   big   Cl-bottle   vodka
       'He carried a big bottle of vodka in his hand.'

(9) a. ta-de   jiu-liang   shi   yi   ping   futejia.   [Measure]
        his   capacity-for-liquor be   one   Cl-bottle vodka.
        'His capacity for liquor is one bottle of vodka.'

     b.#ta-de jiu-liang   shi   yi   da   ping   futejia.
        his   capacity-for-liquor be   one   big   Cl-bottle   vodka.
        Intended: 'His capacity for liquor is a large bottle of vodka.'

The classifier *ping* 'bottle' in (8.a) has a counting reading: (8a) refers to a concrete bottle filled with *vodka*. In this case, we can insert a pre-classifier adjective *da/xiao* 'big/small', as in (8.b), which expresses that the bottle of vodka is a big entity from a perspective chosen by the speaker.[24] However, in (9), the classifier phrase *ping* 'bottle' is interpreted with a measure

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[24] The claim made by the sentence that 'the bottle of vodka is a big entity' can be understood at least in two ways: it can mean that the weight of the vodka in the bottle is too much for someone to carry, or it can mean that the volume of vodka in the particular bottle is too much for someone to drink.   More about this later.

reading and it denotes an abstract measure unit, say, 750mls, where the insertion of adjective *da/xiao* before the classifier is impossible, as in (9.b).

Predictably, when the [+C, +M] ClP with a pre-classifier adjective refers to a plural entity, it can be co-referential with a distributive determiner, which, as we argued in chapter 4, is a test for counting contexts. This is illustrated in (10):

(10) ta   jintian he   le   san   da   wan   yao.   mei wan   dou hen ku.

    he   today drink Perf   three big   Cl-bowl medicine   each Cl-bowl all very bitter

    'He drank three big bowls of Chinese (herb) medicine. Each bowl of it was very bitter.'

The distributive determiner *mei* 'each' is coferential with *san da wan zhongyao* 'three big bowls of Chinese medicine'. The sentence means that there were three individual bowls of Chinese medicine, and he drank them one by one. And every time he drank one, he felt the bitterness of the medicine.   (10) is not true if he put the three bowls of medicine into a big container and drank it in one go. Clearly, then, container classifier *wan* 'bowl' has a counting reading.

[+C, -M] classifiers are *by default* counting classifiers, but can have coerced measure readings in some contexts. We look at how those non-default measure readings interact with pre-classifiers adjectives.

Look at (11). The classifier phrase *yi ge pingguo* 'one Cl apple' in (11.a) refers to an atomic apple (a counting reading), but the ClP in (11.b) means that the quantity of apple put into the cake amounts to that of a normal-sized apple (a measure reading).

(11) a. ta   ba   yi   ge pingguo   toutou   shai dao ziji   koudai   li. [Counting]

    he   OM one Cl apple   secretly   put to   self   pocket   in

    'He put an apple into his pocket secretly.'

  b. zuo   zhe   ge pingguo-pai, wo zongong   yong   le   you   yi   ge   ping,

    make this   Cl apple pie   I   altogether   use   Perf have   one   Cl   apple

    ban   ge   zuotian-de,   ban   ge   shangwu-de.   [Measure]

    half   Cl   yesterday-Mod   half   Cl   morning-Mod

    'To make this apple pie, I used an apple altogether, half of yesterday's leftover

    and half of morning's leftover.'

In (12) we put the adjective *da* 'big' before the classifier phrases in the examples in (11), and we find that this is felicitous when the classifier has the default counting interpretation, but not if the classifier has the coerced measure interpretation:

(12) a. ta ba yi da ge pingguo toutou shai dao ziji   koudai   li.   [Counting]
      he OM one big Cl apple secretly put   to self   pocket   in
      'He put a big apple into his pocket secretly.'
   b.#zuo   zhe ge pingguo-pai, wo zongong   yong le   you yi da ge pingguo,
      make this Cl apple pie   I altogether use Perf have   one big Cl apple
      ban   ge   zuotian-de,   ban   ge   shangwu-de.   [Measure]
      half Cl   yesterday-Mod   half Cl   morning-Mod
      Intended: 'To make this apple pie, I used a big apple altogether, half of yesterday's leftover and half of morning's leftover.'

According to J.M. Lu (1987:63), it is preferable for "adj+Cl+N" to take the numeral *yi* 'one', but larger numbers are possible (as in (13.a)). Further, the distributive determiner *mei ge* 'each Cl', can be dependent on the plural entity referred to by the ClP with pre-classifier adjectives, as shown in (13.b), and the plural ClP only has a counting reading expressing that there are two individual flowers, each of which is red.

(13) a. tou shang dai   le   liang da   duo   hua.   [J.M. Lu 1987 :55]
      head-on   wear Perf two   big   Cl   flower
      '(She) wore two big flowers on her head.'
   b. tou shang dai   le   liang da   duo   hua.   Mei   duo   dou shi hong-de.
      head-on   wear Perf two   big Cl   flower. each   Cl   both be red
      'She wore two big flowers on her head. Each flower was red.'

In sum, when pre-classifier adjectives precede classifiers, the classifier can only have a counting reading. Note that this does not mean that pre-classifier adectives are freely possible with [+C] classifiers in counting contexts. We discuss the question of which counting contexts are possible in section 2.3.

2.2 The modificational relation of pre-classifier adjectives

The question we ask in this section is: what does the pre-classifier adjective modify: the classifier, the noun, or something else?

Cheng & Sybesma (1998) argue that pre-classifier adjectives modify what they call mass classifiers, and take this as evidence that mass classifiers are inherently nouns, which are borrowed to be classifiers. On their view, pre-classifier adjectives cannot modify count classifiers, since these are inherently functional.

In contrast, Zong (2009) claims that pre-classifier adjectives are available for both individual and non-individual classifiers, but pre-classifier adjectives modify the noun complement if the classifier is an individual classifier, and the classifier itself if the classifier is a non-individual classifier, e.g. a container classifier or a group classifier.

Here we argue that (i) while pre-classifier adjectives appear in front of classifiers at surface structure, they do not stand in any direct modification relation to the classifier, and that (ii) pre-classifier adjectives cannot cross the classifier head to modify the noun in Chinese (i.e. Chinese doesn't show what Jackendoff (1977) calls the "transparent phenomenon") [25].

In what follows, we will examine the modificational relation of pre-classifier adjectives in both [+C, -M] and [+C, +M] classifier phrases.

2.2.1 Adjectives before [+C, +M] classifiers

Example (14) contains a [+C, +M] classifier phrase:

(14) a. ta   zhen   le   yi   xiao   bei   putaojiu.   [from J.M. Lu 1987: 60]
     He   pour   Perf   one   small   Cl$_{-glass}$ wine
     'He poured a small glass of wine.'
   b. ta   zhu   le   yi   da   guo   fan.
     I   cook   Perf   one   big   Cl$_{-pot}$ rice
     'I made a big pot of rice.'

According to Cheng & Sybesma (1998), classifiers like *bei* 'glass' and *guo* 'pot' are directly modified by the adjective *xiao* 'small' or *da* 'big', because these classifiers are inherently nouns. For them these adjectives "modify the mass classifier in its abstract function as a

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[25] Jackendoff (1977) notes that in *a tasteless cup of coffee*, the adjective *tasteless* crosses the classifier head *cup* and modifies the noun *coffee*..

container". To avoid ambiguity, we use the word *container* to refer to the concrete entities referred to by container classifiers, and the word *volume* to refer to the capacity of containers. So what Cheng and Sybesma call 'container', we call 'volume'.

(14a) expresses that there is a small quantity of wine contained in the glass and (14b) that there is a big quantity of rice contained in the pot. According to Cheng & Sybesma (1998), large containers imply large quantities: the quantity of stuff contained in the big or small containers depends on the actual volume of the container.

Against this, we note that the pre-classifier *da/ xiao* does not express a size property of the container, because, as shown in (14.c), *xiao* 'small' can be used, when the container is directly asserted to be *big*:

(14) c. Ta   jingchang   yong   na   ge   da   bei   he   jiu.
    he   always   use   that   Cl   big   glass   drink   wine
    Buguo   meici   dou   zhi   he   yi   xiao   bei.
    But   everytime   all   only   drink   one   small   glass
  'He always uses that big glass to drink wine, but every time he only drinks a small glass.'

The classifier phrase *yi xiao bei* 'a small glass of wine' can be used to describe a situation where the glass itself is very small, so that even if the whole glass is filled, there is only a small quantity of wine in it, but it can also describe a situation where a big glass was used, but only filled with a little bit of wine. And this is the situation described by (14.c). The word *bei* 'glass' occurs twice in (14.c). On the first occurrence, in *da-bei*, it is a noun, referring to a concrete big sized glass. On the second occurrence it is in the classifier phrase *yi xiao bei* 'a small glass', where it does not refer to a concrete glass but to the quantity. And (14.c) means that the quantity of wine contained in the glass is a small, not that the glass, or its fixed volume, is small.

In (15) we look at the abstract volume of containers. Suppose there are two bowls of the same size and they are filled with the same amount of rice, say, 200 grams. These two bowls of rice are served to a three-year old kid and a basketball player. Each of them gets one bowl of rice. Generally speaking, 200 grams of rice is a lot (too much) for a three-year old, but maybe not so much (not enough) for a basketball player. We can use the sentences in (15.a) and (15.b) to describe the kid's and the basketball player's cases respectively (note that we ignore the case where the child is extremely hungry and the basketball player has no appetite at all).

(15) *The stewardess in the airplane handed each passenger a bowl of rice:*

    a. na   ge   san shui   de xiaohai gangcai chi le   yi da wan fan.

       that Cl   three-years Mod kid   just now eat Perf one big Cl-bowl 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 Perf one small Cl-bowl rice

       'That basketball player only ate a small bowl of rice.'

If pre-classifier adjectives modify the classifier as a concrete container, then there should be a big bowl in (15.a) and a small bowl in (15.b). But this is not the case. If pre-classifier adjectives modify the classifier as an abstract volume, then the two bowls should contain different quantities of rice, a large quantity for the kid, a small quantity for the basketball player. This is also not the case. What the relevant expressions, *yi da/xiao wan fan* 'a big/small Cl-bowl rice' in (15) mean is that the rice served in the big bowl is a large/small quantity for the relevant eater in view of his/her consumption ability in the context. This kind of quantity information is independent of the actual size or volume of the container as expressed by the classifier.

      The example in (16) show that *da/xiao* 'big/small' cannot cross the classifier head to modify the N complement:

(16) a. yi   da   ping   shui

         one   big   Cl-bottle   water

         'a big bottle of water'

     b. yi   ping   bing shui

       one   bottle   ice   water

      'a bottle of ice water'

     c. yi   da   xiang   xiao   pingguo

       one   big   Cl-box   small   apple

      'a big box of small apples'

The referent of the N complement *shui* in (16a) is a homogeneous entity and it is impossible to say * *da-shui* 'big water' or *xiao-shui* 'small-water'. If we want to express properties of the water, we have to do this with adnominal adjectives as in (16.b). Note too that (16c) is felicitous: it is the apples in the box that are small. Clearly, we cannot assume that

pre-classifier *da* 'big' modifies the N as well, because that would be infelicitous, like '*big small apples'.   And that is not what (16c) means.

To sum up, in [+C, +M] classifier phrases, pre-classifier adjectives neither modify the noun complement nor the classifier, regardless of whether the classifier refers to a concrete container or an abstract volume.

2.2.2   Adjectives before [+C, -M] classifiers

In (17) the classifier phrase has a [+C, -M] classifier:

(17) ni   bie   xiaokan zhe   ji   xiao li   huangdou,
     you   not   belittle   these several small Cl₋grain soybean
     zhe shi women hua   le   duoda-de xinxue cai peiyu   dedao de   liangzhong.
     this be we   spend Perf   much   effort Foc cultivate gain   Mod   selected seed
     'Don't belittle these small grains of soybeans. They are the selected seeds that were
      cultivated with painstaking effort.'

[from J.M. Lu1987:55-56]

Zong (2009) claims that these are cases where the pre-classifier adjective crosses the classifier head to modify the noun complement in count ClPs: according to Zong, in (19) it is the soybeans themselves are small. We disagree: if we want to express that the entity is big or small, we will use *da/xiao* as an adnominal adjective,   but not as a pre-classifier adjective, as in (18):

(18) a. ji   li   xiao   huanggou.
        several   Cl₋grain small   soybean
        'several grains of small soybean'
    b. ji   li   hen   xiao   de   huangou
        several   Cl₋grain very small   Mod soybean
        'several grains of very small soybeans'

The examples in (18) illustrate two types of adnominal adjectives. Simple adjectives are used in bare form, as in (18.a), while complex adjectives are used obligatorily with the modification marker *de*, as in (18.b). Different degree modifiers may occur before Adj-*de*, such as *hen* 'very', *geng* 'more' etc. The differences between these two types of adnominal

adjectives have been discussed in the literature (e.g. D.X. Zhu 1984, Sproats & Shih 1991, Duanmu 1997, Paul 2005). For instance, Paul (2005) argues that *de* divides the NPs into two different syntactico-semantic domains: a modifier outside the scope of *de* – the case of bare adjectives - has the meaning of a 'defining charactistic', whereas a modifier in the the scope of *de* - the case of Adj-*de* is interpreted as an 'accessory property'. We take her term "defining property" to mean 'classifying property', a property which sorts out entities denoted by N into different subkinds. "Accessory property" for her means a property that is not instrumental in establishing a new (sub)type of N.

Following up on this, we propose that the bare adjective *xiao* 'small' in (18.a) combines with the noun *huangdou* 'soybean' directly into a single lexical/phonological item. As argued, we assume that Chinese nouns denote kinds, and we propose here that bare adjectives before N are classifying adjectives, and that the complex adj-N denotes a subkind. Hence, *xiao-huangdou* in (18.a) refers to a subkind of soybean, the kind mini-soybean.

On the other hand, we propose that complex adjectives, like the one in (18.b), modify the set of instantiations of the kind, not the kind itself. So *hen xiao-de huangdou* in (18.b) means that the individual soybeans are small. In both cases the adnominal *da/xiao* 'big/small' specifies the physical size of the entity/ies in the denotation of the head N: the difference lies in what entities these are.

Now, if we compare the ClP *yi xiao li huangdou* 'several small Cl_{grain} of soybeans' in (19) with the ClPs in (18), it is easy to see that the interpretations are completely different.

(19) ni   bie   xiaokan   zhe   ji   xiao   li   xiao   huangdou.
     you   not   belittle   these   several   small Cl_{grain} small   soybean
     'Don't belittle these small grains of mini-soybeans.'

(19) does not mean that the actual size of the soybeans is small, but that, in view of the painstaking efforts you devoted to growing them, what you finally got was much smaller than should have been. Even if the soybeans that were cultivated are the biggest soybeans in the world, they might be considered as little given the effort put in. So, while adnominal adjectives directly modify the noun, pre-classifier adjectives before individual classifiers do not stand in a modification relation to the noun: they express personal evaluations of the denotation of "Cl+N", personal evaluation that is independent of the actual size of the denotation of "Cl+N".

2.3 Pre-classifier adjectives modifying "Cl+N"

We now examine the different types of contexts in which pre-classifier adjectives can be used. There are (at least) three such types: the consumption context, the context of significance and the contrastive context.

2.3.1 Consumption contexts

[+C] classifiers with pre-classifier adjectives can be used in consumption contexts, which involve verbs like *chi* 'eat', *he* 'drink'. Consider the examples in (20).

(20) a. Xiaoling chi le yi da ge mantou. [+C, -M]

   Xiaoling eat Perf one big Cl steamed bum

   'Xiaoling ate a big steamed bum.'

  b. wucan ta chi le yi da ping suannai. [+C, +M: container Cl]

   lunch she eat Perf one big Cl$_{-bottle}$ yogurt

   'She ate a big bottle of yogurt as lunch.'

Given that the pre-classifier adjective requires a counting interpretation for the classifier, all the examples in (20) entail the existence of an atomic entity in the denotation of the "Cl+N": (20.a) entails the existence of an atomic steamed bum of which I ate part; (20.b) entails that there is a concrete bottle out of which I ate some yogurt.

While the ClPs with pre-classifier adjectives entail the atomicity of entities in the denotation of "Cl+N", the pre-classifier adjectives *da/xiao* 'big/small' in (20) do not express that the physical size of the relevant atomic entities is big or small. (20.a) does not mean that the atomic steamed bum is big, but that the steamed bum I ate is a big quantity for me. (20.b) does not mean that the concrete bottle filled with yogurt is big, but that the yogurt that she ate out of a bottle is a large quantity for her". Thus pre-classifier adjectives like *da/xiao* 'big/small' express that the quantity of the atomic entity referred to by "Cl+N" is *big* or *small* in relation to the appetite or the consumption-ability of the eater.

Note that in the cases in (20), as long what is consumed is a large quantity for the eater at the moment in question, it is felicitous to use one+*da*+Cl+N; it does not matter whether the subject finishes the whole atomic entity in the denotation or not. However, this is independent from the semantics of the pre-classifier adjective: when you say *I ate one cucumber* in Chinese, it doesn't mean that you finished the whole cucumber.

Once again we use the three-year old and the basketball player to illustrate the dependency of the pre-classifier adjective on the personal evaluation perspective .This time, we serve each of them a super-large steamed bum, the same size for each.   When finished, the kid says (21a), the basketball player (21b):

(21) a. *the kid told her mum:*

wo gangcai chi le   yi da ge mantou,   xianzai shenme ye   bu   xiang   chi.

I   just now eat Perf one big Cl steamed bum   now   what   Foc   not   want   eat

'I just ate a big steamed bum, and I don't want to eat anything at the moment.'

b. *the basketball player told his wife:*

wo   gangcai zhi   chi   le yi xiao ge mantou,   xianzai haishi hen   e.

I   just now only   eat Perf one small Cl steamed bum   now   still   very   hungry

'I only ate a small steamed bum a moment ago, and I am very hungry now.'

The same item on the menu is considered to be a big entity by a three year old and a small entity by an adult basketball player. Again, *da/xiao* 'big/small' expresses an   evaluation of the quantity as big or small with respect to the eater's consumption ability.

2.3.2   Contexts of significance

Look at (22):

(22) a. yi ren   fa   le   yi   guan   xiao   yagao.

one person   give Perf   one   Cl$_{tube}$ small   toothpaste

b. yi   ren   fa   le   yi   xiao   guan   yagao.

one person   give Perf   one   small   Cl$_{tube}$ toothpaste

'Each is given a small tube of toothpaste.'   [from J.M. Lu 1987: 60]

In (22.a), the adjective *xiao* 'small' directly precedes the head noun *yagao* 'toothpaste' and is an adnominal modifier, while in (22.b), the adjective *xiao* 'small' is a pre-classifier adjective. (22a) means that the tube of toothpaste is small, of a small type. (22.b) means that the tube of toothpaste is an insignificant thing that does not have much value.

The following is a scenario for (22.b). The boss wanted to award the excellent employees in the company. He finally awarded each of them with a tube of toothpaste, which comes in the biggest size tube in the world. The employees had expected a more interesting

present (the hope was for a BMW automobile). One of them complained: "each person was got *yi xiao guan yagao* as an award." The use of the pre-classifier *xiao* 'small' highlights the fact that a tube of toothpaste is of low degree of significance or value etc in this context. The actual size of the tube of toothpaste is irrelevant.

(22) was an example with a counting classifier and a non-naturally atomic noun. (23) shows the same contrast with a naturally atomic noun:

(23) a. mei-ge   xuesheng   dou   jiang   le   yi   ge   da   beizi.
     every-Cl   student   all   award   Perf   one   Cl   big   mug
    b. mei-ge   xuesheng   dou   jiang   le   yi   da   ge   beizi.
     every-Cl   student   all   award   Perf   one   big   Cl   mug
     'Every student is awarded with a big mug.'

(23.a) with adnominal *da* 'big' means that the mug itself is big, the big type of mug; (23.b) with pre-classifier *da* 'big' means that the mug is considered to be a significant award for the students in the eyes of the speaker.

Thus, in the context of significance, pre-classifier *da/xiao* 'big/small' express the speaker's personal evaluation of the entity denoted by "Cl+N" with regard to the significance of the entity in the context.

2.3.3 Contrastive contexts

The examples of (24) illustrate the use of pre-classifier adjectives in contrastive contexts.

(24) a. zhe   yi   xiao   fu   hua   hua   le   ta   ban-nian   shijian.
     this   one   small   Cl   painting   cost   Perf   him   half year   time
     'This small painting cost him half year to finish.'   [from J.M. Lu 1987: 55]

b. ta   wuli   jiaju tai duo, baifang-de ye bu jiangjiu. Yi   jin   men youbian

his   home furniture too much   arrange Foc not carefully once enter door   right

yi   da   zhang jiu-shi   mu-chuang, zuo-bian yi   ge   da   ligui,

one big   Cl   old-style   wooden bed   left-side one Cl   big   wardrobe

zhuozi, yizi,   shafa   ba   wuzi   gaode   yongyubukan.

table   chair sofa   OM   house   made   crammed

'He has too much furniture at home and it was not arranged properly. Once entering, on the right side lies a big old style wood bed and on the left lies a big wardrobe, a table and chairs, which make the house look crammed.'

[from Y.L. Luo 1988: 8]

In (24.a), the pre-classifier adjective *xiao* 'small' in the ClP of *yi xiao fu hua* 'a small Cl painting' does not refer to the size of the painting as small in comparison to other paintings, but expresses that, from a particular perspective it is small: e.g. given that he spent three years painting it, one could have expected something bigger.

