Counting and Classifying Eventualities in Chinese*

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Abstract

Counting and measuring are two different ways to get the quantity information of entities and eventualities. Measuring applies to mass-like entities and unbounded eventualities. Counting, however, requires individuation, and language-specifically, classification of the resultant individuals. The occurrence of classifiers signals the individuation, whereas the choice of a certain classifier signals the classification. In the verbal domain, duratives and repetitives are measuring and counting expressions, respectively. This study firstly presents the gender-like agreement properties of verbal classifiers in Chinese, which are parallel to that of nominal classifiers. Secondly, I use complement-raising to account for a series facts with respect to duratives and repetitives in Chinese: their incompatibility with numeral-initial complements, their ability to separate idiom chunks, their possible postverbal positions, and the relevant argument scope patterns. Thirdly, I explain the cause of Krifka's (1990) ambiguity in *four thousand ships passed through the lock last year* by a structural ambiguity: the numeral is either in construal with *ships* or with an event-individuation expression to form a repetitive. In the latter case, *ships* is a kind-denoting bare noun. The implicit event-individuation expression is represented by compound classifiers in Chinese. Finally, I argue that measuring and counting expressions to the left of the functional word *de* are nominal-external.

1. Introduction

It is well-known that the distinction between telic and atelic in the verbal domain corresponds to the mass-count distinction in the nominal domain (cf. Mourelatos 1981, Bach 1981, Bunt 1985, Talmy 1988, Landman 1989, 1991, Doetjes 1997). The cross-category distinction is seen in the two ways to get the quantity information of entities and eventualities: counting and measuring. The former applies to countable entities and bounded eventualities, whereas the latter applies to mass-like entities and unbounded eventualities.

In measuring, units such as kilo and cup are used, regardless of the physical properties of the measured entities: both water and furniture can be measured in kilos, and both water and sand can be measured by cups, for instance.[1] Similarly, time units such as minute and hour are used, regardless of the types of the measured eventualities: both dancing and quarrelling can be measured in minutes or hours.[2]

(1) a. They put three cups of {water/sand} on the table.
b. They {danced/quarreled} for two hours.

Counting, however, can only be carried out after individuation. The presence of classifiers in languages like Chinese, such as *ge* in (2a), marks the result of individuation of

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[1] In the nominal domain, early discussion of the systematic distinctions between counting and measuring units in Chinese is seen in Ma (1984, 1990). He calls the former Individual Classifier (IC), and the latter Range Classifier (RC), which are equivalent to Cheng & Sybesma's (1997:3) Individual-Classifier and Mass-Classifier (Massifier), respectively.

[2] The occurrence of temporal expressions such as *in five minutes* in (i) has been assumed to signal a telic eventuality. Such temporal expressions are used neither for counting the relevant telic eventualites nor measuring any atelic eventualites. We do not discuss them in this paper.

(i) John ate the apple in five minutes.

nouns (Hansen 1972, Graham 1989, Chierchia 1995, Krifka 1995, Cheng & Sybesma 1997).[3] The presence of the word *time* in the event counting expressions, as in (2b), marks the result of individuation of the relevant bounded eventuality. Both classifiers in nominals and the word *time* here are counting units. In Chinese, nearly all entities can be counted by the classifier *ge* (Chao 1968, Li and Thompson 1981: 112, Zhu 1982: 49), and all eventualities can be counted by the word *ci* 'time'.[4]

(2) a. Akiu mai-le wu ge pingguo.
Akiu buy-PRF five CL apple
'Akiu bought five apples.'
b. John read this book three times.

Nouns are classified into types by some relatively arbitrary criteria, and the classification is shown in gender agreement. Articles and adjectives agree with their related nouns morphologically in type/gender in many languages. In Chinese, such agreement occurs between classifiers and nouns. In addition to *ge*, most nouns can be counted by a type-specific classifier. For instance, videos are counted by *pan* but not *jia* (3a), whereas shops are counted by *jia* but not *pan* (3b):

(3) a. Akiu mai-le liang {pan/ge/*jia} luxiang-dai.
Akiu buy-PRF two CL/CL/CL video-tape
'Akiu bought two video-tapes.'
b. Akiu qu-le liang {jia/ge/*pan} shangdian.
Akiu go-PRF two CL/CL/CL shop
'Akiu has been to two shops.'

What is less known is the fact that eventualities are also classified into types by some relatively arbitrary criteria, and the relevant counting word must agree with the type in Chinese. Thus in addition to *ci*, many eventualities can be counted by a type-specific classifier, called *dong-liangci* 'verbal classifier,' parallel to *ming-liangci* 'nominal classifier,' in Chinese. For instance, the eventuality of getting ill is counted by *chang* but not *tang* (4a), whereas the event of making a trip is counted by *tang* but not *chang* (4b):

(4) a. Akiu qu-nian bing-le liang {chang/ci/*tang}.
Akiu last-year sick-PRF two CL/CL/CL
'Akiu fell sick two times last year.'

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[3] The abbreviations used in the Chinese examples are: EXP: experience aspect, PRF: perfect aspect, PROG: progressive aspect, CL: classifier, DE: modification marker, PRT: sentence-final aspect particle, IMP: imperative particle.