Typically, we can choose to evaluate the painting from another perspective, and then it will be *yi da fu hua* 'a big painting'. For example, realizing the complexity of the techniques used in the painting we may regard it as a big painting. Thus, the adjective expresses a subjective evaluation from the perspective of the evaluator.

In this context, the pre-classifier adjective highlight the contrast between the size of the painting and the evaluation norm.

Similarly, in (24.b), the pre-classifier adjective *da* 'big' highlights the contrast between the small space of the house and the big size of the bed. Given that there is not enough space for so much furniture, the bed is a gigantic object for such a small room, it makes the room look even more crowded. The pre-classifier adjective does comment on the bed's actual size: in a study of 8 m^2, a small bed is big (and (24b) can be used), and it makes the room look extremely crowded.

To sum up: pre-classifier adjectives like *da/xiao* 'big/small' assign a low or high value to the atomic entity in the denotation of "Cl+N" on a certain scale like a scale of quantity, significance etc., from a particular subjective perspective. Such a subjective/personal choice of context implies that pre-classifiers will show a great variability of what subjective dimension the pre-classifier relates to.

2.4 Syntactic structure

Pre-classifier adjectives have been discussed by many linguists, e.g. T'sou (1976), Paris (1981), Lu (1987), Luo (1988), Tang (1990), Cheng & Sybesma (1998). The literature points out properties they have that adjectives in adnominal positions and predicative positions (post-copula positions) do not have.

First, pre-classifier adjectives can only be used in bare form and cannot be modified by modification marker *de* and degree modifiers like *hen* 'very':

(25) a. yi   da   xiang   shu
        one   big   Cl$_{box}$ book
        'a big box of books'

     b. * yi   da-de   xiang   shu
          one   big-Mod   Cl$_{box}$ book

     c.* yi   hen   da   de   xiang   shu
         one   very   big   Mod   Cl$_{box}$ book

Secondly, pre-classifier adjectives are restricted to a small set of dimensional adjectives, like *da/xiao* 'big/small', *chang* 'long' in (26), but not attributive adjectives like *lan* 'blue', *pianyi* 'cheap', *wuwei* 'tasteless' in (27):

(26) a. yi   chang   tiao   xianlian
        one   long   Cl   necklace
        'a long necklace'

     b. yi   xiao   kuai   mianbao
        one   small   Cl$_{piece}$ bread
        'a small piece of bread'

(27) a. # yi   wuwei   bei   kafei

     one   tasteless Cl_{-cup} coffee

     Intended: 'a tasteless cup of coffee'

  b. # yi   lan   ping   shui

     one   blue $Cl_{-bottle}$ water

     Intended: 'a blue bottle of water'

  c. # yi   pianyi   bei   kafei

     one   cheap   cup   coffee

     Intended: 'a cheap cup of coffee'

Tang (1990) explicitly discusses the syntax of the "Adj+Cl" construction. She claims (1990:419) that adjective and classifier forms a single constituent, that function as a compound, a zero-level category, rather than as a phrase. Tang proposes that the ill-formedness of (25.b-c) can be explained by the Lexical Integrity Hypothesis which says that no syntactic operation may affect only part of a lexical item.

The Lexical Integrity Hypothesis successfully captures the first property of the Cl+N phenomenon (the bare form in (25), but it cannot explain the second property, since making Adj+Cl a compound has nothing to say about which adjectives can enter into this compound.

Tang does not clearly tell us what the status is of the compound? Is it a classifier compound, or an adjective compound? More seriously, the proposal cannot account for the enriched meanings, and the interpretational variability of pre-classifier adjectives in the three contexts we discussed.

If we treat Adj+Cl as a compound in (22.b), *xiaoguan* would refer to 'a small tube'. But, as we saw, (22.b) does not refer to *a tube*, but *a(n atomic) tube of toothpaste* and the pre-classifier *xiao* 'small' makes the evaluative statement that a tube of toothpaste is a small (insignificant) thing. Given this, it is not plausible to assume that pre-classifier adjective and the classifier form compounds.

In Section 2.3, we argued that pre-classifier adjectives do not modify the classifier or the noun, but the whole constituent "Cl+N". We assume that pre-classifier adjectives are located in the Spec of the ClP [26] as in (28).

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[26] Liu (2010) discusses the use of 'adj+Cl' in post-copula positions in the Southerm Min dialect. He analyzes adj+Cl as an adjective compound. It is good to point out that Adj+Cl cannot be used in post-copula position in Mandarin, and that the Adj+Cl construction under discussion here differs syntactictically and semantically from the construction Liu discusses.

(28)

```
                    NumP
                   /    \
                Num      ClP
                yi 'one'  /  \
                      AdjP    Cl'
                      da 'big'  / \
                             Cl    NP
                          ping 'bottle' |
                                        N
                                   shui 'water'
```
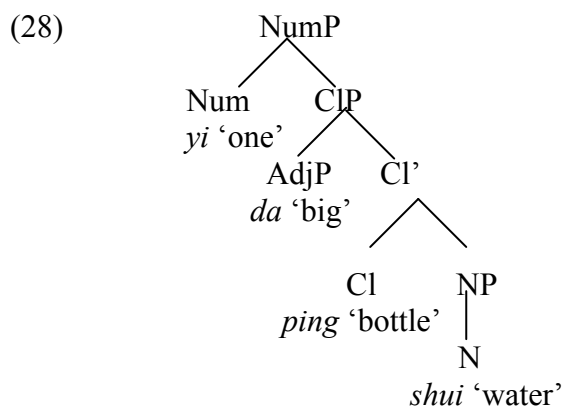
(28) is consistent with the structure of the classifier phrase on the counting reading, where the classifier first takes NP as complement to form ClP, which is then taken as complement by NumP. Moreover, it can account for the second constraint that pre-classifier adjectives are restricted to dimensional adjectives like *da/xiao* 'big/small'. The classifier has a counting meaning, Cl+N denotes a set of singular atoms, and pre-classifier adjectives express properties that evaluate the atoms in the denotation of the "Cl+N" from a particular point of view. Atoms are by nature individuated entities and have size and quantity properties, this is why they can be expected to be modified *da/xiao* or other dimensional adjectives like *chang*, 'long' (James Huang p.c.).

We will account for the first constraint that only bare adjectives can occur as pre-classifier adjectives, in the next subsection.

2.5 Semantics of pre-classifier adjectives

We now propose a semantics for pre-classifier adjectives making use of the notion "expressive" dimension discussed by Potts (2007) and Schlenker (2007).

2.5.1 Introduction to 'expressives'

Potts (2007) identifies six characteristics of expressives: independence, non-displaceability, perspective dependence, descriptive ineffability, immediacy, and repeatability. Pre-classifier *da/xiao* 'big/small' have all these features, but we will here   only concentrate on the first three properties.

Independence: the expressive content contributes a dimension of meaning that is separate from the regular descriptive content.

Nondisplaceability: the expressive content predicates something of the utterance situation.

Perspective dependence: the expressive content is evaluated from a particular perspective, in general the speaker's, but this can vary.

We discuss these concepts in an example by Potts (2007).

(29) That bastard Kresge is famous.

The *independence* property means that we can change or remove the expressive content of a phrase without affecting its descriptive content (Potts 2005:§3.6.3): we can assert to the descriptive content of (29) — the proposition that Kresge is famous—without thereby assenting to the characterization of Kresge as a bastard.

Nondisplaceability means that expression "bastard" is indexical to the utterance situation: the expressive proposition is valid for the utterer at the time and place of utterance" (Potts 2007).

Perspective dependence means that the expressive is a predicate of personal taste. Such predicates depend on a contextual parameter of a judge (Potts 2007). Expressives express the judge's personal attitude toward a certain individual or a current state of affair in the speech-act context. In (29) the speaker is also the contextual judge, *bastard* is evaluated from the speaker's perspective, and the contextual judge is sharing his attitude toward Kresge with us, his personal dislike of Kresge.

Schlenker (2007) proposes a propositional analysis of expressives. For Schlenker (2007:237), expressives are "*indexical* (evaluated with respect to a context), *attitudinal* (predicating something of the mental state of the agent in the context) and sometimes *shiftable* (in that the context of evaluation need not be the context of the actual utterance)". The differences between Potts (2007) and Schlenker (2007) are not very important in the present context; we adopt here the basic assumptions concerning expressives that they share, assuming that Schlenker's notion of 'indexical' is roughly equivalent to Potts's notion 'nondisplaceable', and that Schlenker's notions of 'attitudinal' and 'shiftable' are roughly equivalent to Potts's notion of 'perspective dependence'.

2.5.2 Pre-classifier adjectives as expressives

The three contexts where ClPs with pre-classifier adjectives appear are repeated in (30). (30.a) is a consumption context, (30.b) a context of significance, and (30.c) a contrastive context.

(30) a. ta   na / he   le   yi   da   ping   futejia.

       he   carry/drink Perf one big $Cl_{-bottle}$ vodka

       'He carried/drank a big bottle of vodka.'

    b. yi   ren   fa   le   yi   xiao   guan   yagao.

       one person give Perf one small Cl_{-tube} toothpaste

       'Each is given a small tube of toothpaste.'

    c. zhe   yi   xiao   fu   hua   hua   le   ta   ban-nian   shijian.

       this one small Cl painting cost Perf him half year time

       'This small painting cost him half year to finish.'

(30.a) means that the wine in the bottle is a large quantity for the subject; (31.b) means that the tube of toothpaste is an insignificant object in the eyes of evaluator; (30.c) means that the painting is considered to be small in view of the long time he spent painting it.

We use (30.a) to show that pre-classifiers satisfy the characteristic properties of expressives. In (30.a), *yi da ping futejia* 'a big bottle of vodka' means that the vodka in the bottle has a large value on a quantitative scale. At least two different scales are natural possibilities here. The pre-classifier *da* can mean that the bottle of vodka contains a heavy quantity of vodka. Suppose that a three-year old kid is trying to help his dad to carry a bottle of vodka, and he is staggering his way from the kitchen. Obviously, a bottle of vodka is too heavy for him. In this situation we can (30.a) (with *carry*, of course, and not with *drink*). The classifier in (30.a) can also mean the bottle of vodka contains a voluminous quantity of vodka in relation to the subject's capacity for liquor. Suppose that Tom is not a good drinker and he can only drink one glass of vodka maximally. But on the night that he was dumped by his girlfriend, he drank a whole bottle of vodka. Also in this situation we can use (30.a). In this case, *yi da ping vodka* implies that Tom drank too much alcohol.

Pre-classifier adjectives are *shiftable*. We saw above that the Pre-classifier *da* 'big' can express the speaker's personal evaluation of the size of the bottle of vodka from two different perspectives, weight and capacity for liquor. In both cases, the speaker shifts the context of utterance to the context of personal evaluation.

Pre-classifier adjectives are *attitudinal*. In the context of the drinking example, it is the speaker's personal opinion that one bottle of vodka is a large quantity for Tom, exceeding his maximal capacity for liquor. Tom himself may feel different about that. We saw the same in the example of the rice in the bowl in (15) where the speaker thinks that the quantity of rice contained in the specific bowl is big for a small child, but small for a basketball player.

Pre-classifier adjectives are *indexical*. The truth of (30.a) depends on the utterance context. For example, in the drinking situation, the speaker thinks that a bottle of vodka is too much for Tom *in that particular situation*. This does not mean that a bottle of vodka is always too much for Tom. If Tom continues to drink, he will become a drunk who can drink 3 bottles of vodka easily. In that case, if Tom drank a bottle of vodka, we would say that he drank *yi xiao ping vodka* 'a small bottle vodka'. Therefore, the personal evaluation expressed by pre-classifier adjectives is *indexical* to a particular context/situation.

We conclude that pre-classifiers *da/xiao* 'big/small' are expressives. We will not try to fit pre-classifiers into Potts's (2007) semantics of expressives. Our aim here is modest: we want to show how pre-classifier adjectives behave differently from attributive/predicative adjectives.

When the adjective precedes the classifier, the classifier in ClPs has a counting interpretation. The semantics of classifiers on the counting reading, which we argued for in Chapter 4, is illustrated in (31):

(31) $\|Cl\ N\| = \lambda x.\pi_1(x) \in ({}^{\cup}\boldsymbol{k}_N \cap k) \wedge \alpha(\pi_1(x)) \wedge \pi_2(x) = k$

The set of pairs of type d×k whose first element is an atomic individual instantiation of kind $\boldsymbol{k}_N$ in context k with property α and whose second element is k.

Following Kennedy (1997), we assume that gradable adjectives denote measure functions from objects to abstract representations of measurement, is sets of degrees. We take the degree adjective of *da* 'big' on its normal interpretation to be a predicate of individuals of type <d, t> as in (32). $\textbf{norm}_{BIG}$ is the degree that is the norm for what counts minimally as big.

(32) $\|da\| = \lambda x.\ MEAS(x) > \textbf{norm}_{BIG}$

The set of individuals that measure higher than the norm.

In English, when the adjective *big* modifies NPs, it shifts to its modifier interpretation at type <<d,t>,<d,t>> or <<d×k,t>,<d×k,t>>, depending on whether it modifies mass or count nominals (see Rothstein 2010).

In the case of pre-classifier adjectives, *da/xiao* 'big/small' syntactically modify the count Classifier Phrase "Cl+N". Semantically, we take the pre-classifier interpretation to be a

count predicate of type <d×k, t>. We represent the evaluative function of the pre-classifier adjectives by restricting the norm of comparison to be dependent on the perspective of *the judge in context k*. **judge**$_{k,BIG}$ is the minimal degree for what counts as big according to the contextually provided judge in context k. *da*$_{-Ev}$ is *da* on its evaluative function:

(33) $\|da_{Ev}\| = \lambda x.\text{MEAS } (\pi_1(x)) > \textbf{judge}_{k, BIG}$

We show how the semantics in (33) explains the interpretation of pre-classifier *da*$_{-Ev}$ in (30.a). The interpretation of *big or small* in (33) depends on **judge**$_{k,BIG}$, the minimal value for what counts as big according to the evaluation perspective chosen by the judge. On one perspective we understand *yi da ping futejia* 'a big bottle of vodka' as concerning weight, on the other perspective we understand it as concerning volume. If we choose to evaluate the bottle of vodka from the perspective of weight, we have to further identify the norm of evaluation. In our example, the norm of evaluation is a three-year old's carrying ability. If we choose to evaluate the bottle of vodka from the perspective of volume, the norm of evaluation will be different, in our example it was subject's capacity for drinking liquor. We assume that all these decisions are encoded in the parameter **judge**$_{k,BIG.}$

We give the following semantics for (30a):

(30.a.) ta   na / he   le   yi   da   ping   futejia.

        he   carry/drink   Perf   one   big   Cl$_{-bottle}$ vodka

        'He carried/drank a big bottle of vodka.'

(34) a. $\|ping\| = \lambda \textbf{\textit{k}}\lambda \textbf{\textit{x}}.\pi_1(\textbf{\textit{x}}) \in (\text{BOTTLE} \cap k) \wedge \text{CONTAIN}(\pi_1(\textbf{\textit{x}}), \textbf{\textit{k}}) \wedge \pi_2(\textbf{\textit{x}}) = k$

     b. $\|ping\ futejia\| = \|ping\| (\|futejia\|)$

       $= \lambda \textbf{\textit{x}}.\pi_1(\textbf{\textit{x}}) \in (\text{BOTTLE} \cap \text{ } k) \wedge \text{CONTAIN}(\pi_1(\textbf{\textit{x}}), \textbf{\textit{vodka}}) \wedge \pi_2(\textbf{\textit{x}}) = k$

     c. $\|da_{-Ev}\ ping\ futejia\| = \|da_{-Ev}\| (\|ping\ futejia\|)$

       $= \lambda \textbf{\textit{x}}.\pi_1(\textbf{\textit{x}}) \in (\text{BOTTLE} \cap k) \wedge \text{CONTAIN}(\pi_1(\textbf{\textit{x}}), \textbf{\textit{vodka}}) \wedge \pi_2(\textbf{\textit{x}}) = k$

              $\wedge \text{MEAS } (\pi_1(\textbf{\textit{x}})) > \textbf{judge}_{k, BIG}$

2.5.3 Pre-classifier adjectives and plurality

Most of the examples with pre-classifier adjectives we have discussed so far have only *yi* 'one' as Num. However, classifier phrases with pre-classifier adjectives are also possible with other numerals. According to Lu (1987), of 328 examples, 88.1% take *yi* 'one'. The next most frequent quantifier is *ji* 'several' (4.6%). The numerals together form 6.4%.[27] We have also shown some examples with plural ClPs, namely (18.a) and (23), the latter repeated as in (35).

(35) ni   bie xiaokan zhe   ji   xiao li   huangdou,
    you   not belittle these several small Cl-grain soybean
    zhe shi women hua le duoda-de xinxue cai peiyu   dedao de liangzhong.
    this be   we   spend Perf much   effort Foc cultivate gain Mod selected seed
    'Don't belittle these small grains of soybeans. They are the selected seeds that were cultivated with painstaking effort.'

According to the semantics in (33), the pre-classifier *da/xiao* are predicated of a set of atomic individuals, which can be modified by numbers and be pluralized. This correctly predicts that in plural Adj+Cl+N, the pre-classifier adjective has a distributive reading, in which it distributes over the individual entities in the denotation of Cl+N. (35) means that each soybean is an insignificant entity in the eyes of the speaker. Accordingly, we suggest that the pluralization operator, as notated PL *, scopes over the 'adj+Cl+N'.

We gave the semantics of pluralization in Chapter 4. Here we give pluralization for a predicate P of type $\langle d \times k, t \rangle$: *(P) is given in (36):

(36) $*(P) = \lambda x. \pi_1(x) \in *\pi_1(P) \wedge \pi_2(x) = k$

The semantic derivation of *xiao li huangdou* 'small grain soybean' is given in (37.a) and (37.b).

(37) a. $\|li\ huangdou\| = \lambda x. \pi_1(x) \in (^{\cup\cap}\text{SOYBEAN} \cap k) \wedge \pi_2(x) = k \wedge \text{GRAIN}(\pi_1(x))$

  b. $\|xiao\ li\ huangdou\| = \|xiao_{-Ev}\|(\|li\ huangdou\|)$

  $= \lambda x. \pi_1(x) \in (^{\cup\cap}\text{SOYBEAN} \cap k) \wedge \pi_2(x) = k \wedge \text{GRAIN}(\pi_1(x)) \wedge \text{MEAS}(\pi_1(x)) > \textbf{judge}_{k,\ \text{SMALL}}$

---

[27] Note that in these statistics, Lu (1987) did not distinguish between individual classifiers and non-individual classifiers.

Pluralization applies to this predicate and gives the set of pluralities of atomic soybeans, where each member of the plural entity is counted as 'an insignificant entity':

(38) $\lambda x.\pi_1(x) \in *(\cup \cap SOYBEAN \cap k) \wedge \pi_2(x) = k \wedge GRAIN(\pi_1(x)) \wedge MEAS(\pi_1(x)) > \mathbf{judge}_{k, SMALL}$

This expression can be modified by numerical adjectives in the normal way.

2.6 Conclusion

We examined the syntactic and semantic properties of pre-classifier adjectives. We showed that pre-classifier adjectives can only appear in the counting contexts, before before [+C, -M] and [+C, +M] classifiers.   We saw that pre-classifier adjectives are not unrestricted can only be used in certain contexts, prominently consumption, the contrastive and the significance contexts. We argued that pre-classifier adjectives modify neither classifiers nor nouns, but Cl+N. Syntactically, they are the Spec of the ClP. We proposed a semantics of pre-classifier adjectives as 'expressives; with interpretations sensitive to a contextual judge's personal evaluation or attitude in a situation to the entities in the denotation of Cl+N'

3.   Licensing of the post-classifier *de*

In this section we study the post-classifier *de*. We discuss Cheng & Sybesma's (1998) account in Section 3.1, Tang's (2005) account in terms of "information weight" in Section 3.2., Hsieh's (2008) account in terms of 'indeterminateness' 3.3 respectively, and my own observations made in Li 2007 in Section 3.4.   After that we formulate out proposals for the syntax and semantics of post-classifier *de*. We argue that the post-classifier *de* can occur with individual and non-individual classifiers and that *de* cannot be regarded as a syntactic marker for mass classifiers. We also propose that the post-classifier *de* forces the Num and the classifier in to a constituent, with a modifier meaning, expressing measurement.

3.1 Cheng & Sybesma 1998

As we saw, Cheng & Sybesma (1998) make two independent claims about post-classifier *de*. First, they claim that post-classifier *de* only follows what they call 'mass' classifiers like *ping* 'bottle' and *xiang* 'box' in (39), but not 'count' classifiers like the general classifier *ge* and the classifier for animals *tou* 'head' in (40).

(39) a. san   bang   (de)   rou

      three Cl_{-pound} DE   meat

      'three pounds of meat'

   b. liang   xiang   (de)   shu

      two Cl_{-box} DE   book

      'three boxes of books'

(40) a. jintian   lai   le   san   ge   (*de)   laoshi.

      today   come   Perf   three   Cl   DE   teacher

      'Today three teachers came.'

   b. women   you   ba   tou   (*de)   niu.

      we   have   eight Cl_{-head} DE   cow.

      'We have eight heads of cows.'

We saw in Chapter 2 that there are counterexamples to the claim that *de* only follows mass classifiers. For example, in (41), classifiers like *ke* and *li* are typical individual classifiers in Chinese, but they allow a post-classifier *de*:

(41) a. yi   nian   yue   zhongzhi-le   yi-bai-sishi-duo-wan   ke   de   shumu.

     one year   about   plant-Perf   one-hundred-forty-more-million Cl   DE   tree

     '(They) planted more than 1,400,000 trees a year.'

   b. yi   ge yi   sui   de   yin'er mei-ci   zhi   neng   chi 1/3   li   de   ganmao-yao

     one Cl one year Mod baby every time only   can   eat 1/3   Cl   DE cold pill

     'A one year old baby can only take 1/3 of a cold pill every time.'

The second claim made by Cheng & Sybesma (1998) about *de* concerns its semantics. They argue that the post-classifier *de* introduces a measure reading for mass classifier phrases. According to them, *de*-less mass ClPs have by default an individuating reading, and *de*-marked ClPs have a measure reading. The examples in (42) and (43) are taken from their paper.

(42) a. zhuo-shang   you   san   wan   tang.

      table on   there-be   three Cl$_{-bowl}$ soup

      'There are three bowls of soup on the table.'

    b. zhuo-shang   you   san   wan   de   tang.

      table   on   there-be   three Cl$_{-bowl}$ DE   soup

      'There is enough soup on the table to fill in three bowls.'

(43) a. # ta   yong   xiao-wan   he   le   san   bei   jiu.

       he   use   small-bowl   drink Perf   three   Cl$_{-glass}$ liquor

    b. ta   yong   xiao-wan   he   le   san   bei   de   jiu.

      he   use   small-bowl   drink   Perf   three   Cl$_{-glass}$ DE   liquor

      'He used a small bowl to drink three glasses of liquor.'

According to Cheng & Sybesma (1998), Num-Cl-N *san wan tang* 'three bowls soup'in (42.a) has a counting reading: (42a) means that there are three individual bowls, each of which is filled with soup and stands on the table. (42.b), with Num-Cl-*de*-N, i.e. *san wan de tang* 'three bowls *de* soup' has a measure reading: it means that the soup is spilled all over the table and there are no bowls.

According to Cheng & Sybesma, (43a), without *de*, is infelicitous, *bei* 'glass' without *de*, induces the default reading that the wine is consumed from an actual glass. In (43) *bei* 'glass' is followed by *de*, and (43.b) merely expresses that the quantity of the wine consumed was three glass-units.

I agree with Cheng & Sybesma that Num-Cl-*de*-N in (42.b) and (43.b) has a measure reading. I do not agree, however, with their interpretation of Num-Cl-N in (42.a) and (43.a). *De*-less ClPs in Chinese are, in fact, ambiguous between counting and measure readings.[28] This is shown in (44).

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[28] We argued in Chapter 4, that [+C, +M] classifiers are equally open for counting and measure interpretations, that [+C, -M] classifiers have by default a counting reading, and measure readings by coercion only, that [-C, +M] classifiers have by default a measure reading, and a counting reading by coercion, while [-C, -M] classifiers, i.e. kind classifiers, can neither count nor measure individuals.

(44) a. wo ling   le liang ping   jiu,   zuo shou yi ping, you shou yi ping.

I   carry Perf two   Cl$_{bottle}$ wine   left hand one   Cl$_{bottle}$ right hand one   Cl$_{bottle}$

'I carried two bottles of wine, one in the left hand and the other in the right hand.'

b. wo   zonggong   he   le   you   yi   ping   putaojiu,

I   altogether   drink Perf   have   one Cl$_{bottle}$ wine

ban ping   bai-de   ban ping   hong-de

half Cl$_{bottle}$ white   half Cl$_{bottle}$ red

'I drank a bottle of wine in total, half bottle of a white wine and half bottle of a red wine.'

(44a) shows the counting reading of the classifier phrase *liang ping jiu* 'two bottles wine' is shown in (44.a), (44.b) shows the measure reading in which the classifier *ping* 'bottle' measures the quantity of wine as one bottleful, say, 750 ml.

According to the native speakers we consulted, (42.a) and (43.a) can have a measure interpretation. (43.a) is not regarded as very bad, and, they claim, it is completely acceptable, if you know the volume of the bowl from the context.

It seems, then, that whether the classifier phrase can get a measure reading, depends on whether the classifier is typically used as a standard measure unit for the kind of entities in the noun denotation, and whether enough information can be inferred from the context about the capacity of the container. *Glass* is a frequently used container for liquor, but it is not a standard or original measure unit for liquor, since we can think of glasses with different sizes. Therefore, when we use 'a glass of liquor' without any further contextual information, it is difficult to get a measure reading (cf. (43.a)). But if we use the classifier *ping* 'bottle' (instead of *bei* 'glass') to modify the noun *liquor*, then we get a measure reading easily, as in (45.a):

(45) a. ta yong   xiao wan   he   le   san   ping   hongjiu.

he   use   small bowl   drink Perf   three Cl$_{bottle}$ red wine

'He drank three bottles of red wine with a small bowl.'

This is because the classifier *bottle* is a prototypical package/container for *liquor*, like *barrel* for *oil*, *cup* for *coffee*, and *volume* for *book*. A conventional combination of classifier and noun facilitates measure readings. For example, the conventional combination of *bottle* and *wine* makes the quantity of 750 ml salient, because wine bottles conventionally take 750 ml.

Accordingly, (45.a) has a measure reading, and means that he used a small bowl to drink 3£750 ml of wine.

Similarly, it is conventional to put bubble tea in a plastic cup of 700 cc. Because of this, (45.b) can have a measure reading, asserting that he uses a small bowl to drink 3×700 cc of bubble tea.

b. ta   yong   xiao   wan   he   le   san   bei   nai-cha
   he   use   small bowl   drink Perf   three Cl-cup   milk-tea
   'He drank three cups of bubble tea with a small bowl.'

In the light of the counterexamples, we need to reconsider the syntax and semantics of post-classifier *de*:

(i) It turns out that *de* is possible both after individual and non-individual classifiers. Are there syntactic constraints on its distribution?

(ii) When individual classifiers are followed by *de*, do they also have a measure reading? If they do, is it the same type of measure reading as we find for non-individual classifiers followed by *de*?

3.2 Tang 2005

In Chapter 2, we discussed Tang's (2005) criticism of Cheng & Sybesma (1998). We argued that her cases where *de* follows an individual classifier are not the same phenomenon as what Cheng & Sybesma (1998) discuss: Tang's examples concern attributive readings of Num-Cl-*de*-N, while Cheng & Sybesma's examples concern measure readings (see Chapter 2 for details). Some of the examples are repeated in (46) and (47).

(46) a. liang   ben   de   shu   [count classifier]
        two   Cl-volume DE book
        'books that are sorted in accordance with two in number'
     b. wu   ge   de   pingguo
        five   Cl   DE   apple
        'apples that are sorted in accordance with five in number'

(47) a. liang   mi   de   bu   [mass classifiers]

      two   meter   DE   cloth

    'cloth that is sorted in accordance with two meters'

   b. liang   bang   de   rou

      two   pound   DE   meat

    'meat that is sorted in accordance with two pounds'

While Tang (2005) mainly discusses the attributive type of Num-Cl-*de*-N, she gives some examples, in which Num-individual Cl-*de*-N do not have an attributive meaning, but a measure reading:

(48) a. mingtian   de   huodong   xuyao yi   bai   zhang de   fangzuozi.

    tomorrow   Mod   activity   need one hundred   Cl   DE   square talbe

    'Tomorrow's activity needs one hundred square tables.'

   b. yi nian   yue   zhongzhi   le   yi-bai-sishi-duo-wan   ke   de shumu.

    one year about   plant   Perf one hundred forty more million Cl   DE tree

    '(They) planted more than one million and forty hundred thousand trees a year.'

In (48.a), *yi bai zhang-de* 'one hundred-Cl-*de*' expresses that the number of individual tables is one hundred, and in (48.b), *yi-bai-sishi-duo-wan-zhi-de* expresses that the number of individual trees is one million and forty hundred thousand. The interpretations of these examples in (48) are similar to the cases discussed in Cheng & Sybesma (1998). But, the classifiers in (48) are individual classifiers, which normally do not have measure readings.

    Tang does not distinguish the examples in (48) from the attributive ones in (46) and (47).   She treats all of them as complex NPs with Num-Cl-*de* as modifiers. Tang suggests that the felicity of the examples in (48) is related to the information weight of the modifier-modifiee relation: weighty modifiers facilitate the measure interpretation. Num-Cl phrases like *yi bai zhang* 'one hundred picees' and *yi-bai-sishi-duo wanb ke* 'one million and forty hundred thousand Cl' are complex and heavy modifiers, and they can have the particle *de* after the individual classifier. In contrast, *wu ke* 'five Cl' is, according to Tang, a simple modifier, and *wu ke de shu* 'five Cl de trees' is ungrammatical.

    Tang's "information weight" account works for the examples in (48), but does not extend to the example in (49). In (49), the numeral *yi bai lin yi* 'one hundred and one' is a complex number, but it does not allow modification marker *de*.

(49) * mingtian   de   huodong xuyao yi   bai   lin   yi   zhang de   fangzuozi.
      tomorrow Mod activity   need   one hundred   and   one Cl   DE   square talbe
      'Tomorrow's activity needs one hundred and one square tables.'

3.3 Hsieh 2008

More examples like (48) are given in Hsieh (2008), taken from the Academia Sinica Corpus. The examples in (50-51) have individual classifiers followed by *de* and a measure reading.

(50) a. jin   yi-bai   wei   de   qianjiu   renyuan   (A.S. Corpus)
         close one-hundred   Cl   DE   rescue   worker
         'close to one hundred rescue workers'
      b. hao   ji   bai   tiao   de   hai she   (A.S. Corpus)
         quite several hundred   Cl   DE   sea snake
         'quite several hundreds of sea snakes'

(51) a. pai-le   wu-qian   zhang   de   yizi…   (A.S. Corpus)
         put:in:order-Perf   five-thousand   Cl   DE   chair
         'put 5 thousand chairs in order…'
      b. wu-bai-wan   zhi   de   yazi   (A. S. Corpus)
         five-hundred-ten:thousand   Cl   DE   duck
         '5 million ducks'
      c. tongshi   you   peiyang   le   23   wei de zhongzi jiangshi …(A.S. Corpus)
         meanwhile again   cultivate   Perf   23   Cl DE seed lecturer
         'at the same time 23 'seed' lecturers were educated…'

Hsieh (2008) proposes that in (50), the *de*-marked individual ClP expresses a non-fixed or indeterminate quantity. Thus, in (50.a) the NumP is modified by an approximation modifier *jin* 'close to', and in (50.b), the Num is *ji* 'several', which expresses an unfixed or indeterminate quantity.

In contrast, the examples in (51) do not need approximation modifier and the numeral can be precise. (Note that (51.c) is not acceptable for me and for other native speakers I consulted with.) Hsieh calls the context in (51) an emphasis/contrastive context, while the context in (50) is called an indeterminacy context. By 'emphasis'/'contrastive' Hsieh means

that the *de*-marked ClP emphasizes large quantities as in 'as many as Num N'. This account is in some respects similar to Tang's (2005) account of information weight.

Hsieh, following Lyons (1976) and Tang (2005), assumes that there are two lexically different types of classifiers in Chinese, 'mensural' and 'sortal' classifiers. hence, according to Hsieh the post-classifier *de* can be used in the following three contexts:

(i)   After a 'mensural' classifier

(ii)   After a sortal classifier, when the quantity is non-fixed

(iii)   After a sortal classifier, when there is emphasis or contrast.

Hsieh (2008) proposes a unified syntactic account for these three contexts.

Hsieh argues that in Num+Cl+N, the Num and the Cl form a single constituent which is the complement of the head noun. She shows that some modifiers preceding the Num-Cl-N don't modify the noun but the complex Num-Cl. The examples in (52) and (53) are (slightly) adapted from Hsieh (2008).

(52)   a. zhengzheng   yi/san   zhi   ji
            as a whole   one/three   Cl   chicken
          'a whole chicken/three chickens in total'
       b.* zhengzheng   ji
            as a whole   chicken
       c.* yi/san   zhengzheng   zhi   ji
            one/three   as a whole   Cl   chicken
          'a whole chicken/three whole chickens'

Hsieh argues that when the modifier *zhengzheng* 'whole' precedes the whole numeral classifier phrase, as in (52.a), it modifies "Num+Cl", not the noun, as in (52.b) nor Cl+N, as in (52.c). (52.a) means the wholeness of a single chicken if the Num is *yi* 'one' or the total number of chickens if the Num is larger than *yi* 'one'. We agree with Hsieh about the contrast between (a) and (b-c). However, according to the my own intuition and the native speakers I consulted, regardless of whether we use the numeral *yi* 'one' or *san* 'three', we always get the wholeness reading, namely, a whole chicken or three whole chicken. It is a measure reading. We will elaborate this point from Section 3.6.

(53) a. manman   yi/san   ping   shui

　　　　full   one/three   Cl-bottle   water

　　　　'a full bottle of water /three full bottles of water'

　　b. *manman   shui

　　　　full   water

　　c.* yi / *san   manman   ping   shui

　　　　one/ three   full   Cl-bottle   water

The modifier *manman* 'fully' in (53) is similar. It appears before the whole nominal phrase, but modifies Num-Cl. As for its interpretation, *manman* 'fully' in (53) can only "be related to the measurement represented by the massifier *ping*", no matter whether the Num is *yi* 'one' or *san* 'three' (Hsieh 2008: 42-43).

　　　　On the basis of the examples in (50) and (53), Hsieh (2008) proposes that Num-Cl in Num-Cl-N is a single constituent, which heads #P or NumP (Number Phrase). The NumP enters into a Spec-Head relation with the head noun. This is illustrated in (54).

(54)　　　　　　　　#P
　　　　　　　　 ╱　＼
　　　　　DemP　　　#'
　　　　　　　　　 ╱　＼
　　　　　　　NumeralP　#'
　　　　　　　　 |　　　 |
　　　　　　　　Num　　 #
　　　　　　　　　　　ge/ping
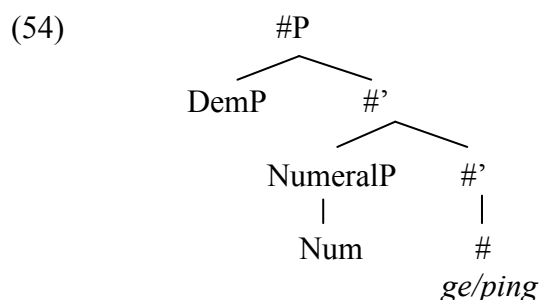
Hsieh assumes that Numerals such as *yi* 'one' or *ji* 'several' are merged in NumeralP and that demonstratives such as *zhe* 'this' or *na* 'that' are merged in DemP.

　　　　Hsieh proposes the structure in (54) as a unified structure for individual and non-individual classifiers, where 'the NumP can be occupied either by classifiers or massifier'. In this, her proposal differs from proposals that assume that mass and count classifier phrases have distinctive structures, i.e. Cheng & Sybesma (1998), and proposals based on that, like Borer (2004) and Watanabe (2006).

　　　　Hsieh (2008) proposes the feature taxonomy for the Num head in (52) in terms of the two features: [±PL], which is the singular/plural feature, and [±Ind] which is the indeterminite/determinite feature, which she assumes is a sub-feature of [+PL].

(55)

```
                    Num
                   /    \
              [-PL]      [+PL]
                        /    \
                   [-Ind]    [+Ind]
```
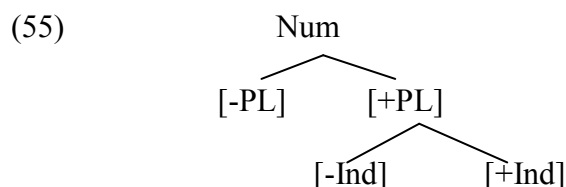
She proposes that *de* requires the feature of [+Ind], i.e. *de* is necessary to identify the [+Ind] feature under the node of [+PL]. This implies that on Hsieh's analysis, the particle *de* is part of NumP and the presence or absence of the particle *de* after the classifier does not correspond to a difference in syntactic structure of the nominal phrase.

However, there is a serious problem with Hsieh's analysis. We agree that when *de* follows an individual classifier, the examples are better with approximators like *jin* 'nearly' or *duo* 'more'. However, such modifiers are not needed when *de* follows a non-individual classifier. In that case exact quantities are unproblematic, as in *three bottles de wine*. If *de* requires [+Ind], these cases are a mystery.

In addition, as we will show in Section 3.4, when the Num is a fraction, it is also possible to use *de* after individual classifiers. Fractions are generally perceived as pretty exact, so they seem to invalidate Hsieh's [+Ind] proposal again. We will deal with this issue in Section 3.5.

3.4 Li's (2007) observation

Li (2007) also notes that individual classifiers can be followed optionally by *de* in some cases, see (56):

(56) a. ta   peng-zhe   shi   duo   ben   de   shu
        he   carry-Prog   ten   more   Cl   DE   book
        'I was carrying more than 10 books.'
     b. ta   yilian   xie   le   liang-bai   duo   feng   de   xin
        she   continuously   write   Perf   two-hundred   more   Cl   DE   letter.
          'She wrote more than 200 letters continuously.'

Like Hsieh, Li argues that *de* requires a context of quantification of "aboutness" or "approximation", not a context of "exactness".

Li & Rothstein (2010) observe two other cases where *de* can follow individual classifiers: (i) when the Num is a (contextually) high round number; (ii) when the Num is a fraction.

Against Cheng & Sybesma's (1998)'s claim about (40) (repeated here as (57)) that the ungrammaticality of the examples with *de* is not due to the classifiers, but to the Num. The Nums in these examples (*wu* 'five' and *san* 'three') are low numbers. If we change the number to a high round number, like *wubai* 'five hundred' or *qian* 'thousand', these sentences are grammatical with *de,* as in (58).

(57) a. jintian   lai   le   san   ge   (*de)   laoshi.
        today   come   Perf   three   Cl   DE   teacher
        'Today three teachers came.'
    b. women   you   ba   tou   (*de)   niu.
        we   have   eight   Cl-head   DE   cow.
        'We have eight heads of cows.'

(58) a. women   qing   le   jin   qian   wei   de   laoshi.
        we   invite   Perf   near   thousand   Cl   DE   teacher
        'We invited nearly one thousand teachers.'
    b. women   you   babai   tou   de   niu.
        we   have   800   Cl   DE   cow
        'We have 800 cows.'

The real generalization seems to be that individual classifiers can be followed by the particle *de* if the Num is a (contextually) high round number or a fraction.

Some more examples of high round numbers are given in (59).

(59) a. sanshi duo   ge   de   pingpangqiu-tai   daduo dou   you   ren   zai   da.
        30   more Cl   DE   ping pang   table most   all   have   people Prog   play
        'Most of thirty-some ping pong tables are being used by people.'   (from PKU corpus)
    b. nabian bian   zhong   le   qi   ba   ke,   shi lai   ke   (de)   juzi shu.
        there   then   plant   Perf   seven eight Cl   ten around   Cl   DE   mandarin tree
        'On that side were planted seven or eight, or around ten mandarin trees.'

(from PKU corpus: prose by *Yu Pingbo*)

The examples in (60) show the other case where the Num slot is filled in by a fraction like ½, ¼, ¾.

(60) a. san-fen-zhi-yi   li   de   ganmao-yao

one-third   Cl   DE   cold-pill

'one third of a cold pill'

b. na   zhi   gou   zhan   le   ban   zhang   de   shafa.

that   Cl   dog   occupy   Perf   half   Cl   DE   sofa

'That dog occupied half of the sofa.'

In the following two sections, we will look at the interpretation differences between Num-Cl-N and Num-Cl-*de*-N in relation to the counting/measure distinction.

We will argue that the presence of *de* after classifiers induces a measure reading Num-Cl-*de*-N, where Num-Cl is quantity denoting. We call this a derived measure reading. The derived measure reading forced by *de* incorporates the meaning of the original classifier. We will discuss two types of derived measure readings. In section 3.5, we will argue that when the classifier has an inherent measure interpretation, *de* has the semantic-pragmatic function of changing emphasis. This reading we will call *as much as Num-Cl*. In section 3.6 we will argue that when the classifier has an inherent counting reading the semantics constructs an approximate measure interpretation. This reading we will call *as many as Num-Cl*.

3.5 Num-Cl-*de*-N: as much as …

3.5.1 Num-Cl-*de*-N with [+Measure] classifiers

Cheng & Sybesma (1998) and Hsieh (2008) argue that 'mass' or mensural classifiers like *xiang* 'box', *ping* 'bottle' can be followed by the particle *de*. We propose here that *de* can occur after a classifier if it is [+Measure], i.e. [+C, +M] classifiers on the measure reading and [-C, +M] classifiers. We make the following predictions.

First, we predict that [-C, +M] classifiers like *gongli* 'kilometer', *mi*, 'meter' etc can have an optional *de*:

(61) a. wo   zou   le   san   gongli   (de)   lu
     I   walk   Perf   three kilometer   DE   road
     'I walked three kilometers of road'

   b. ta   mai   le   liang   bang   (de)   rou.
     she   buy   Perf   two   pound   DE   meat
     'She bought two pounds of meat.'

Measure words like *gongli* 'kilometer' and *bang* 'pound' do not have corresponding naturalistic objects like containers; they denote measure units only. For example, s*an gongli lu* 'three kilometers road' does not refer to a particular section of road; it just means that the length of road is three kilometers. The insertion of *de* after the measure word does not result in a drastic reinterpretation of the phrase: *san gongli de lu* 'three kilometers *de* road' in (61.a) has the emphasized meaning that *the distance that I walked is **as much as** three kilometers*.

      Secondly, we predict that [+C, +M] classifiers (with low precise numbers) can be followed by *de* when they denote measure units but not when they denote counting units:

      In (62.a), *san ping jiu* 'three bottle wine', has a counting reading; there are three individual bottles, which are opened one by one. In (62.b), *san ping jiu* 'three bottle wine' has the measure reading: it is the amount of wine that my stomach can hold that is as much as three bottles.

(62) a. wo   kai   le   san   ping   jiu.   [Counting]
     I   open   Perf   three   Cl_bottle   wine
      'I opened three bottles of wine.'

   b. wo-de   wei   neng   zhuangxia   san   ping jiu.   [Measure]
     my   stomach   can   hold   three Cl_bottle wine
      'My stomach can hold three bottles of wine.'

We find we can insert *de* after these classifiers when they have a measure interpretation, but not when they have a counting interpretation:

(63) a. * wo   kai   le   san   ping   de   jiu.   [Counting]
         I   open   Perf   three   Cl-bottle   DE   wine
         Intended: 'I opened three bottles of wine.'

    b. wo-de   wei   neng   zhuangxia   san   ping   de   jiu.   [Measure]
         my   stomach can   hold   three   Cl-bottle   DE   wine
         'My stomach can hold three bottles of wine.'

None of the accounts discussed above is able to explain this contrast, but our semantic account can: the post-classifier *de* requires the measure interpretation of the classifier.

The insertion of the particle *de* after the classifier in (63.b) does not affect the truth value of the sentence: (63.b) means the same as (62.b). As in (61a) *de* has an emphatic meaning: (63.b) emphasizes the quantity of three bottles: *'as much as three bottles.'*

3.5.2   Syntax of Num-Cl-*de*-N

We argued in Chapter 4 that ClPs have different syntactic structures on counting and measure interpretations, $[_{NumP}$ Num $[_{ClP}$ Cl$[_{NP}$ N]]] on the counting reading, and $[_{NP}$ $[_{NumP}$ Num$[_{ClP}$ Cl]]N] on the measure reading. We will now argue in the sequence Num-Cl-*de*-N, the Num and the Cl form a single constituent modifying the head noun.

First, as shown in (64), the particle *de* can only be inserted after classifiers but not between the numeral and the classifier.

(64) a. wo   he   le   san   ping   **de**   jiu.
         I   drink   Perf   three   Cl-bottle   DE   wine
         'I drank about three bottles of wine.'

    b. *wo   he   le   san   **de**   ping   jiu.
         I   drink   Perf   three   DE   Cl-bottle   wine

This is what we would expect if Num Cl form a constituent (a modifier).

Secondly, in examples with *de*, the modifier *duo* 'more' can occur either after the Num (65.a) or after the classifier (65.b).

(65) a. tuoyun   le   shi   **duo**   xiang   **de**   tushuziliao
         consign   Perf   ten   more   boxes   DE   book
         'consigned more than ten boxes of boxes'
      b. zhuan   le   liang   koudai   **duo**   **de**   pingguo
         carry   Perf   two   bag   more   DE   apple
         'carried more than two bags of apples'   [from Lü   1980/1999:184]

Li & Rothstein (2010) argue that (65a) can have both a counting reading and a measure reading, but a measure reading is preferred in (65.b). Again this is what we might expect if Num Cl is a constituent.

Thirdly, as we saw above, Hsieh (2008) points out that some modifiers precede Num-Cl-N, but actually modify Num-C.

(66) a. manman   yi/san   ping   shui
         full   one/three   Cl-bottle   water
         'a full bottle of water /three full bottles of water'
      b. *manman   shui
         full   water
      c. * yi / *san   manman   ping   shui
         one three   full   Cl-bottle   water

When the adverbial *manman* 'full' precedes Num-Cl-N, the nominal phrase can only be interpreted with a measure reading: *manman* modifies the quantity of water denoted by the Num+Cl. In (67) we see that *de* can be inserted after the classifier also when modified by *manman* 'full'. This indicates that in Num-Cl-*de*-N, Num-Cl is a single constituent modified by *manman*.

(67) manman   yi/san   ping   de   shui
      full   one/three   Cl-bottle   DE   water
      'a full bottle of water /three full bottles of water'

Based on the above three points, we argue that in the sequence Num-Cl-*de*-N, *de* forces the cluster Num-Cl to be a modifier of the head noun and denotes the quantity or the number of the entities referred to by the head noun. We propose that Num-Cl-*de*-N is analyzed as [$_{NP}$ [$_{CP}$

[$_{NumP}$ Num [$_{ClP}$ Cl]]*de*]N], where the particle *de* is analyzed as a non-root complementizer in the spirit of Paul (2007, 2010) and takes the Num+Cl as complement, forming a phrase that modifies the head noun:

(68)

```
                    NP
                   /  \
                  CP    N
                 /  \   shui 'water'
              NumP    C'
              /  \    |
           Num   ClP  C
           san   ping  de
          'three' 'bottle'
```
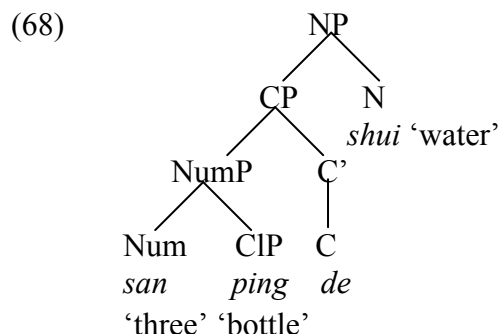
3.5.3 Semantics of Num-Cl-*de*-N : *as much as …*

In this subsection, we propose a measure-based semantics for Num-Cl$_{-Measure}$-*de*-N on the basis of the structure given in (68).

We assume that the basic meaning of a MEAS head is as a measure function $\lambda n\lambda x$. MEAS(x) = <n,U> of type <n, <d,t>>. A MEAS head combines with a number to give a predicate of type <d, t>. We assume that [-C, +M] classifiers like *gongjin* 'kilo' and [+C, +M] classifiers like *ping* 'bottle' have interpretations as measure heads. In (69) we give their interpretations and combination with numerals.

(69) a.‖ *gongjin*‖ =$\lambda n\lambda x$.MEAS (x)= <n,KILO>
   b. ‖*ping*‖ =$\lambda n\lambda x$.MEAS (x) = <n,BOTTLE>
   c. λx.MEAS (x) = <2,KILO>
   d. λx.MEAS (x) = <3,BOTTLE>

These Num-Cl measure predicates can be used in prototypical predicate positions, like after the verb *zhong* 'weigh' or *you* 'have/reach', as in (70):

(70) a. zhexie   pingguo   zhong   liang   gongjin.
      those   apple   weigh   two   kilos
      'These apples weighs two kilos.'
   b. ta   he   de   jiu   you   san   ping.
      he   drink Mod   wine   have   three Cl$_{-bottles}$
      'The wine he drank reaches three bottles.'

This measure head, Num-Cl, shifts its basic measure reading when it is used in a classifier position, i.e. in Num-Cl-N. The reason is that classifiers map kinds onto sets of entities or quantities. Hence, in classifier position, the head *gongjini* and *ping* are of type $<n<\boldsymbol{k},<d,t>>>$. Namely, they apply to a number to give a complex classifier, which applies to a kind and gives a set of instantiations of the kind with the appropriate measure properties. This interpretation is given in (72b). *Liang gongjin* 'two kilo' is of type $<\boldsymbol{k}, <d, t>>$ and its interpretation is given in (71.c). The interpretation of (71.a) is in (71.d).

(71) a. liang   gongjin   pingguo

       two   kilo   apple

       'two kilos of apples'

   b. $\| gongjin\| = \lambda n \lambda \boldsymbol{k} \lambda x.x \in {}^{\cup}\boldsymbol{k} \wedge MEAS(x)=<n,KILO>$

   c. $\|gongjin_{<n<k<d,t>>>}\|(\|liang_n\|) = \lambda \boldsymbol{k} \lambda x.x \in {}^{\cup}\boldsymbol{k} \wedge MEAS(x)=<2,KILO>$

   d. $\|liang\ gongjin_{<k<d,t>>}\|(\|pingguo_k\|) = \lambda x.x \in {}^{\cup\cap}APPLE \wedge MEAS(x)=<2,KILO>$

We propose that [+C, +M] classifier phrases on their measure reading undergo the same process. We shift the measure interpretation of the [+C, +M] classifier to the right type as in (72b):

(72) a. ta   he   le   san   ping   jiu

       he   drink   Perf   three   Cl-bottle   wine

     'He drank three bottles of wine.'

   b. **Derivation I: *san ping shui* 'three bottles of water'**

     $\| ping \| = \lambda n \lambda x.\ MEAS(x) = <n,BOTTLE>$

     $\| ping_{cl} \| = \lambda n \lambda \boldsymbol{k} \lambda x.\ {}^{\cup}\boldsymbol{k}(x) \wedge MEAS(x) = <n,BOTTLE>$

     $\|san\ ping\| = \lambda \boldsymbol{k} \lambda x.\ x \in {}^{\cup}\boldsymbol{k} \wedge MEAS(x) = <3,BOTTLE>$

     $\|san\ ping\ shui\| = \lambda x.x \in {}^{\cup\cap}WATER \wedge MEAS(x) = <3,BOTTLE>$

Now we come to the measure examples with *de*. When a basic measure reading is available, the particle *de* can be unproblematically inserted after the measure head, as in (73a) with *gongjin* 'kilo', and in (73b) with the non-individual classifier *ping* when it has its measure reading.

(73) a. tamen   chi   le   liang   gongjin   de   pingguo.
　　　 they   eat   Perf   two   Cl$_{-kilo}$ DE   apple
　　 'They ate as much as two kilos of apples.'
　　 b. ta   he   le   san   ping   de   jiu
　　　 he   drink   Perf   three   Cl$_{-bottle}$ DE   wine
　　 'He drank as much as three bottles of wine.'

Semantically *de* applies to a predicate of type <d,t> and turns it into a modifier of type <<d,t>, <d,t>>. The particle *de* takes the meaning of *liang gongjin* 'two kilos', given (72.b) as input, and turns it into a modifier of the head noun. Since the head noun denotes a kind, we *shift* it to the instantiations of the kind:

Derivation II: *liang gongjin de pingguo* 'two kilos of apples'

$\|liang\ gongjin\|$ =λnλx.MEAS(x) = < 2, KILO>

$\|liang\ gongjin\ de\|$ =λPλx.P(x)∧MEAS(x) = <2,KILO>

$\|liang\ gongjin\ de\ pingguo\|$ = λx. **SHIFT**($^{\cap}$APPLE)(x)∧MEAS(x)=<2,KILO>

$\qquad\qquad\qquad\qquad$ = λx. $^{\cup\cap}$APPLE(x) ∧ MEAS(x) = <2,KILO>

In *san ping de shui, san ping* is of type <***k***,<d,t>> which is the wrong type for *de* to apply to. However, if *ping* is interpreted as a measure head of type <n, <d, t>> and not as a classifier, it can apply to Num to give an expression of type <d,t>, which *de* can take as a complement, as given in derivation III.

Derivation III: *san ping de shui* 'three bottles of water'

$\|ping\|$ =λnλx. MEAS(x) = <n, BOTTLE>

$\|san\ ping\|$ =λx. MEAS(x) = <3,BOTTLE>

$\|san\ ping\ de\|$ = λPλx. P(x) ∧ MEAS(x) = <3,BOTTLE>

$\|san\ ping\ de\ shui\|$ = λx. **SHIFT**($^{\cap}$WATER)(x)∧MEAS(x)=<3, BOTTLE>

$\qquad\qquad\qquad\qquad$ = λx. $^{\cup\cap}$WATER(x) ∧ MEAS(x) = <3,BOTTLE>

In other words, we derive the same meaning and in derivation I, but from a different structure. These two derivation processes reflect the fact that Num-Cl-N and Num-Cl-*de*-N express the same meaning: the quantity of the denotation of N amounts to the value expressed by Num-Cl.

The latter with *de* present focusses on the predicate pgrase *san ping* and adds the pragmatic emphasis interpretation that the quantity of N is *as much as* the value of Num-Cl.

Two related facts about individual classifiers have to be explained. First, we know that, [+C, -M] classifiers can be coerced into measure interpretations, as in recipe context, but *de* is not allowed in such contexts as shown in (74).

(74) zuo zhe ge pingguo-pai wo zongguo   yong le   you yi   ge   (*de)   pingguo.
      make this Cl apple-pie   I altogether use Perf have one Cl   DE   apple
      'To make this apple pie, I used an apple altogether.'

Another fact is that if Num is a fraction, it is possible to use *de* after the classifier to get a measure reading, as in (75).

(75) ta   chi   le   san-fen-zhi-yi   li   (de)   ganmao-yao
      he   take Perf   one third   Cl$_{-grain}$ DE   cold pill
      'He took one third of a cold pill.'

We assume that the particle *de* can only mark measure readings that are induced within the Num+Classifier complex. In (71) and (73), the measure interpretation of the classifier is the classifier's default interpretation, since in both cases the classifier is [+M]. This means that the measure reading of the classifier of type $<n,<d,t>>$ is readily available as an alternative to the classifier interpretation of type $<n, <\boldsymbol{k}, <d, t>>>$. The particle *de* selects this interpretation of the classifier, which means that Num+Cl forms a measure phrase of type $<d, t>$.

In (74), on the other hand, the classifier is [+C] and of type $<\boldsymbol{k},<d \times k ,t>>$. There is no readily available alternative interpretation of type $<n,<d,t>>$. The coerced measure reading in (74) is induced by contextual factors (i.e. the recipe context) at the level of the NP, and can be regarded as a late reanalysis. The reading is thus not available at the level of the classifier head. However, de requires an interpretation of Num+CL at type $<d, t>$ at the point at which it combines with Num Cl, so in examples like (74) the necessary interpretation is not available and insertion of *de* is impossible.

In contrast, we propose that when the Num is a fraction, the measure interpretation of the classifier head is induced at the level of the classifier head. We assume that fractions don't have natural interpretations as number predicates, they only have interpretations at type n. Since the fraction 1/3 denotes a number and not a predicate, it triggers a measure reading of *li*

'grain' at type $\langle n,\langle d,t\rangle\rangle$, a reading which is not similarly triggered by natural numbers that do have a number predicate interpretation. Hence, Num combines immediately with the classifier to form a constituent of type $\langle d,t\rangle$, and insertion of *de* is possible.

Derivation IV:

$\|li\| = \lambda n\lambda x.MEAS(x) = \langle n, U_{natural\ unit}\rangle$

$\|1/3\ li\| = \lambda x.MEAS(x) = \langle 1/3, U_{natural\ unit}\rangle$

$\|1/3\ li\ de\| = \lambda P\lambda x.\ P(x) \wedge MEAS(x) = \langle 1/3, U_{natural\ unit}\rangle$

$\|1/3\ li\ de\ ganmaoyao\| = \lambda x.\ ^{\cup\cap}COLD\text{-}PILL(x) \wedge MEAS(x) = \langle 1/3, U_{natural\ unit}\rangle$

To sum up, we have discussed three facts about *de* and [+M] classifiers:

(i) *de* can follow [+M] classifiers, classifiers with a a default measure reading. The measure reading does not depend on *de*, since there are cases where the measure reading can also be derived in the construction Num-Cl-N.

(ii) When the classifier denotes a measure unit, Num-Cl-*de*-N expresses the measure reading *as much as Num-C*l.

(iii) Individual classifiers can get a measure reading in the case of fractions. We assume that fractions only have an interpretation at type n, and with that force an interpretation of the individual classifier of type $\langle n,\langle d,t\rangle\rangle$.

3.6 Num-Cl-*de*-N: *as many as …*

We are now concerned with constructions where *de* follows counting classifiers, [+C, -M] classifiers and [+C, +M] classifiers on the counting reading.

3.6.1 Num-Cl-*de*-N with [+C] classifiers

We will argue here that when the classifier denotes a counting unit, it can be incorporated into a measure phrase forced by the particle *de*. However, on this measure reading, Num-Cl-de-N express the meaning of *as many as…* not *as much as…*This process affects [+C, +M] Cls and [+C, +M] on their counting interpretation. We first look at [+C, -M] classifiers followed by *de*. See the examples of (76).

(76) a. nabian bian zhong le qi ba ke, shi lai ke (de) juzi shu.
　　　 there then plant Perf seven eight Cl ten around Cl DE mandarin tree
　　　 'On that side were planted seven or eight, or around ten mandarin trees.'

(from PKU corpus: prose by *Yu Pingbo*)

　　 b. ge shengshi yue you shisi yu ge (de) wenyi tuanyi.
　　　 Each province-city about have forty more Cl DE art troupes
　　　 'Each province or municipality has about more than forty art troupes.'

(from PKU Corpus)

(76.a) means that the number of mandarin trees planted is around ten. The presence of *de* emphasizes the value expressed by Num-Cl and stresses that the overall quantity of mandarin trees planted is estimated to be *as many as* ten.

　　　 The individual classifier *ke* denotes in (76a) a counting unit and not a measure unit. (76.a) provides a tree-planting context, where individual trees are planted one after another, so the individual classifier *ke* can only refer to individual trees. However, in the example in question, the counting unit is not used in a counting context to count the numbers of trees one by one; the context is a measure context in which the total number of trees, the overall quantity, is 'measured'. We relate the quantity of trees to a numerical value via a measurement mechanism like estimation. (76.a) means that the overall number of trees planted is estimated to be equal to ten individuals.

　　　 On this measure reading, the Num of the classifier phrase must be a (contextually) high round number. Compare the examples in (77).

(77) a. tamen yi nian zhong le wu ke (*de) shu.
　　　 they one year plant Perf five Cl DE tree
　　　 'They planted as many as five trees within one year.'

　　 b. tamen yi nian zhong le wu-bai-lin-yi ke (*de) shu.
　　　 they one year plant Perf five-hundred-and-one Cl DE tree
　　　 'They planted as many as five hundred and one of trees within a year.'

　　 c. tamen yi nian zhong le wu-bai ke (de) shu.
　　　 they one year plant Perf five hundred Cl DE tree
　　　 'They planted (as many as) five hundred of trees within one year.'

When the Num is a precise number like *wu* 'five' in (77.a) or *wubai-lin-yi* 'five hundred and one' in (77.b), *de* is unacceptable. If the number is a high round number like *wubai* 'five hundred' in (77c), *de* can follow classifier *ke*. We propose that what goes on is similar to what we saw in the previous example: we use high round number as a method of estimation, approximation: we can use the high round numbers to let the ClP express a measure phrase expressing an estimated measure value. (For a general discussion of using high round numbers to express estimation, see Kadmon 1987).

Next we show that [+C, +M] Cls can also be followed by *de* when denoting counting units. Also in this case, they express the measure meaning of *as many as*. We take the container classifier *ping* 'bottle' as an example.

(78) a. na-ge   fuwusheng yi tian kai   le   liu-bai   ping   de hong jiu.
        that-Cl waiter   one day open Perf six-hundred Cl-bottle DE   red wine
        'That waiter opened as many as six hundred bottles of red wine within one day.'
    b.*na-ge   fuwusheng yi tian   kai   le   liu   ping   de   hong jiu.
        that-Cl   waiter   one day   open Perf   six   Cl-bottle DE   red wine
        Intended: 'That waiter opened as many as six bottles of red wine within a day.'
    c.* na-ge   fuwusheng yi tian kai   le   liu-bai-lin-yi   ping   de hong jiu.
        that-Cl   waiter   one day open Perf   six-hundred and one Cl-bottle   DE red wine
        Intended: 'That waiter opened as many as 601 bottles of red wine within a day.'

When classifier *ping* denotes a counting unit, it refers to a concrete *bottle* as in (78.a). (78.a) means that the number of actual bottles the waiter opened is estimated to be approximately 600, it doesn't mean that what he opened was as much as 600 bottles. In this case, although the classifier *ping* denotes a counting unit, it has been incorporated into a measure phrase, which measures the overall number of individual entities, *as many as* 600 bottles.

The interpretation of '*as many as* ...' for [+C, +M] classifiers is subject to the same constraint as that for [+C, -M] classifiers: the measure reading of *as many as*...is available only when the Num of [+C, +M] classifier phrase is a (contextually) high round number as in (78.b).

Predictably, the measure interpretation of 'as many as …' is impossible for true measure words, [-C, +M] classifiers like *gongjin*, 'kilo' and *gongli* 'kilometer'. This is because they are true measure words and denote intrinsic measure units; they do not

correspond to actual naturalistic objects like *bottle* or *cup*.   *500 gongjin (de) dami* '500 kilos rice' does not imply that there are five hundred individual kilo units of rice.

3.6.2   Semantics of Num-Cl-*de*-N: *as many as …*

We start by specifying our syntactic assumptions about the construction. In Section 3.4.2, we argued that, when the classifier denotes a measure unit, *de* takes Num+Cl as complement to form a modifier of the head noun. Since on the measure reading, Num-Cl-N has the structure [[Num+Cl]N] the semantic interpretation is direct.

However, when the classifier has a counting interpretation, the Cl and the N form a constituent which is modified by the Num. We propose that the presence of *de* after the classifier forces syntactic re-analysis of the counting structure into the measure structure. In other words, we assume that no matter whether the classifier denotes a counting unit or a measure unit, the presence of *de* after classifier always force Num and Cl to be a constituent. Hence the structure proposed in (68) is also the structure we propose for Num-Cl-*de*-N with [+C] classifiers. We support this proposal with the examples in (79) and (80).

(79) a. ta   zhong   le   wu-bai   ke   **de**   shu.
      he   plant   Perf   five-hundred   Cl   DE   tree
      'He planted five hundred trees.'

  b.* ta   zhong   le   wu-bai   **de**   ke   shu.
      he   plant   Perf   five-hundred   DE   Cl   tree

(79) shows that when the classifier denotes a counting unit, *de* can only be inserted after the classifier, but not after the numeral. The contrast between (79a) and (79b) suggests that the insertion of *de* can force Num and Cl to form a single constituent.

(80) a. ta   zhong   le   zhengzheng   wubai   ke   de   shu.
      he   plant   Perf   as-a-whole   500   Cl   DE   tree
      'He planted 500 hundred trees in total.'

  b.* ta   zhong   le   wubai   zhengzheng   ke   de   shu.
      he   plant   Perf   500   as-a-whole   Cl   DE   tree

  c.* ta   zhong le   wubai   ke   de   zhengzheng   shu.
      he   plant Perf 500   Cl   DE   as-a-whole   tree

(80) shows that some modifiers like *zhengzheng* appear in front of the whole nominal phrase, and do not modify the whole phrase or the noun but Num+Cl.

We turn to the semantics of Num-Cl$_{COUNT}$-de-N.

In Chapter 4, we argued, following Rothstein (2010) that the basic interpretation of counting classifiers like *ke* is as function mapping kinds to sets of individuals that are atomic relative to counting context k, a function of type $<\boldsymbol{k},<d×k,t>>$. We illustrate this in **Derivation V:**

Derivation V: *wubai ke shu* 'five hundred trees'

$\|ke\| = \lambda\boldsymbol{k}\lambda x. \pi_1(x) \in (^{\cup}\boldsymbol{k} \cap k) \wedge \alpha(x) \wedge \pi_2(x)=k$

$\|ke\ shu\| = \lambda x. \pi_1(x) \in (^{\cup\cap}TREE \cap k) \wedge UNIT_{tree}(x) \wedge \pi_2(x)=k$

$\|wubai\ ke\ shu\|$ = (pluralizing in the context of applying *ke shu* to *wubai*)

$\qquad \lambda x. \pi_1(x) \in *(^{\cup\cap}TREE \cap k) \wedge *UNIT_{-tree}(x) \wedge \pi_2(x) = k \wedge |\pi_1(x)|_k = 500$

When *de* follows the count classifier, *de* Num and the individual Cl to form a single constituent of type $<d, t>$, which can then shift to the modifie type. Even though a measure reading is imposed, the counting meaning of the classifier is not discarded.

We propose the following: *de* looks for a predicate meaning of type $<d,t>$. The classifier shifts to a measure function of type $<n,<d,t>>$. The meaning it shifts to is that of *an estimation function*, EST, which estimates the overall *number* of a plurality. We suggest that Num-Cl$_{COUNT}$-*de*-N expresses the estimated value of a plurality, measured in terms of a 'quantity of counting-units'.

(81) a. Basic counting meaning of the classifier:

$\qquad \lambda\boldsymbol{k}\lambda x. \pi_1(x) \in (^{\cup}\boldsymbol{k} \cap k) \wedge \alpha(x) \wedge \pi_2(x)=k$

b. Shifted measure meaning of the counting classifier:

$\qquad \lambda n\lambda x. x \in *k \wedge EST(x) = <n,U_{natural\ unit}>$

The function that maps number n onto the set of members of the pluralization

of the context set k whose *estimated* value is n.

c. This applies to the round number 500:

$\qquad \lambda x. x \in *k \wedge EST(x) = <500,U_{natural\ unit}>$

The set of pluralities in *k, whose cardinality is estimated to be approximately equal to 500 natural units.

In (81.c) *ke* denotes atomic plant units and the Num Cl shifts to the set of pluralities of atomic plant-type entities whose estimated value is 500. Thus, estimation is a contextual operation introduces as a 'counting measure', and the numbers are round, because that is what they are in estimation.

This measure phrase can be used as a predicate in copula position as in (82):

(82) ta   zhong de   shu   you   wubai ke.
     He   plant Mod   tree have   500   Cl
     'The trees he planted reached 500.'

When the measure head is used in a classifier position, as in (83), its interpretation is given in Derivation IV:

(83) a. ta   zhong le   wubai ke   de   shu.
         he   plant Perf 500   Cl   de   tree
         'He planted five hundred trees.'

     b. **Derivation VI: *wubai ke de shu* 'five hundred trees'**

Step 1**:** $\|500\ ke\| = \lambda x.x \in {}^*k \wedge EST(x) = \langle 500, U_{\text{natural plant unit}} \rangle$

Step 2: $\|500\ ke\ de\| = \lambda P \lambda x.{}^*P(x) \wedge x \in {}^*k \wedge EST(x) = \langle 500, U_{\text{natural plant unit}} \rangle$

Step 3: $\|500\ ke\ de\ shu\|$

$= \lambda x.\ {}^{*\cup\cap}TREE(x) \wedge x \in {}^*k \wedge EST(x) = \langle 500, U_{\text{natural plant unit}} \rangle$

The set of pluralities that are sums of instantiations of the kind *tree,* whose estimated cardinality is around 500.

The present semantics accounts for the constraint that in the readings discussed here the Num must denote a large round number. As Krifka (2002, 2009) argues, "round numbers in measuring contexts tend to have round interpretations". Furthermore, according to Krifka (2002:446-447) "short expressions have a preference for vague interpretations, (…) long expressions have a preference for precise interpretations".

Given this, estimation will favor round numbers in short expressions. Moreover, it will favor *high* numbers, because, arguably, one normally doesn't need to *estimate* a small number, one just checks.

We saw that Hseih proposed that *de* was sensitive to a feature of 'indeterminateness'. We propose that the inderminateness is a by-product of the semantic reinterpretation of the counting classifier as an estimation measure.

4. Conclusion

In this chapter we analyzed the distribution and semantics of pre-classifier adjectives and post-classifier *de* in relation to the syntax and semantics of the counting and measure interpretations of classifiers that we proposed in chapter 4.

We observed that adjectives can be found before both individual and non-individual classifiers. We argued that only when the classifiers are interpreted with a counting function can they be preceded by adjectives like *da/xiao* 'big/small'. We argued that pre-classifier adjectives like *da/xiao* 'big/small' semantically have an 'expressive' interpretation, expressing a contextually provided judge's personal evaluation that the atomic entity in the denotation of Cl+N is big or small relative to the particular perspective chosen by the speaker.

We observed that the particle *de* is possible both after individual and non-individual classifiers. We claimed that Num-Cl-*de*-N always has a measure reading in that Num-Cl denotes the quantity of entities represented by N. We distinguished two types of measure readings, the *as much as* … type where the classifier denotes a measure unit, and the *as many as* …type where the classifier denotes a counting unit. The latter reading involves an estimation function EST, which restricts Num to contextually large round numbers.

1. Introduction

In the present chapter, we study aspects of the meaning of classifiers beyond the counting and the measure readings, and beyond the language of Mandarin Chinese. We will discuss the "Cl+N" construction in three Chinese languages, Mandarin, Wu, and Cantonese.[30] In all three languages, numerals cannot by themselves modify nouns and need a classifier in between: "Num+Cl+N". In all three, classifiers can be used independently of the Num, as "Cl+N". The languages differ with respect to the distribution and interpretation of "Cl+N" construction. In Mandarin, the "Cl+N" construction is only found in postverbal positions and has an indefinite reading. In Cantonese and Wu Chinese (the *Fuyang* dialect), the construction is available in both preverbal and postverbal positions. In Wu Chinese "Cl+N" has a definite reading, when appearing preverbally; indefinite when appearing postverbally (Li&Bisang 2010). In Cantonese (the HongKong variant), preverbal "Cl+N" has a definite reading, while postverbal "Cl+N" is either definite or indefinite (see Cheung 1972, Cheng & Sybesma 1999, 2004).

"Cl+N" has been discussed intensively in the literature in many Chinese dialects (e.g. Cheung 1972, Shi & Liu 1985, Cheng & Sybesma 1999, 2004, without reaching agreement about the syntactic status and the semantic function of the classifier. Many questions are still left open. We are particularly interested in the following:

(i) What are the factors that constrain the distribution of indefinite and definite "Cl+N"?

(ii) What is the syntax of indefinite and definite Cl+N phrases?

(iii) Is the "Cl+N" construction derived from the counting reading or the measure reading of the classifier?

(iv) What is the semantic function of the classifier in indefinite and definite "Cl+N" constructions?

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29 In this chapter we extend the analysis in Li & Bisang (2010) where it is argued that "classifiers are able to mark definiteness (familiarity/referentiality)". The purpose of this chapter is twofold (i) to integrate Li & Bisang's analysis into the [±Counting, ±Measure] typology proposed in dissertation; and (ii) to give a semantics for the definite and indefinite uses of Cl+N based on the syntactic/semantic analysis for classifiers and Cl+N phrases given in Chapter 4.

30 **Mandarin**, a northern Chinese language, was originally spoken across most of northern and south-western China. It now has become the national language of People's Republic of China. The variant of Mandarin used in this dissertation is the Putonghua 'common language', i.e. the standard Mandarin.

Cantonese , a southern Chinese language, is spoken in Guangdong Province, Hong Kong and Macau.

Wu is a language situated between Mandarin and Cantonese. It is spoken in the Yangtze Delta area including Shanghai, Zhejiang Province and southern Jiangshu Province. The Wu data presented in this paper are all from the *Fuyang* dialect, which belongs to the Taihu Lake clusters of the Northern Wu dialect. It is spoken in the Fuyang city, lying in the northwest of Zhejiang province and to the southwest of Shanghai. It has about 600,000 speakers. It is the mother tongue of the author.

With respect to the first question, we argue that the interpretation of the classifier in "Cl+N" as definite or indefinite is pragmatically constrained by information structure. Since Chinese languages are topic-prominent languages, in which preverbal nominals tend to function as topics or secondary topics (Li & Thompson 1976, 1981), preverbal nominals are by default interpreted as definite. That is why definite "Cl+N" are prototypically found in preverbal positions.

Our answer to the second question is that on the indefinite reading of Cl+N, the classifier is projected into the head of ClP, and Cl+N is inherently predicative. On the definite reading, the classifier undergoes Cl-to-D raising and heads a definite DP.

Concerning the third question, we claim that the "Cl+N" construction is only available when the classifier is interpreted with a counting function and not a measure function. The counting function of classifiers can be extended to mark (in)definiteness, since counting classifiers pick out a set of atomic individuals instantiating the kind denoted by the noun, rather than a set of quantities.   If we analyze definiteness in terms of old/new information, we make the plausible claim that individuals can be old or new relative to the information, but this distinction makes little sense for quantities (in the sense that a quantity like '750 ml of wine' is familiar to anybody who drinks wine with some regularity.)

As for the semantic functions of classifiers, we propose that Cl+N has a predicative meaning, and that indefinite interpretations of Cl+N result from default existential closure over the VP interpretation. Definite interpretations of Cl+N result from Cl-to-D- raising. This is semantically interpreted as existential closure of that meaning Cl-N, following Landman (2004), and definiteness is a semantic constraint added to the existential meaning derived in this way. (Thus, though we use Landman's rule of argument formation, we do not claim like (2004) that definites in Chinese start out at type d; instead we argue that definites are derived by raising from predicates to the generalized quantifier reading, and that definiteness is a semantically expressed familiarity constraint, like the *exactly* effects in Landman (2004) or "weak familiarity" à la Roberts (2003).

This chapter is structured as follows. Section 2 presents the distribution of indefinite and definite "Cl+N" in Mandarin, Wu, and Cantonese. In Section 3, we account for the distribution patterns of "Cl+N" in terms of (in)definiteness related to information structure. Section 4 discusses the syntax of indefinite "Cl+N". Section 5 examines the semantics of definite "Cl+N". Section 6 argues that the classifier in "Cl+N" has a counting reading, and works out the semantics of the indefinite and definite interpretations of "Cl+N".

2. "Cl+N" in three Chinese languages

In the previous chapters, we discussed classifiers in the Numeral-Classifier construction "Num+Cl+N". We saw that in Mandarin numerals cannot modify noun directly without the assistance of classifiers. The same is true in Wu and Cantonese:

(1) a. iʔ   *(tsəʔ)   kiu   [Wu: Fuyang]

      one   Cl   dog

      'one dog'

   b. nian   *(gə)   niŋ

      two   Cl   man

      'two people'

(2) a. leuhng   *(jek)   gau   [Cantonese]

      two   Cl   dog

      'two dogs'

   b. yat   *(chaan)   faahn

      one   Cl   meal

      'one meal'   (from Matthews & Yip 1994:93-97)

On the other hand, in all three languages we can have classifier+noun constructions without a numeral. For example, Mandarin has postverbal "Cl+N", Wu and Cantonese can have both preverbal and postverbal "Cl+N":

(3)a. **(*ge)**   **laoban**   mai   le   **liang**   **che**.   [Mandarin]

     Cl   boss   buy   Perf   Cl   car

     'The boss bought a car.'

   b. **gə**   **lɔpan**   ma   le   **bu**   **tsʰotsɻ̩**.   [Wu: Fuyang]

     Cl   boss   buy   Perf   Cl   car

     'The boss bought a car.'

   c. **go**   **louban**   maai   zo   **ga**   **ce**.   [Cantonese]

     Cl   boss   buy   Perf   Cl   car

     'The boss bought a/the car.'

We start with our discussion with "Cl+N" in Mandarin.

2.1 "Cl+N" in Mandarin

In Chapter 3, we showed that bare nouns in Mandarin can occur in preverbal and postverbal positions. Bare nouns in preverbal positions have a definite reading, as in (4.a); those in postverbal positions can either be definite or indefinite, as in (4.b). Note that bare nouns are number neutral: the bare nouns in (4) have both singular and plural readings.

(4) a. shu   bujian   le.
      book   missing   Part
      'The book(s) is(are) missing.'
  b. wo   mai   le   shu.
     I   buy   Perf   book
     'I bought book(s)'.
  OR 'I bought the book(s).'

In contrast with bare nouns, the "Cl+N" construction in Mandarin is only found in postverbal positions, as in (5.b), and not in preverbal positions like the subject position in (5.a).

(5) a.* ben   shu   bujian   le.
      $Cl_{-volume}$ book   missing   Part
  b. wo mai   le   ben   shu.
     I   buy   Perf $Cl_{-volume}$ book
     'I bought a book.'

The postverbal "Cl+N" in (5.b) only has an indefinite reading. The speaker of (5.b) simply asserts that he was engaged in an activity of book-buying.

In contrast to the examples in (4), there is an implication of singularity for "Cl+N". Look at the continuations in (6):

(6) a. wo mai le   shu.   Mei-ben dou   hen haokan.
     I   buy Perf book   each-Cl   all   very interesting
     'I bought books. Each is interesting.'
  b. wo mai le   ben   shu. # Mei-ben   dou hen   haokan.
     I buy Perf $Cl_{-volume}$ book   each-CL   all   very interesting
      # 'I bought a book. Each is interesting.'

Mei ben 'each volume' requires a plural NP as antecedent: the bare noun *shu* 'book' can provide that, Cl+N cannot.

One way of making (5.a) grammatical is to put existential *you* 'there be' before "Cl+N", as in (7.a):

(7) a. you   ben   shu   bujian   le.
        there-be   Cl-volume book   missing   Part
        'There is a book missing.'

In this case *ben shu* 'Cl book' prefixed with *you* (as in (7.a)) keeps its singular meaning, but gets an indefinite interpretation: it refers to a book, not books, and not the book. So, if there were ten books on my desk last night, but now I noticed that there are only nine books left and I am not sure which one is missing, I can report this event by using (7.a) with "Cl+N" as an indefinite phrase. Huang (1982, 1987) calls the sentential initial *you* an existential verb. Semantically, it existentially closes the indefinite (see Cheng 1990, Tsai 1994). Since *you* is an existential verb, Cl+N is in postverbal position also in (7.a).

Besides canonical object positions (as in (5.b)) and as the complement of *you*-sentences (in (7.a)), "Cl+N" is also found in post-copula positions, as in (7.b) and (7.c), where "Cl+N" expresses properties like "studenthood" and "cathood".

(7) b. ta   shi   ge   xuesheng.
        he   be   Cl   student
        'He is a student.'
    c. zhe   shi   zhi   mao.
        this   is   Cl   cat
        'This is a cat.'

The generalization is that "Cl+N" in Mandarin has an indefinite interpretation and appears postverbally in a lexically governed position.

However, this generalization seems to be challenged by the *ba* construction. Mandarin is an SVO language, where the postverbal position is the base-generated position for objects (Li & Thompson 1974, Huang 1982, Sun & Givon 1985, Wu 2003). But when the object is definite or specific and the verb has a causative meaning, the object can be moved

from the base-generated postverbal position to a preverbal position, and is marked by the object maker *ba*. This is called the *ba* construction. (8.b) is assumed to be derived from (8.a):

(8) a. laonong   mai   le   tou niu.   [SVO]
     peasant   sell   Perf Cl   cow
     'The peasant sold a cow.'
   b. laonong   ba   tou niu   gei   mai   le.   [SOV]
     peasant   OM   Cl   cow   give sell Part
     'The peasant had a cow sold.'

The "Cl+N" phrase, i.e. *tou niu* 'head cow', has an indefinite reading, 'a cow' both in (8a) and (8b). But the meaning is enriched in (8b): it implies that a cow is a valuable thing for the peasant and it is surprised that he sold it; according to Wang Jian (p.c.) (8.b) implies that there is a set of entities which belong to the peasant and *tou niu* 'Cl cow' is an important member of that set; alternatively, we think that (8b) means the peasant sold a valuable thing, *in casu* a cow.

The indefinite reading of "Cl+N" in *ba* construction should not be seen as a counterexample to our generalization that "Cl+N" is not found in preverbal positions in Mandarin, because the phenomenon shown in (8.b) is very marginal and restricted by many conditions.

For instance, the construction requires the verb to be a verb complex. Leaving out *gei* 'give' in (8.b) makes the sentence ungrammatical or much less acceptable. See (8.c):

  c.*/ ??? laonong   ba   tou niu   mai   le.
        peasant   OM   Cl   cow   sell   Part
        'The peasant had a cow sold.'

In addition, the preposing of "Cl+N" isn't completely productive: for example in (9), we cannot derive (9.b) from (9.a), despite the fact that the verbal complexity is the same as in (8a) and (8.b).

(9) a. ta   diu   le   ben   shu.   [SVO]

    he   lose Perf Cl$_{-volume}$ book

    'He lost a book.'

  b.*/ ??? ta   ba   ben   shu   gei   diu   le.   [SOV]

    he   BA Cl$_{-volume}$ book give lose Part

    Intended: 'He got a book lost.'

We have no explanation for the above two mentioned restrictions. We think there is an idiosyncratic factor involved in the *ba* construction in Mandarin which produces the indefinite interpretation and the enriched pragmatic meaning, a factor that interferes with the generalization.[31] As we will see, the counterparts in Wu and Cantonese do not have a similar interpretation, and are not similarly constrained.

    In sum: in Mandarin Chinese, "Cl+N" is only possible in postverbal positions and only has an indefinite reading.

2.2 "Cl+N" in Wu
2.2.1 Preverbal "Cl+N"

In Wu, "Cl+N" can occur unproblematically in preverbal position, like the subject position and the (sentential) topic position. In (10) "Cl+N" is in subject position.

(10) a. tsəʔ giu   sɿ-ɲiɔ   die.

    Cl   dog die   Part

    'The dog died.'

  b. tsəʔ giu kuan mpoʔ tʰaʔ tsʰan.

    Cl   dog Cl   tail too long

    'The tail of the dog is too long.'

The "Cl+N" *tsəʔ giu* 'the dog' in (10.a) refers to a particular dog that is identifiable in the context by the interlocutors, or some dog that is familiar to the interlocutors based on their

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[31] Note when a bare noun is fronted in the BA constructions, it gets a definite reading and not an indefinite reading. As the example shown below, the bare noun *niu* gets a definite reading, meaning 'the cow(s)'. In addition, the contrastive effect is not observed. So it looks as if the constrastive effect really is connected to the particular use of indefinite Cl+N in this position.

e.g. Laonong ba niu mai le.

    peasant OM cow sell Perf

    'The peasant sold the cow(s).'

shared background knowledge. In this case, Cl+N has a definite reading: *the dog*. The subject of (10.b) is a complex noun, in which the head noun "Cl+N", *kuan mpoʔ* 'Cl tail', is modified by another "Cl+N",. *tsəʔ giu* 'Cl dog'. Both "Cl+N" phrases are interpreted with a definite meaning, so the phrase means: 'the tail of the dog'.

The preverbal "Cl+N" in (10) should be distinguished from the "Cl+N" construction that is introduced by the existential quantifier *iu* 'there be', as in (11):

(11) a. iu   tsəʔ   giu   sɹ̩-n̥iʔ   die.
        there-be   Cl   dog   die   Part
        'There died a dog.'
     b. iu   iʔ   tsəʔ   giu   si-n̥iɔ   die.
        there-be   one   Cl   dog   die   Part
        'There died one dog.'

In (11a), *tsəʔ giu* 'Cl dog' can only have an indefinite meaning. (11.a) is similar to (11.b), which has a NumP as subject. We assume that *iu* 'there be' is verbal, like *you* 'there be' in Mandarin, and hence "Cl+N" in (11.a) is in a postverbal position.

In contrast, the "Cl+N" subject in (10) can stand on its own in argument position, without requiring existential *iu*, and in fact with a definite meaning.

(12) is an example of Cl+N in sentential initial position, the default position for the topic of the sentence.

(12) gə   piŋku,   ŋʏ   tɕʰiʔ-n̥iɔ   die.
     Cl   apple   I   eat-finish   Part
     'The apple, I ate it.'

In (12), the subject is *ŋə* 'I' and *piŋku* 'apple' is the topic. The entity denoted by "Cl+N" *geh pinggu* 'Cl apple' is part of the proposition that is being talked about, so it must be interpreted as definite, 'the apple'.

Wu has a construction similar to to the *ba* construction in Mandarin. In Wu (the *Fuyang* dialect), the object marker is kʰəʔ 'catch', so we call this construction the kʰəʔ construction. The most striking difference between the *ba* construction in Mandarin and the

k^{h}əΩ construction in Wu is that "Cl+N" after object marker *k^{h}əΩ* gets a definite reading and not an indefinite reading:

(13)a. gə noŋmiŋ k^{h}əΩ **tsəΩ** **ɳiu** ma-ɳiɔ die.

    Cl peasant OM Cl cow sell Part

    'The peasant sold the cow.'

    b. i k^{h}əΩ **ben** **çy** mɳiɔ die.

     he OM Cl book lost Part

     'He lost the book.'

Compare the examples in (13) with the Mandarin example (8.b), repeated as (13c):

    c. laonong ba tou niu *(gei) mai le. [Mandarin]

     peasant OM Cl cow give sell Part

     'The peasant sold a cow.'

The *k^{h}əΩ* construction in Wu differs from the Mandarin *ba* construction in the following ways. First, Wu doesn't require a verb complex: both Wu examples in (13.a-b) are grammatical. Secondly, the enriched pragmatic meaning found in Mandarin is absent in Wu. Thirdly, Cl+N (13.a-b) refers to a particular cow or a particular book identifiable by both the speaker and the hearer, hence is it definite.

We will argue in Section 3, that in Wu Chinese, the preposing the definite from a postverbal position follows from syntactic and semantic requirements in Wu and is not triggered by an idiosyncratic pragmatic factor, as it is in Mandarin.

2.2.2 Postverbal Cl+N

"Cl+N" is also found in postverbal positions in Wu, and there it has an indefinite reading, like in Mandarin.

Two types of postverbal positions can be distinguished: base-generated object positions and post-copula positions. (14) is an example with Cl-N in object position:

(14) a. ŋɤ tɕʰiʔ le gə piŋgu. ɕiusɿ tɕuosaŋ laŋ gə.

    I eat Perf Cl apple just desk on Cl

    'I ate an apple, the one on the table.'

  b. ŋɤ saŋ gə yoʔ maʔ le bu tsʰotsɿ. n tsʰæ-tsʰa-kʰan zɿ goz̩ tsoʔ?

    I last Cl month buy Perf Cl car you guess be what car

    'I bought a car last month. Can you guess what car it is?

In (14), *apple* and *car* do not denote entities known or identifiable by the addressees: *Cl car* and *Cl apple* simply mean 'a car' and 'an apple' respectively. It is only continuation in (14.a) that identifies the apple; similarly, in (14.b) the question presupposes the indefiniteness of the car in the first part of the sentence.

    Post-copula nominals are predicational and express properties of the subject. Post-copula "Cl+N" are not referential in most cases.[32] For example, *tsəʔ giu* 'Cl dog' in (15.a) only expresses the *doghood* of the subject and it does not refer to a particular dog.

(15) a. kəʔ tsəʔ sɿ tsəʔ kiu.

    this Cl be Cl dog

    'This is a dog.'

  b. ia banŋiu sɿ kə ŋakuoɲin.

    his/her friend be Cl foreigner

    'His/her friend is a foreigner.'

In Wu, if you want to use a definite nominal as object, it must always be moved to a preverbal position, via the *kʰəʔ* construction or by topicalization.

    Thus, if we want to make definite reference to an apple or a car in (14a.-b), we would use the sentences in (16) with the *kʰəʔ* construction. (Note that the marker *kʰəʔ* does not always have to be realized overtly, as shown in (16.b))

(16) a. ŋɤ kʰəʔ [gə piŋgu] tɕʰiɲiɔ die.

    I OM Cl apple eat Part

    'I ate an apple, the one on the table.'

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[32] We leave aside copula sentences with definite NPs, such as "He is the student that I mentioned to you last time" or "He is Mr. Smith" (see Partee 1987b).

b ŋɤ	saŋ	gə	yoʔ	[bu	tsʰotsɻ]	ma	le	uælæ	die.
I	last	Cl	month	Cl		car	buy	Perf	back	Part

'I went to buy the car last month.'

In sum: in Wu Preverbal "Cl+N" have a definite interpretation and postverbal "Cl+N" have an indefinite interpretation.

2.3 "Cl+N" in Cantonese

As noted in the literature (e.g. Cheung 1972, Hashimoto 1993, Matthews & Yip 1994, Cheng & Sybesma 1999, and many others), 'Cl+N' can occur preverbally and postverbally: preverbal "Cl+N" is unambiguously definite, but postverbal "Cl+N" is ambiguous between an indefinite and a definite reading.

(17) a. ji   bat   hou   hou   se.

     Cl   pen   good   good   write

     'This/that pen is good to write with.'

    b. keuih   maai-zo   gaa   ce.

     he   sell-Perf   Cl   car

     'He sold a car/ the car. '   [from Matthews & Yip 1994: 93]

In (17.a), *ji bat* is is definite: "this/that pen". (It is maybe even better glossed as "the pen", since Cl+N has a definite reading, but not a deictic reading.) In (17.b), Cl+N, i.e. *gaa ce* 'Cl car' occurs in object position. It can have a definite meaning, where it means: 'a car identifiable for the addressee in the context, or an indefinite meaning, where we only express that a car selling event took place.

There is in Cantonese a construction similar to the *ba* construction in Mandarin, with the marker *jeung* 'take', but it is not very productive.

For instance, the two examples in (18) are ungrammatical, no matter whether we use bare noun or Cl+N after *jeung*. According to our Cantonese informants, they would use SVO sentences to express the same information. Note that the counterparts in Mandarin of the cases in (18) are totally grammatical with bare nouns, as in (19).

(18) a.* ngo jeung (go) pingguo sik zo.   [Cantonese]
         I   OM   Cl   apple   eat Part
       Intended: 'I ate the apple(s).'
      b.* keuih jeung (go) yahn da   zo.
          he   OM   Cl   man   beat   Part
       Intended: 'He beat the man/the men.'

(19) a. wo ba   pingguo chi le.   [Mandarin]
         I   OM   apple   eat Part
       'I ate the apple(s).'
      b. ta   ba   ren   da   le.
        He OM   man   beat Part
       'He beat the man/men.'

Secondly, compared with the *ba* construction in Mandarin, the *jeung* construction has a narrower range of uses. We cite Matthews & Yip (1994: 144): "unlike *ba*, however, it is not used with all transitive verbs, but is primarily restricted to cases where the motion takes place" (as in (20.a)) "It is also applicable in metaphorical cases of movement or removal, such as exchanging places" (as in (20.b))

(20) a. keuih jeung di   wujou   saam   jauwaih   pehk.
         s/he take Cl-Pl   dirty   clothes   around   throw
        'He throws his dirty clothes all over my place.'
      b. yiu   jeung di   mhoisam ge yeh gut-yat-seng tan-jo   keuij.
         need put Cl   unhappy Mod stuff one-voice   swallow-Perf it
        'You should take the unhappy things and swallow them in one gulp.'

Thirdly, when the *jeung* construction with "Cl+N" is felicitous, the "Cl+N" only has a definite reading. For example, the plural classifier phrase *di wujou* in (20.a) can only mean 'the dirty clothes' but not 'some dirty clothes'. Again, in contrast with the counterparts in Mandarin, the cases in (20) do not show an enriched pragmatic meaning in the *jeung* construction.

We will argue in Section 3 that in Cantonese, the preferable position for definite "Cl+N" is in preverbal positions, but the lack of a productive *jeung* construction paves the way for the expansion of definite "Cl+N" interpretations into postverbal positions.

We summarize the results in Table 6-1. Note that + means that the relevant reading is available and – means that reading is not available.

[Cl+N]	Definite reading		Indefinite reading	
	Preverbal	Postverbal	Preverbal	Postverbal
Mandarin	–	–	–	+
Wu	+	–		
Cantonese	+	+		

Table 6-1

3. Information structure and (in)definite "Cl+N"

In this section, we adopt a semantic-pragmatic approach to account for the distribution of the indefinite and definite readings of "Cl+N" phrases. We propose that these interpretations of "Cl+N" are constrained by pragmatic notions, following from the association between word order and information structure.

Li Frances (1971) was one of the first to claim that word order reflects information structure in Mandarin. Following on this, Li and Thompson (1976, 1981) argue that Mandarin Chinese is a topic-prominent language in which the preverbal subject position represents an unmarked topic, while the postverbal position is associated with focus. In a more recent study, Xu (2004) shows that the sentence-final position is the default position for informational focus in Mandarin.

Informally, the topic is 'what is being talked about', which implies givenness or high degree of identifiablity. As Lambrecht puts it (1994:262), "a topic constituent must have a referent, and this referent must be identifiable and have a certain degree of pragmatic salience in discourse…" Thus, nominals acting as topics tend to be definite. In contrast, the term focus refers to expressions that are either prosodically or syntactically prominent and convey new information: typically nominals acting as focus are indefinites, although definite NPs are not excluded from focus position (according to Lambrecht, "a focus constituent is in principle free with respect to the question of identifiability and activation").

Chinese languages are topic prominent languages, in which preverbal nominals are usually topics and postverbal nominals are usually focus. As a consequence, preverbal nominals have by default definite interpretations and postverbal nominals indefinite interpretations.

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This correlation between (in)definiteness and sentence position plays a major role in the analysis of a variety of phenomena in Mandarin: like the (in)definite interpretation of bare nouns in Mandarin (e.g. Chao 1968, Li & Thompson 1981, Shi 2002) and the "definiteness constraint" on subject position in Chinese, (e.g. Tsai 1994, Xu 1996). In this section, we will (following Li & Bisang 2010), use the correlation to explain the interpretation of Cl+N in terms of (in)definiteness in our three Chinese languages.

We start with Wu. Even though Chinese languages are all topic-prominent languages, they exhibit different degrees of topic-prominence. D. Liu (2001) claims that Wu is a more prototypical topical-prominent language than Mandarin: it is very easy to topicalize elements like objects or even the whole verb phrase, i.e. to move them to sentential initial positions or positions near the subject.

We propose that as a consequence in Wu, the distribution of definite and indefinite "Cl+N" strictly follows the generalization about the correlation of word order and information structure. If so, we expect that in Wu, preverbal "Cl+N" has a definite reading and postverbal "Cl+N" has an indefinite reading, since the former falls into the topic domain and the latter into the focus domain.

The Cantonese data are the same as in Wu, except for the possibility of having definite readings in post-verbal positions. So why are the latter possible?

In the first place, we think that the frequent use of Cl+N in subject position may help it to acquire the status of a quasi-definite marker, a use which then can be applied to it in other positions. Secondly, we think that the most important reason for the possibility of expressing definiteness in postverbal positions is the lack of a productive operation in Cantonese corresponding to the Mandarin *ba* construction that we saw above. We propose that because Cantonese does not have a productive mechanism for preposing definite objects from postverbal positions, it doesn't have enough easy ways of expressing meanings with, say, definite objects, leading to the extension observed (see Li & Bisang 2010).

According to D. Liu (2001), Mandarin is a less prototypical topic-prominent language than Wu. We propose that, in contrast to Wu and Cantonese, the "Cl+N" construction in Mandarin is not fully grammaticalized: "Cl+N" is only found in base-generated postverbal object position, a focus position where "Cl+N" has an indefinite interpretation.

The question that remains is: why doesn't Mandarin allow definite Cl+N as subjects or topics? We don't know, but it may be related to the following typological difference northern and southern Chinese languages D. Liu (2001) argues that northern Chinese languages like

Mandarin are demonstrative-prominent languages in that they prefer to use "demonstrative + N" instead of "Cl+N" to express definiteness, while southern Chinese languages like Wu and Cantonese are classifier-prominent languages, in that they prefer to use "Cl+N" over "demonstrative + N".

We now move from the distribution of these expressions to the syntax of Cl+N

4. Syntax of indefinite "Cl+N"

In this section we discuss the syntax of indefinite "Cl+N". We address the following questions: (i) is the indefinite "Cl+N" a reduced form of "one+Cl+N"? (ii) What is the syntactic projection of indefinite "Cl+N"? Is it a NumP (with an empty number) or ClP?

4.1 Indefinite "Cl+N" as a reduced form of "one+Cl+N"

Lü (1944) derives the indefinite "Cl+N" from "one+Cl+N" in Mandarin.

Lü claims that there are two variants of the numeral *yi* 'one' in Mandarin: a strong *yi* and a weak *yi*. The strong *yi* is stressed and it is the cardinal 'one'. It emphasizes the singularity of entities, as illustrated in (21).

(21) a. yitong   bei   bu   de   you   *(yi)   ge   xuesheng , wu   ge   chefu.
     meanwhile Pass arrest Mod   have   one   Cl   student   five   Cl   carter
     'Those who were arrested at the same time include one student and five carters.'

    b. wo   *(yi)   ge   ren   qu
     I   one   Cl   person   go
     'I will go by myself.'

The weak *yi* is not only phonologically weak, i.e. unstressed, but also semantically weak, i.e. it is not referential or quantity-denoting, shown in (22):

(22) a. ta   chi   le   (yi)   wan   fan   jiu   congcong   zou   le.
     he   eat   Perf   one Cl_{bowl} rice then   hurriedly   leave   Part
     'He left in a rush after taking a bowl of rice.'

    b. wo   shi   (yi)   ge   hen   wangu   de   ren.
     I   be   one   Cl   very   stubborn   Mod   man
     'I am a very stubborn man.'

Lü claims that the stressed *yi* cannot be omitted (as in (21)), but unstressed *yi* can be omitted in certain contexts (as in (22), and, importantly, omission of unstressed *yi* is only possible in postverbal position.

Thus, according to Lü, "Cl+N" is unstressed *yi* +Cl+N in postverbal positions.[33]

4.2 Indefinite Cl+N as NumPs

In their comparative study of Cantonese and Mandarin nominal structures, Cheng & Sybesma (1999:525-527) discuss the distinction between "Cl+N" and "*yi*+Cl+N". They argue, against Lü (1944), that indefinite "Cl+N" cannot be regarded as a phonological reduction of "one+Cl+N" by omitting the numeral *yi* 'one'.

They show that in Mandarin indefinite "Cl+N" only has a non-specific reading, while "one+Cl+N" is three-way ambiguous between a specific, a non-specific and a quantity reading. They use bounded predicates and secondary predicates as tests to distinguish Cl+N and *yi*+Cl+N.

Cheng & Sybesma show that a Cl-N phrase cannot occur as the object of a bounded predicates, whereas a [yi-Cl-N] phrase can, as contrated in (23):

(23) a. Wo   chi-wan-le   yi-kuai   binggan.
     I   eat-finish-LE   one-Cl   cookie
     'I finished a cookie.'
   b. *Wo chi-wan-le   kuai   binggan.
      I eat-finish-LE   Cl   cookie

According to Cheng and Sybesma, there is no phonological reason why *yi* 'one' could not be suppressed in (23).

Huang (1987) shows that in secondary predicates the object NP (i.e. the subject of the secondary predicate) must be indefinite and specific. Cheng & Sybesma show that in this context, [yi-Cl-N] phrases cannot be replaced by [Cl-N]:

---

[33] Lü mentions that speakers tend to use "Cl+N" in the oral discourse, e.g. daily conversation, but when they are asked to write it down, they usually write it in the form of "yi+Cl+N". We suggest that this phenomenon is to do with the teaching of prescriptive grammar and the use of Chinese in a formal register in schools.

(24) a. Wo   jiao-guo   yi-ge xuesheng   hen   congming.

I   teach-EXP   one-Cl student   very   intelligent

'I once taught a student who was very intelligent.'

b. *Wo jiao-guo   ge   xuesheng   hen   congming.

I teach-EXP   Cl   student   very   intelligent

While Cheng & Sybesma argue against the reduction of Cl+N to "one+Cl'N', surprisingly enough, later in the same paper they propose the same structure for both: they propose that when "Cl+N" is interpreted as an indefinite, it has an empty Num head, and the whole phrase projects into a NumP:

(25)
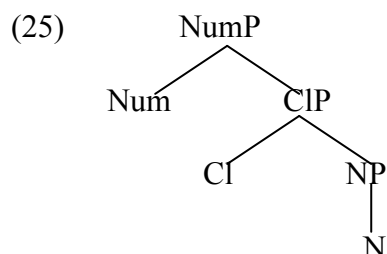
We think that Cheng & Sybesma's arguments against identifying the two are convincing, and hence we think their analysis postulating a 'null one' numeral is not to be accepted.

4.3 Indefinite Cl+N as ClP

In this section, we study some more differences between one+Cl+N and indefinite Cl+N. With a different set of diagnostics, we reach the same conclusion as Cheng & Sybesma (1999) that indefinite Cl+N is non-specific, and one+Cl+N can be quantity-denoting, specific, and non-specific. We propose that the indefinite "Cl+N" is a classifier phrase, not a numeral phrase.

Like Lü (1944), we distinguish weak *yi* from strong *yi*. We will show that indefinite "Cl+N" and "one+Cl+N" differ in distribution, regardless of whether the numeral *yi* is stressed or not.

We look at stressed *yi* first. We show three differences between stressed *yi* +CL+N and Cl+N.

First, we can coordinate stressed yi+Cl+N with other NumPs to express the accumulative quantity of different entities, as in (26.a). In contrast, it is impossible to coordinate "Cl+N" with NumPs, like 'two Cl N', as in (26.b).

(26) a. wo chi le   yi   ge pingguo he liang ge juzi.
         I eat Perf one Cl apple   and two   Cl orange
      'I ate one apple and two oranges.'
     b.* wo chi le   ge pingguo he liang ge juzi.
         I   eat Perf Cl apple   and two   Cl orange
         Intended: 'I ate an apple and two oranges.'

Secondly, true NumPs, including "stressed *yi*+Cl+N", can occur in subject position with an indefinite interpretation, but, as we have seen, Cl+N can never be subject in Mandarin:

(27) a. yi   ge   pingguo bu gou   wo   chi.
        one Cl   apple   not enough I   eat
      'One apple is not enough for me to eat.'
     b.* ge   pingguo bu   gou   wo   chi.
        Cl   apple   not enough I   eat
        Intended: "An apple is not enough for me to eat."

A. Li (1998) argues that although Chinese generally only allows definite nominals as subject, NumPs can be used as subjects if they denote pure quantities: in (27.a) the predicate *being not enough* forces a quantity denotation for the subject, "one Cl apple". Such a quantity reading is impossible for "Cl+N", and (27.b) is ungrammatical.

Thirdly, temporal expressions like *xiaoshi* 'hour' or *yue* 'month' are durational, and can only be used with "Num+Cl+N", not with "Cl+N":

(28) a. wo hua   le   *(yi)   ge   xiaoshi chifan
        I   spend Perf one   Cl   hour   eat meal
      'I spent one hour eating meal.'
     b. wo dai xainggang   dai   le   *(yi)   ge   yue
        I   at   Hong Kong stay Perf one   Cl   month
      'I stayed for one month in Hong Kong.'

Next we discuss the differences between Cl+N and unstressed *yi*+Vl+N.

"Unstressed *yi* +Cl+N" allows specific and non-specific readings, while "Cl+N" can only have a non-specific reading in Mandarin. We show this with examples involving relative clause modification and creation verbs.

Modification by a relative clause: Zhang (2006) shows that when a relative clause (RC) modifies a NumP in the order "RC+Num+Cl+N", the NP has a specific reading, while if a relative clause modifies a NP in the order "Num+Cl+RC+N", the NP has both specific and non-specific readings. In (29) we see that "*yi*+Cl+N" allows modification with both types of relative clauses:

(29) a. wo   zai zhao [RC xue   yingyu   de] yi   ge   xuesheng.   [Specific]
      I   Prog seek   learn English Mod one Cl   student

      ta   keneng zai tushuguan li.
      he   maybe   at   library   in

      'I am looking for a student who learns English. Maybe he is in the library.'

   b. wo   zai zhao yi   ge [RC xue   yingyu   de] xuesheng.   [(Non-)specific]
      I   Prog seek   one Cl   learn English Mod   student

      Shui   dou keyi,   danshi zuihao shi   da-si de.
      Who   all OK   but   best   be   senior Mod

      'I want to look for a student who learns English. Any one will do, but it is better to have a senior student.'

(29.a) means that the speaker has a specific student in mind, a student that is not known by the addressee. (29b) allows the same reading, but also allows a non-specific interpretation, where the speaker has no particular individual in his mind. and anyone who learns English will be fine for him.

In "Cl+N", relative clauses can only modify the noun, not the whole "Cl+N" phrase, as in (30):

(30) a. * wo xiang zhao [RC xue yingyu   de] ge   xuesheng.
        I   want   seek   study English Mod Cl   student
        'I want to look for the student who learns English.'

   b. wo xiang zhao ge   [RC xue   yingyu   de] xuesheng.   [Non-specific]
      I   want   seek   Cl   learn English Mod student
      'I want to look for a student who learns English.'

When the noun of "Cl+N" is modified by the relative clause as in (30.b), it only has a non-specific reading, where any student who learns English will do.

Creation verbs: "one+Cl+N" and "Cl+N" have different interpretations in contexts of creation. Diesing (1992) notices that some verbs place felicity restrictions on their objects that have to do with presuppositionality. In particular, verbs of creation are incompatible with objects whose existence is presupposed.

Zhang (2004) reinterprets this constraint as a constraint disallowing specific interpretations of indefinites in creation contexts. In (31) "Cl+N" is acceptable. "One+Cl+N" is also acceptable, but not with a specific reading: *yi ge dangao* "one Cl cake" and *ge dangao* "Cl cake" cannot refer to a particular cake that is identifiable to the hearer, both talk about an unspecific cake-baking event.

(31) a. wo   kao   le   yi   ge   dangao.

      I   bake   Perf   one   Cl   cake

  b. wo   kao   le   ge   dangao.

      I   bake   Perf   Cl   cake

    Both: 'I baked a cake.'

We see that "stressed *yi* +Cl+N" has a quantity reading, "unstressed *yi*+Cl+N" a specific and a non-specific reading, while "Cl+N" only has a non-specific reading.

We propose the structure in (32) for indefinite "Cl+N", where ClP is the maximal projection of the indefinite "Cl+N" and there is no other functional projection above it.

(32)

                  ClP

           Cl   NP

     ben$_i$ 'volume' |

                   N

             shu 'book'
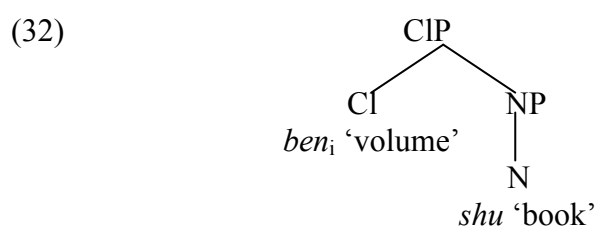
5.   Syntax of definite "Cl+N"

In this section we discuss the syntax of definite 'Cl+N'.   Our main question here is: does the 'Cl+N' project into a ClP (Cheng & Sybesma 1999) or a DP (Simpson 2005)?

In section 5.1 we review a phonological reduction approach to the definite "Cl+N" (Shi & Liu 1985). In section 5.2, we will examine Cheng & Sybesma's (1999) proposal that

definite Cl+N are classifier phrases headed by classifiers. We make our own proposal in Section 5.3.

5.1 From "Dem+Cl+N" to definite "Cl+N"

The definite "Cl+N" construction has been discussed by many Chinese dialectologists in different Chinese dialects. A group of scholars from mainland China holds the view that definite "Cl+N" is derived from demonstrative phrases by deleting the demonstrative (e.g. Shi & Liu 1985, Wang 2005, Y. Chen 2007).

Shi & Liu (1985) claim that in the Suzhou dialect of Wu, the definite "Cl+N" is derived by deleting the distance-neutral demonstrative /gəʔ/ before "Cl+N". 'Distance-neutral' means that "when /gəʔ/ is contrasted with a distal demonstrative, it indicates the entity to be close to the speaker; when it is contrasted with a proximal demonstrative, it indicates the entity to be far from the speaker. When it is used by itself, it is neutral in terms of distance." (cf. Y. Chen 2007: Chapter 3). According to Shi & Liu (1985), on the definite interpretation, "Cl+N" simply refers to identifiable entities and it does not distinguish distance: ""Cl+N" does not emphasize quantity, and carries no contrastive meaning, and has a weak deictic function" (Shi & Liu 1985:160). Based on this similarity, Shi & Liu assume that "Cl+N" originates from the demonstrative phrase of "/gəʔ/+one+Cl+N".

Shi & Liu (1985) claim that there is phonological evidence for this analysis. They observe that in the Suzhou dialect, when the Cl+N construction has a definite reading, the (monosyllabic) classifier has the tone sandhi from its base tone to a secondary high level tone (tone 44). This tone is consistent with that of the classifier after the neutral demonstrative /gəʔ/. For example, the classifier *bu* has the same tone of 44 when it appears after the demonstrative, as in (33.a) and when it used in "Cl+N", as in (33.b).

(33) a. ge^{44}ʔ bu^{44} tɕʰ'i ts'o

     Dem   Cl   car

     'this car'

    b. bu^{44} tɕʰ'i t'o

     Cl   car

     'the car'

Wang (2005) is a typological study of the "Cl+N" construction in the southern Jiangsu Province and Anhui Province. He argues that in some dialects, the phonological trace of the dropped element can still be found. For example, in the *Lianshui* dialect (Jianghuai Mandarin), there is a glottal /ʔ/ before the definite "Cl+N", as shown in (34). He proposes that the glottal is the leftover of the demonstrative.

(34) kəm⁵⁵   zəm³⁵   to³¹⁻³⁵ kɔ³¹   teʔ⁰

    Cl   man   pretty   tall

     'The man is pretty tall.'

There are two problems with this proposal.

    First, definite "Cl+N" and "Dem+Cl+N" have different interpretations. Take the case of "Cl+N" in the Suzhou dialect discussed above. According to Shi & Liu's proposal "Cl+N" and "Dem+Cl+N" ought to have the same meaning. But this does not seem to be the case. In Shi & Liu's paper, we find the examples in (35).

(35)a. tsã̀   tsʔ-dɤ   sa   zã̀-ho   lE- gəʔ

    Cl-piece paper   what   place   Part

    'Where is the piece of paper?'

   b. gəʔ tsã̀   tsʔ-dɤ   sa   zã̀-ho   lE- gəʔ

     this   Cl-piece paper   what   place   Part

     'Where is that piece of paper'   (Note: *that* has a distance neutral use)

While at a first glance, the subject *tsã̀ tsʔ-dɤ* 'piece paper' in (35.a) and *gəʔ tsã̀ tsʔ-dɤ* 'this piece paper' (35.b) have the same meaning: both refer to a particular paper that is identifiable in the context. However, the sentences are in fact not synonymous. In (35.a), the interlocutors know which paper is under discussion; the definiteness of "Cl+N" relies on the context and there is no contrastive (deictic) meaning involved. (35.b), on the other hand, has a salient deictic meaning. It is quite possible that the referent wasn't mentioned in the previous discourse, and expresses new information and a contrastive meaning.

    Secondly, languages that have definite "Cl+N" do not necessarily have a neutral demonstrative in their language system. For example, Cantonese has the definite "Cl+N"

construction, but it does not have a neutral demonstrative. This is unexpected on Liu & Shi's analysis.

In view of these two problems, we assume that definite "Cl+N" and Dem+Cl+N are different constructions.

5.2   Definite "Cl+N" as ClP

Cheng & Sybesma (1999) propose that in languages with articles/determiners, the deictic function in the nominal phrase is taken care of by the article/determiner (D^0), while in languages without articles/determiners like Chinese, some of those functions are performed by the Cl^0, including the deictic function. Specifically, Cheng & Sybesma (1998) assign the classifier in definite "Cl+N" the same meaning as the definite article in English.

Cheng & Sybesma propose (36) as the structure of definite "Cl+N" in Cantonese, where the classifier project as the head of ClP and does not project any high nodes like NumP or DP.

(36)

```
              ClP
             /   \
           Cl     NP
                  |
                  N
```

Thus, they treat indefinite "Cl+N" as a NumP with an empty Num, and definite "Cl+N" as ClP without a Num projection.

This proposal has been criticized in Simpson (2005). Simpson argues that the analysis of definite "Cl+N" as a lower projection than indefinite "Cl+N" gives the wrong interpretation of true numeral classifier phrases of "Num+Cl+N".

We use the Wu data to illustrate the point. (37) shows that "Cl+N" can be modified by numerals and that Num+Cl+N has an indefinite reading.

(37)a. bu   tsʰotsɻ   paʔniɔ   die.   [Wu:Fuyang]

　　　　Cl   car   broken   Part

　　　'The car is broken.'

　　b. ŋɤ   ma   le   n̨iaŋ   bu   tsʰotsɻ.

　　　　I   buy   Perf   two   Cl   car

　　　'I bought two cars.'

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Simpson (2005:14) points out that if the classifier has the same interpretation as the definite article in English, one would expect a definite interpretation as one of the readings (i.e. *the two* cars or *the cars that are two* in (37.b)). However, this is not the case, we can only get an indefinite reading for (37.b).

Cheng & Sybesma (1999) assume that this reading is unavailable by stipulating that NumP+Cl is always indefinite, and that definite nominals are always projected into ClPs.

The problem with that stipulation is that, with it, the analysis does not extend beyond Cantonese. In Wu (*Shanghainese* and the *Fuyang* dialect) the Num+Cl+N can have a definite reading. For example, in the Fuyang dialect, the element of /n̠ian/ is an imprecise quantifier meaning 'several' and can be used in the numeral phrase of /n̠ian /+Cl+N. /n̠ian /+Cl+N has an indefinite reading in postverbal position and a definite reading in preverbal position. See (38):

(38)a. ŋɤ   ɕin   **n̠ian   gə   n̠in**   læ   baŋ   ŋɤ.   [Indefinite NumP]

   1sg   search   several CL   people   come   help   1sg

   'I am looking for some people to help me.'

   b. **n̠ian   gə   n̠in**   tə   ga-i   ?   [Definite NumP]

   several   CL   people   at   where

   'Where are the people?'

Impossible: 'Where are some people?'

In view of these problems, we think that it is problematic to assume that the definite Cl+N is a classifier phrase, with a less articulated projection than the indefinite Cl+N.

5.3   Definite "Cl+N" as DP

We now propose a DP analysis for definite "Cl+N" (Simpson 2005 makes a   similar proposal).

A. Li (1999) argues that Chinese determiner phrases have the DP structure: [$_{DP}$ D[$_{NumP}$ Num[$_{ClP}$ Cl[$_{NP}$ N]]].   We propose that when "Cl+N" has a definite reading, the classifier heads the projection of DP. We propose that due to the lack of lexical elements in Num, and the lack of a lexical D-element, the Cl undergoes Cl-to-D raising and becomes the head of DP, as in (39):

(39)

DP
D   NumP
*ben*ᵢ 'volume'
Num   ClP
Cl   NP
*t*ᵢ
N
shü 'book'
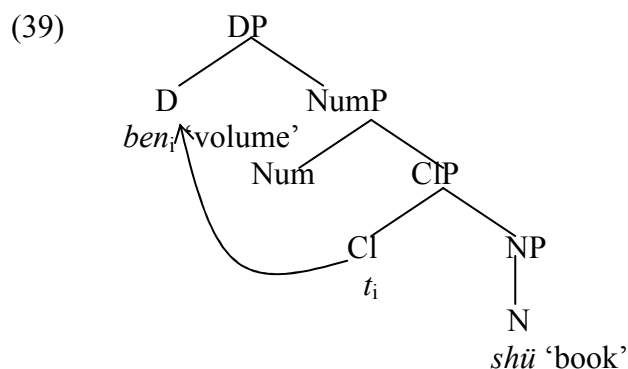
We discuss two arguments for assuming this structure.

Argument 1: One piece of syntactic evidence that support the analysis is the fact that classifiers can modify proper names, as in (40.b) (note that "Cl+proper name" (40.b) refers to the same individual as the bare proper name does (40.a)):

(40) a. ɕiaouaŋ   giŋtsɔ mi   læ   saŋban.   [Wu: Fuyang]
     XiaoWang   today   not   come   work
     'XiaoWang did not come to work today.'

    b. gə   ɕiaouaŋ   giŋtsɔ   mi   læ   saŋban.
      Cl   XiaoWang   today   not   come   work
      'The Xiaowang did not come to work today.'

Longobardi (1999) argues with the data in (41) that in Italian proper names are generated in N and raised to D, except when the D is already filled by a determiner.

(41) a.* Antica Roma
    b. Roma Antica
    c. L'antica Roma

In the same spirit we propose that in (40.a), the Chinese proper name *XiaoWang* is raised from N to D, whereas in (40.b), the proper name must remain in the position of NP and cannot undergo N-to-D raising, because the D position is filled by the classifier *kə*.

Simpson (2005) gives a similar argument on the basis of the data from Southeast Asian languages like Vietnamese, Thai and Cantonese. He shows that in Vietnamese a second general classifier element can occur preceding the regular classifier, resulting in sequences

with clear definite interpretations. The examples in (42) are from Simpson (2005:15). (Note that we do not find a similar construction in Chinese languages.)

(42) a. con   dao   [anh   cho   toi   muon],   no   that sac.   [Vietnamese]

     Cl   knife   you   give   me   borrow,   it   real   sharp

     'The knife you gave me is really sharp.'

   b. cai   con   dao   [anh   cho   toi   muon],   no that sac

      Cl   Cl   knife   you   give me   borrow,   it real sharp

      'The knife you gave me is really sharp.'

In (42.a), Cl+N has a definite interpretation; this definite interpretation is preserved in in (42.b), where Cl+N is modified by the general classifier *cai*. This follows, if we assume with Simpson that in (42.a) the classifier is raised by Cl-to-N, while in (42.b), the general classifier is in the D^0 position.

     Argument 2: we mentioned in Section 5.1 that in some dialects, like the Suzhou dialect, the classifiers in the definite "Cl+N" construction have tone sandhis. In the *Fuyang* dialect of Wu, we also observed tone sandhi for the definite use of classifiers as in (42):

(43) a. ŋɤ   tɕʰiʔ   le   **iʔ**   **uan^{135}**   **van**.

     I   eat   Perf   one   CL$_{-bowl}$ rice

     'I ate a bowl of rice.'

   b. **uan$^{135-55}$ van**,   ŋɤ   tɕʰiʔ-n̠iɔ   die.

     Cl$_{-bowl}$ rice   I   eat- finish   Part

     'The bowl of rice, I finish it.'

When the classifier *uan* 'bowl' is used in normal classifier positions, it has its base tone of 135 (low falling and rising). However, when it is used in the definite "Cl+N", the CL changes its base tone 135 to a high tone 55. We suggest that the changed tone can be seen as an overt realization of D at the PF level.

Our DP proposal for definite "Cl+N" predicts that it is possible for NumP to have a definite reading if the Num can undergo Num-to-D raising.[34] We propose that this is what happens in (38b), repeated here:

(38) b. **ȵian   gə   ȵin**   tə   ga-i   ?   [Wu: Definite NumP]
      several CL   people at   where
      'Where are the people?'

We propose the following structure of the definite NumP in (38.b):

(44)
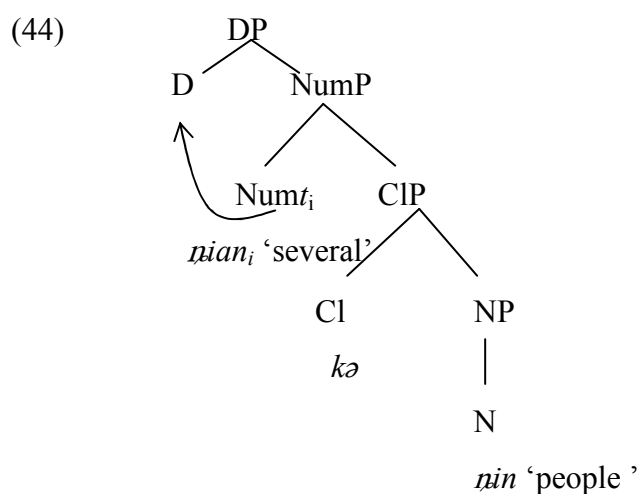
To sum up, in this section, I argued for a DP analysis of definite "Cl+N" where the classifier in "Cl+N" undergoes Cl-to-D raising to get the definite reading. This proposal can not only account for definite "Cl+N" but also definite "Num+Cl+N" in Wu.

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[34] Note that for the time being, we ignore the question which numerals or quantifiers can be used to express definiteness.

6.   Semantic interpretation of "Cl+N"

In this section, we will argue that the classifier in the "Cl+N" construction is interpreted with a counting reading. We will use this to formulate a semantics for indefinite and definite "Cl+N".

6.1 "Cl+N" with a counting reading

We begin by examining in Mandarin and in Wu, which types of classifier can be used in the construction of "Cl+N".

We start with [-C, +M] classifiers like *gongjin* 'kilo', *li* 'mile', *bang* 'pound', measure words that are by default only associated with measure interpretations. These classifiers require numerals (see also Yip 2008). As (45) shows, measure words cannot form a "Cl+N" construction in Mandarin:

(45) a.* wo   zou   le   li   lu.   [Mandarin]
        I   walk Perf   mile   road

    b. wo   zou   le   yi   li   lu.
       I   walk   Perf   one   mile   road.
       'I walked one mile'

The Wu data in (46) show that [-C, +M] classifiers cannot form "Cl+N" in subject position either:

(46) a. * di   lu   tso   le   ŋo   pan   kəʔ   ɕioŋdɛi.   [Wu]
         Cl-mile road   walk Perf   I   half   Cl   hour
         'The mile of road took me half an hour.'

    b. */??? tɕʰiŋ   si   n̨ian   kəʔ.
            Cl-liter water cool   Part
            'The liter of water is cool.'

Next we check [+C, -M] classifiers, classifiers that are by default associated with counting readings.   We have already seen many examples of these, they can be used without numerals in postverbal positions in Cantonese:

(47) a. wo   mai   le   ben   shu.   [Mandarin]
          I   buy   Perf   Cl   book
          'I bought a book/#books.'

     b. zhuo-shang   fang-zhe   ge   pingguo.
          table-on   put-Dur   Cl   apple.
          'On the table lies an apple/# lie apples.'

In both examples, "Cl+N" refers to individual entities. (47.a) means that there is an individual book that I bought, and (47.b) means that there is a single atomic apple lying on the table, not apple stuff or a plurality of apples.

The examples in (48) shows that in Wu Chinese, "Cl+N" with [+C, -M] classifiers can be used in the subject position with a definite reading.

(48) a. ben   çy   zɿ   ŋɤ-go.   [Wu]
          Cl-volume   book   be   mine.
          'The book is mine.'

     b. gə   pʰiŋgu   lanȵiɔ   die.
          Cl   apple   rotten   Part
          'The apple is rotten.'

We next look at [+C, +M] classifiers like *ping* 'bottle', *xiang* 'box', *qun* 'group', *dui* 'pile' etc in Mandarin. Those classifiers are equally open to counting and measure interpretations. These classifiers can only be used in "Cl+N" when the classifier has a counting reading. Look at the following:

(49) a. wo   shou   shang   na   zhe   ping   jiu.   [Mandarin]
          I   hand   on   take   Dur   Cl-bottle   wine
          'I am carrying a bottle of wine in my hand.'

     b. # ta-de   wei   neng   zhuang   xia   ping   jiu.
          his   stomach   can   contain   down   Cl-bottle   wine
          'His stomach can contain a bottle of wine.'

The container classifier phrase in (49.a) has a counting reading, which implies the existence of a concrete bottle filled with wine. The Cl+N, i.e. *ping jiu* 'bottle of wine' can only be

indefinite. (49.b), on the other hand, talks about the capacity of the stomach or his drinking ability, which triggers a measure interpretation. The only available reading for (49.b) is the absurd interpretation that he has a concrete bottle in his stomach, i.e. the reading where Cl+N *ping jiu* 'bottle wine' is interpreted with a counting reading, we are then forced to put a concrete bottle in his stomach. This is, of course, infelicitous.

In Wu Chinese, [+C, +M] classifiers can appear in the definite "Cl+N" construction, when those classifiers are interpreted with a counting reading. See the contrast between (50.a) and (50.b).

(50)a. ŋɤ çiʔ   go   biŋ   çiu   iŋkuo   çink^{h}iu   go.   [Wu]
    I   eat Mod   Cl$_{bottle}$ wine   England   import   Part
    'The bottle of wine that I drank was imported from England.'

b.# ŋɤ çiʔ   go   biŋ   çiu   dele   uæ-li   da   sɔ   la.
    I   eat Mod   Cl$_{bottle}$ wine   at   stomach-in   Prog   burn   Part
    Intended: 'The bottle of wine that I drank is burning in my stomach.'

The generalization is that "Cl+N" construction is possible only when the classifier is interpreted with the counting function. According to Yip (2008), this generalization holds in Cantonese as well.

6.2 Semantics of indefinite "Cl+N"

In Section 5.2, we argued that in the indefinite "Cl+N" construction has the maximal projection of ClP (as in (51)). This structure is consistent with our analysis of the structure corresponding to the counting reading, where the classifier first takes NP as complement and then the whole element can be taken as complement by NumPs (cf. Chapter 4, and Rothstein 2009).

(51)

                     ClP

            Cl   NP
        ben$_i$ 'volume'
                      N
               shu 'book'

The structure of (51) can form the basis of an indefinite NumP as in (52.a), or a definite DP with a deponstrative D as in (52.b), or be the complement of Num, and Num+Cl+N the complement of DP, as in (52.c).

(52) a. liang   ben   shu
      two   Cl   book
     'two books'

  b. zhe   ben   shu
     this   Cl   book
      'this book'

  c. zhe   liang   ben   shu
     these   two   Cl   book
     'these two books'

Following the observation that the classifier in "Cl+N" only has a counting reading, we propose that indefinite "Cl+N" denotes a set of atomic entities, a set of singularities. In Chapter 4 we proposed the following meaning for the [+C] classifiers:

(53) $\lambda \boldsymbol{k} \lambda x.\ \pi_1(x) \in (^{\cup}\boldsymbol{k} \cap k) \wedge \alpha(\pi_1(x)) \wedge \pi_2(x) = k$

The classifier in (53) takes a kind as input and maps it onto set of the atomic instances of the kind in counting context k, that have the lexical property α expressed by the classifier. This is the basis for the indefinite reading of Cl+N:

(54) a. $\|shu\| = ^{\cap}\text{BOOK}$ (kind-denoting)

    b. $\|benshu\| = \lambda x.\ \pi_1(x) \in (^{\cup\cap}\text{BOOK} \cap k) \wedge \text{Volume}(\pi_1(x)) \wedge \pi_2(x) = k$

This semantics for "Cl+N" makes two predictions.

      First, it predicts that the indefinite "Cl+N" is available in postverbal positions in all the three Chinese languages. The semantics of "Cl+N" in (53) interprets "Cl+N" as a predicative nominal phrase of type <d×k, t>. This is the right 'indefinite' semantics for noun phrases in post-copula position (Partee 1987). For object position, we make the assumption, which is widely made in the literature following Heim (1982), that object position is in the

scope of an operation of default existential closure, and we assume that it is this operation that gives the "Cl+N' its indefinite interpretation. The interpretation is shown in (55):

(55) a. Wo   mai   le   ben   shu.

       I   buy   Perf Cl_{volume} book

     'I bought a book.'

  b. $\|ben\ shu\| = \lambda x.\pi_1(x) \in (^{\cup\cap}BOOK \cap k) \wedge Volume(\pi_1(x)) \wedge \pi_2(x) = k$

  c. $\exists x \exists e[BUY(e) \wedge Ag(e) = I \wedge Th(e) = x \wedge \pi_1(x) \in (^{\cup\cap}BOOK \cap k) \wedge Volume(\pi_1(x)) \wedge \pi_2(x) = k]$

However, unlike in English, we assume that default existential closure has scope over the VP and not over the subject position (e.g. Diesing 1992). This explains why indefinite Cl+N cannot occur preverbally, unless they are under the scope of the explicit existential operator *you* as was shown in (7a).

    Secondly, the semantics in (53) predicts that "Cl+N" can only be interpreted as a singular indefinite, not a plural indefinite. "Cl+N" denotes a set of atoms, a set of singularities, and existential closure expresses that this set is not empty.

6.3 Semantics of definite "Cl+N": from counting to definiteness-marking

In this subsection, we propose a semantics for the definite interpretation of the classifiers

    Lyons (1999) claims that the semantic-pragmatic concept of definiteness exists in all languages, but that its grammatical realization may differ cross-linguistically. While languages pick their notion of definiteness from the family of concepts that relate to inclusiveness, identifiability and referentiality, they may differ in what element they choose. So the crucial question for us is: what does definiteness of classifiers mean in Chinese languages?

6.3.1   A uniqueness-based approach of definiteness

Cheng & Sybesma (1999) assume that classifiers with a definite interpretation have the same meaning as the English definite article: "if we maintain that Chinese nouns are predicates, classifiers are like Ds in that (a) they are type-shifters, changing predicates into arguments, and (b) they yield the definite interpretation (comparable to an iota operator." (Cheng & Sybesma: 1999: 520-521).

Wu & Bodomo (2009) argue against this. They show that the definite reading of Cheng & Sybesma's Cantonese examples has restrictions that English definite phrases headed by *the* do not have. Consider (56).

(56) a. Keoi   maai-zo   gaa   ce.
　　　he   sell-ZO   Cl   car
　　　'He sold the car.'　　　　　　(Cheng&Sybesma 1999:524, (25b))
　　b. Wufei   jam-jyun   wun   /di   tong   la.
　　　Wufei   drink-finish   CL-bowl /CL-PL   soup   SFP
　　　'Wufei finished the soup.'　　　(Cheng&Sybesma 2005:270, (24b))

Wu & Bodomo (2009:497) argue that (56a) is only appropriate when the hearer already knows that a third person owned a car (and only one car), and that (56b) requires that the hearer knows that a person called Wufei was served a particular bowl of soup or some particular soup. Without these assumptions, you do not get a definite reading; but an indefinite reading, where the bare classifier *gaa ce* in (56.a) is understood as 'a car', and *wun*/*di tong* in (56.b) as 'a bowl of soup/some soup'.

We will show here that definite classifiers in Wu shouldn't be identified with English style determiners either.

First, "*the*+N" in English obviously does not have the same distribution as definite "Cl+N" in Wu. In Wu, definite "Cl+N" is restricted to preverbal positions, while English D "the+N" does not have such a restriction. Secondly, the definite classifier in Wu does not have a uniqueness presupposition.

Following Sharvy 1980 and Link 1984, the English definite article is interpreted as a sigma operation (generalizing Russell's 1905 iota operation): an operation that maps a set on the sum of the elements in that set, if that sum is itself in the set, and is undefined otherwise.

Now, we assume a predicative interpretation for "Cl+N', and a DP interpretation for the whole phrase, so it is not the classifier itself that is interpreted as the sigma operation, but, presumably, the D position.

But the sigma operation has a uniqueness presupposition built into its meaning. Li and Bisang 2010 argue that this is not appropriate for Wu.

In the first place, note that uniqueness is found in Chinese languages like Wu in expressions that are not classifier phrases at all.

Loebner (1985) proposes that across languages, there exists a special group of nouns which refer to unique entities, independently of the particular situation referred to, nouns like *sky* and *sun*. Those nouns tend to occur with the definite article in English: *the sky* and *the sun*. In Wu, these nouns occur as bare nouns, as in (57).

(57) a. tʰiŋ   zɻ   lan   ko.   [generic]   [Wu]
        sky   be   blue   Part
        'The sky is blue (in general).'
     b. tʰa-ian   iʔ-tin-vəʔ-tin   go   faʔ-kuaŋ-faʔ-n̥iʔ.
        sun   non-stop   Mod   emit-light-emit-heat
        'The sun emits light and heat non-stop.'

Note that the examples in (57) are generic: (57.a) means that the sky is blue in general and (57.b) means that the sun has the properties ascribed to it in a permanent way.

Similarly, proper names referring to places or locations can also be used to make unique reference independent of context. Again, in English, they take the definite article: *The Great Wall*, *the Capital*. In contrast, the counterparts in Wu occur as bare nouns:

(58) a. dzan tsʰen   koẓ   zɻkuaŋ   zɔ   ko ?
        Great Wall   what   time   build   Part
        'When was the Great Wall built?'
     b. [Looking at the map of China]
        ɕiudo   tə   ka-i?
        Capital   at   where
        'Where is the Capital?'

Secondly, the examples with definite "Cl+N" in Wu that we have discussed do not generally presuppose uniqueness. Look at the examples in (59):

(59) a. [In a room with three doors, one of which is open]
        ɕuan   men   bəʔ   ŋə   kuan-ɦao   i.
        Cl   door   help   me   close   it
        'Please help me close the door.'

b. kintsɔ uælæ bænlu   laŋ,   tsəʔ leŋtʰæ tɕʰi pʰaʔ niɔ die.

   today back halfway on   Cl   tyre   go   broken Part

   'Today, on the way back, the tyre was flat.'

(59.a) is an immediate situation use: three doors are part of the background, and we do not need to assume that Cl+*door* must refer to a door that is presupposed to be unique. There *is* reference to a *single* door, because of the semantics of the classifier given, but the actual utterance will identify the correct one without presupposition requirements. In other words, if accommodation goes on here (as predicted by Kadmon 1987), it is so subtle that native speakers don't notice it.

(59.b) is an associative use or a bridging cross-reference use situation. A singular tyre is mentioned of a car which is known to the hearer and the speaker. Not enough information is given to determine which of the four tyres it is, i.e. not enough information is given to uniquely identify the tyre. And such information is not required either.

These cases are not atypical for Wu at all, nor for Cantonese: mostly the uses of definite "Cl+N" are like the cases in (59), uniqueness plays no role.

6.3.2 A familiarity-based approach of definiteness

While we have argued that uniqueness plays no role in the semantics of definite [Cl+N], familiarity does. Familiarity accounts of definiteness are given in the literature by Christophersen (1939), Hawkins (1978), Heim (1982), and many after that.   The idea is that definites are used to pick out referents that are 'in some sense' familiar to the discourse participants. For example, Christophersen (1939) argues that the use of 'the' in English directs the hearer to the referent of a noun phrase, by indicating that this referent is familiar to hearer as well as speaker. Heim (1982) proposes that the use of a noun phrase is familiar if it links to a discourse referent about which there is already information in the local context of interpretation, which she formalizes as a file of information held in common by the interlocutors in the discourse.

A recent proposal concerning familiarity is made by Roberts (2003). Roberts (2003) distinguishes two kinds of familiarity: "strong familiarity" and "weak familiarity". "Strong familiarity" refers to discourse-anaphoric uses of definites, which essentially require a definite to be anaphoric to a preceding linguistic expression. In contrast, the notion of "weak familiarity" allows for a number of ways in which something can be familiar: by being perceptually accessible to the discourse participants, by being 'globally familiar in the general

culture', or by being derivable through contextual existence entailments (Roberts 2003:304). Weak familiarity only requires that the existence of the relevant entity be entailed by the interlocutor's common ground (Roberts 2003: 306).

We propose that definiteness in the Chinese languages be identified with Roberts' notion of weak familiarity. We propose that definite "Cl+N" refer to entities that are directly involved in the situation or are presupposed to be familiar or identifiable by interlocutors, as part of the background information.

What contexts allow the presence of "Cl+N"? In general, the definite "Cl+N" construction is more frequently found in daily conversations than in descriptive contexts like, for instance, story-telling. The most natural situations for their use are immediate situation uses like we have seen in (59): on-the-spot uses, the bridging use etc. Anaphoric uses are not very natural. In what follows, we will use the data of Wu Chinese (the Fuyang dialect) to illustrate the possible contexts for definite "Cl+N".

Context 1—the on-the-spot use: definite "Cl+N" naturally refers to a perceptually visible entity.

(60) kʰuaʔ kulaæ, bu tsʰotsɿ pəʔ ia kua-n̩iɔ die. [Wu: Fuyang]
    quick come Cl car PASS 3PL scratch PART
    'Come over! The car was scratched by someone.'

Here the speaker is reporting what he/she found in the scene. Suppose that there are two cars in their family and they are parked next to each other. The speaker finds that one of them is scratched and calls the rest of the family members. The hearers will only identify which car is scratched after entering the immediate situation.

The expression *kə n̩in* 'Cl man' can even refer to the speaker or the addressee if (and only if) they are on the spot:

(61) a. kintsɔ gə n̩in man tɕʰiʔn̩iʔ. [Wu: Fuyang]
      today Cl man very tired
      'Today, the person (the speaker) is very tired.'
    b. kəmɔ gə n̩in gaʔ lɔ ɕian man.
      currently Cl man so old look Part
      'Lately, the person (the addressee) looks so old.'

"Cl+N" in (61.a) refers to the speaker himself, and (61.b) refers to the hearer on the spot.

A scenario for (61.a) is the following: a husband returns home after working for a long day. When he sees his wife in the kitchen, he says (61.a). A scenario for (61b) is the following: two old friends have not seen each other for a few years. One day they meet in the street. One of them says (61.b) to the other.

Context 2—the familiarity use: definite "Cl+N" refers to the entity that is assumed to be known by interlocutors in a local context.

(62) a-piŋ,   tsəʔ giu   ɕankan san   maobiŋ die.   [Wu: Fuyang]
     A-Ping,   Cl dog   seem   get   sick   Part
     'A-Ping, the dog seems to get sick.'

In (62), the speaker is telling the hearer about the sickness of the dog. In reporting this event, he assumes that the hearer knows which dog he is talking about. In most cases, the definite refers to the individual in their immediate environment, e.g. their own dog at home. But the dog need not be on the scene.

On the two uses discussed so far, the definite can easily be a 'new' definite, not mentioned before in the discourse.

Context 3—the bridging use: the definite CL+N can be modified by different modifiers, e.g. nouns, pronouns, adjectives, relative clauses. [Modifier+CL+N] always implies definiteness.

(63)a. **[tsəʔ giu] [tsəʔ tɕia]** tœnn̩iɔ die.   [Wu: Fuyang]
      CL dog CL leg fracture Part
      'The leg of the dog was fractured.'
   b. faŋgan **[gə kʰækuan]** uan̩iɔ die.
      room   CL switch   broken   Part
      'The switch of the room does not work.'

In these examples The head noun has a relational interpretation, such as '*the leg of ..., etc.*'. Clark (1979) calls this the "bridging" phenomenon. We assume that the modifiers provide relevant contextual information to help to identify relevant referents in the denotation of N.

As we mentioned, definite "Cl+N" are not naturally used in cases of strong familiarity, i.e. as discourse anaphors.

(64) a. A wine glass broke last night. The glass had been very expensive.

b. ???ɕi-n̠iʔ-tsɿ ŋɤ kʰɔpaʔ le tsəʔ pætsɿ. **[tsəʔ pætsɿ]** mɑn kuæ.

     yesterday I break Perf Cl glass Cl glass very expensive

     'I broke a glass yesterday. The glass had been very expensive.'

c.# ɕi-n̠iʔ-tsɿ ŋɤ kʰɔpaʔ le tsəʔ pætsɿ. **[i]** mɑn kuæ.

     yesterday I break Perf Cl glass 3SG very expensive

     'I broke a glass yesterday. It had been very expensive.'

d. ɕi-n̠iʔ-tsɿ ŋɤ kʰɔpaʔ le tsəʔ pætsɿ. **[kəʔ tsəʔ pætsɿ]** mɑn kuæ.

     yesterday I break Perf Cl glass DEM CL glass very expensive

     'I broke a glass yesterday. This glass had been very expensive.'

In the English example in (64.a) (from Heim 1982), *the glass* is strongly familiarity, since it is a discourse anaphor to the indefinite antecedent *a glass*. In Wu, it is preferable to use pronouns or demonstratives in such cases, as in (64.c-d).

There are two facts that a familiarity-based proposal can easily explain.

First, definite "Cl+N" has an episodic reading, while definite bare nouns have a generic reading:

(65) a. (*gə) tʰa-iaŋ zɿ iuan kə.   [Generic]

     Cl sun be round Part

     'The sun is round.'

b. kintsɔ *(gə) tʰa-iaŋ mɑn dœ.   [Episodic]

     today CL sun very big

     'Today, the sun is really strong.'

(65.a), with the bare noun *tʰa-iaŋ* 'sun', means that the sun has the generic property of being round'. In contrast, (65.b) with the definite "Cl+N" *gə tʰa-iaŋ* means that the sun is really strong at a particular moment.

We propose that bare nouns like *tʰa-iaŋ* have a uniqueness requirement built into their semantics and are used naturally in contexts where we express what the characteristic properties of this unique object are. On the other hand, the definite reading of "Cl+N" *kə tʰa-iaŋ* implies familiarity in a context here and now: we are likely to use it to express properties that are instantiated here and now, episodic properties.

The second fact is why there is a subject-object asymmetry for definite "Cl+N" in Wu:

(66) a. ŋɤ   kʰɔpaʔ   le   **[tsəʔ   uan].**   [SVO]

　　1SG   break   PERF   CL   bowl

　　'I broke a bowl.'   NOT 'I broke the bowl.'

　b. ŋɤ   kʰəʔ   **[tsəʔ   uan]**   tɕʰi   kʰɔpaʔ   die.   [SOV]

　　1SG   OM   CL   bowl   go   break   PART

　　'I broke the bowl.'

　c. **[tsəʔ   uan],**   ŋɤ   kʰɔpaʔ   ko.   [Topicalization]

　　CL   bowl   1SG   break   PART

　　'The bowl, I broke (it).'

NOT   'A bowl, I broken (it).'

As explained, in Chinese, topics are usually found in preverbal positions and express hearer-old information. In contrast, foci are usually in postverbal positions and express hearer-new information. But, of course, familiarity is a 'hearer-old' notion. Hence we expect definites to occur in topic positions, hence preverbal positions.

6.3.3   Semantics of definite "CL+N".

We now formulate the semantics of definite CL+N.

   The semantics we gave for indefinite CL+N is repeated in (67):

(67) a. Wo   mai   le   ben   shu.

　　I   buy   Perf   Cl$_{volume}$ book

　　'I bought a book.'

　b. $\|ben\ shu\|=\lambda x.\pi_1(x)\in (^{\cap\cup}\text{BOOK} \cap k)\wedge\text{Volume}(\pi_1(x)) \wedge\pi_2(x)= k$

　c. $\exists x\exists e[\text{BUY}(e)\wedge\text{Ag}(e)=I\wedge\text{Th}(e)=x\wedge\pi_1(x)\in (^{\cap\cup}\text{BOOK}\cap k)\wedge\text{Volume}(\pi_1(x)) \wedge \pi_2(x)=k]]$

We derive a predicative meaning for "Cl+N", which gets existentially closed by default existential closure in postverbal positions like object position.

      We assume the same predicative interpretation for definite Cl+N to start with.   We proposed a different syntax for definite "Cl+N", which involves Cl-to-D raising.   We propose that this syntactic operation is semantically interpreted much like the operation *argument formation* AF in Landman (2004). Landman's operation of argument formation is in essence a definiteness type shifting rule: it maps a predicate interpretation on a

generalized quantifier which is the result of existentially closing and maximalizing the predicate interpretation. Now maximalization corresponds to Sharvy's sigma operation, and we have argued in this chapter that the sigma operation is not appropriate for Chinese. So we want to replace it by what *is* appropriate for Chinese, a condition of weak familiarity. We formulate argument formation as:

(68) $AF_{WEAK-FAM}$: $\alpha \rightarrow \lambda P.\exists x[\alpha(x) \wedge WEAK\text{-}FAM(x) \wedge P(x)]$

We propose, then, that $AF_{WEAK-FAM}$ is the interpretation of Cl-to-D raising. This means that it will take the predicative meaning of 'Cl+N' (in (69a) into a generalized quantifier meaning (in (69b):

(69) a. $\lambda x.\pi1(x) \in ([k \cap k) \wedge \alpha(\pi1(x)) \wedge \pi2(x) = k$

b. $\lambda P\exists x[\pi_1(x) \in (^\cup \boldsymbol{k} \cap k) \wedge \alpha(\pi_1(x)) \wedge \pi_2(x) = k \wedge WEAK\text{-}FAM(\pi_1(x)) \wedge P(\pi_1(x))]$

We work this out for (70):

(70) kintsɔ   man   lan.   gə   tɕʰuaŋdoŋ   laŋ   piŋ   tɕiʔ   man   die.
     today   very   cold   Cl   window   on   ice   freeze   full   Part
     'Today is very cold. The window is full of ice.'

(71) Denotation of "Cl+N" at type $<d{\times}k, t>$
     a. Predicate interpretation:
        $\|kə\ tɕʰuaŋdoŋ\| = \lambda x.\pi_1(x) \in (^{\cup\cap}WINDOW \cap k) \wedge Unit(\pi_1(x)) \wedge \pi_2(x) = k$
     b. Definite interpretation:
        $\lambda P\exists x[\pi_1(x) \in (^{\cup\cap}WINDOW \cap k) \wedge Unit(\pi_1(x)) \wedge \pi_2(x) = k \wedge WEAK\text{-}FAM(\pi_1(x)) \wedge P(\pi_1(x))]$

By this semantics, the *window* will need to satisfy the requirements of weak familiarity discussed above.

7. Summary

This chapter examined the distribution, syntax and semantics of the indefinite and definite Cl+N construction in three Sinitic languages. We showed that the distribution of definite and indefinite "Cl+N" is constrained to different degrees by the information structure in the three languages we examined. In particular, definite "Cl+N" are typically found in preverbal positions, which are usually topics, and indefinite "Cl+N" in postverbal positions, which are usually foci.

We argued that indefinite "Cl+N" are classifier phrases whose indefinite semantics in object position is derived from default existential closure over the internal arguments of the VP, (following in essence Heim 1982), while definite "Cl+N" are DPs, in which the classifier undergoes Cl-to-D raising, a process which is semantically interpreted as argument formation (following Landman 2004). Argument formation produces a definite generalized quantifier interpretation. Whereas in English the definiteness condition involved is taken to be a maximalization condition (following Sharvy 1980), for Chinese this condition is taken to be weak familiarity (following Roberts 2003).

Chapter 7 Conclusion

We have argued in this thesis that the distinction between counting and measure functions of classifiers is grammaticized in Chinese, and is a distinction which cross-cuts the lexical dichotomy between count and mass classifiers or between sortal and mensural classifiers.

In Chapter 2, we discussed the influential proposal of Cheng & Sybesma (1998) that Chinese has mass classifiers and count classifiers going with mass nouns and count nouns respectively. This claim implies that there is a distinction between two lexically different types of nouns in Chinese, mass nouns and count nouns. After examining the two diagnostics given by Cheng and Sybesma for distinguishing mass classifiers and count classifiers, we find that these diagnostics cannot separate the two classes of classifiers in a clear-cut way. They cannot form the basis for a lexical dichotomy of mass and count classifiers, and hence, they cannot form the basis for a distinction in mass and count nouns in Chinese.

Chapter 3 discussed Chierchia's (1998b) theory in which all Chinese lexical nouns are mass nouns which denote kinds. We justifies Chierchia's (1998b) claim with various tests. We then discussed the interpretational variability of Chinese bare nouns. We claimed that both the indefinite and definite readings of Chinese bare nouns are derived from the basic kind reading via Carlson's instantiation relation.

In Chapter 4 we turned to the semantics of classifiers. We argued that counting and measure are the two basic functions of classifiers, which are distinguished at the syntactic level. We argued for a two-feature system constraining the default interpretations of lexical types of classifiers: [±C(ounting)] and [±M(easure)] and specified the syntax and semantics for the four types of classifiers produced by this feature system

In Chapter 5 we used the distinction between counting and measure functions of classifiers to account for the two diagnostics proposed by Cheng & Sybesma (1998). We argue that pre-classifier adjectives are licensed when the classifier has a counting reading and that post-classifier *de* forces a measure reading of the classifier phrase. Both counting and measure classifiers can be used in the *de*-phrase to get a measure reading, but the counting classifier gets an *as many as…* type of measure reading, where the classifier denotes a counting unit, and the measure classifier gets an *as much as …* type of measure reading, where the classifier denotes a measure unit.

In Chapter 6 we extended our discussion of classifiers beyong the counting and the measure functions, and beyond Mandarin. We analyzed the "Cl+N" construction in three

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Sinitic languages, Manarin, Wu and Cantonese. We claimed that the distribution of definite and indefinite "Cl+N" is constrained by information structure: definite "Cl+N" are usually found in preverbal (topic) positions and indefinite "Cl+N" in postverbal (focus) positions. We also argued that the definite classifiers in Wu and Cantonese have different definiteness requirements from the definite article in English: whereas English definites use Sharvy's maximalization operation, Chinese definites are more appropriately characterized by Roberts's "weak familiarity".

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