[4] See Loke 1994 for a more refined analysis of the classifier *ge*.
The word *ge* is also used in contexts which have nothing to do with individuation. For instance, it can occur between a demonstrative and a proper noun, the reference of which is unique.

(i) Na *(**ge**) Hufei zhen bu xiangh ua. (Cheng & Sybesma 1999: 523)
that CL Hufei truly not decent
'That Hufei is really unreasonable!'

Ge can also occur to the left of an adjective, as in (ii-a); or to the left of negation, as in (ii-b) (Zhu 1982: 49):

(ii) a. Akiu pao-le *(**ge**) kuai
Akiu run-PRF CL fast
'Akiu run fast.'
b. Akiu xiao *(**ge**) bu ting
Akiu laugh CL not stop
'Akiu laughed endlessly.'

No other classifier can occur in such contexts. Lü (1983: 131) claims that in certain cases, *ge* is used for prosodic reasons (cf. W. Zhang 1991: 266).

b. Akiu qu-le na jia shangdian liang {tang/ci/*chang}.
Akiu go-PRF that CL shop two CL/CL/CL
'Akiu has been to that shop two times.'

Eventuality-measuring phrases such as *for two hours* in (1b) are called durative (D), whereas eventuality-counting phrases such as *three times* in (2b) are called repetitive (R).[5] [6]

This paper addresses issues of repetitives and duratives in Chinese, which have theoretical implications: how language individuates and classifies entities and eventualities by the parallel gender-like agreement properties of nominal and verbal classifiers; how the special syntactic and semantic properties of duratives and repetitives in Chinese are syntactically accounted for; how the existence of compound classifiers in Chinese explains a type of ambiguity between entity-counting and event-counting in languages such as English; and how the so-called nominal modification marker *de* does not introduce any modifier to a nominal in measuring and counting constructions.

In section 2, I show how verbal classifiers agree with eventualities in Chinese. In section 3 I account for the distributions of repetitives and duratives in Chinese. In section 4 I discuss compound classifiers, showing how they disambiguate Krifka's (1990) ambiguity in *four thousand ships passed through the lock last year*. In section 5 I argue that the measuring or counting expression to the left of *de* is nominal-external. Section 6 concludes the paper.

2. Classification of Eventualities in Chinese

I use the following types of eventuality to illustrate the agreement between eventuality-types and the verbal classifiers of repetitives.[7] Note that the order between a repetitive and an object/complement can vary generally.[8] I discuss the issue of order in section 3.

First, only return trips can use the classifier *tang*, regardless of the manner of the motion (running, walking, and driving, etc.) (Lü et. al. 1980).

(5) a. Ta lai-le san tang.
he come-PRF three CL
'He came three times.'
b. Ta qu-le liang tang Meiguo.
he go-PRF two CL USA
'He has been to USA twice.'
c. Ta wang nar pao-le liang {ci/tang}.
he to there run-PRF two CL/CL
'He run there twice.'

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[5] R/Ds are usually called frequency and duration phrases respectively. They answer questions how many times and for how long the eventuality occurs rather than to what degree a property or an action of an eventuality is. The underlined parts of the following data are degree expressions, which are called degree object (*du-liang binyu*) in Ma (1983). They are not discussed in this paper.

(i) a. Ta zou-le wu bu.
he walk-ASP five step
'He walked for five steps.'
b. Ta pao-le liang quan.
he run-ASP two circle
'He run for two circles.'
c. Wo gao ta yi cun.
I high he one inch
'I am one inch higher than him.'
d. Ni yao rang ta san fen.
you should concede he three degree
'You should concede to him somehow.'

[6] Duratives have different requirements on the occurrence of the classifier *ge* to the right of the numeral:

(i) san *(ge) yue/jidu
three CL month/season
'three months/seasons'
(ii) san (*ge) tian/nian/fenzhong
three CL day/year/minute
'three days/years/minutes'
(iii) san (ge) xiaoshi
three CL hour
'three hours'

[7] See Shao (1996) for a recent description of verbal classifiers.

[8] Since both objects and complements are selected by verbs, I use the two terms interchangeably in this paper.

Second, hitting events use instrument- or goal-denoting classifiers, for either a single occurrence or multiple continuous occurrences of the eventuality. The instrument-denoting classifiers are either body part words, as in (6a), or other instrument words, as in (6b). A goal-denoting classifier is shown in (6c). If neither the goal nor the instrument is specific, *xia* is used for hitting and touching, as in (7). (I use the superscriptions to show the meaning of the words when they are not used for counting units)

(6) a. Ta da-le Baoyu liang bazhang.
he hit-PRF Baoyu two CL^{palm}
'He hit Baoyu twice with his hand.' (not necessarily with two hands)

b. Ta kan-le nei kuair mutou san dao.
he cut-PRF that.one piece wood three CL^{knife}
'He cut the wood with a knife three times.' (not with three knives)

c. Ta da-le wo liang zuiba.
he hit-PRF I two CL^{mouth}
'He slapped my mouth twice.'

(7) Baoyu {da/qin/mo}-le Daiyu liang xia.
Baoyu beat/kiss/touch-PRF Daiyu two CL
'Baoyu {beat/kissed/touched} Daiyu twice.'

Third, eating, drinking, smoking, and some perception events also use body part words as classifiers, for either a single occurrence or multiple continuous occurrences of the eventuality:

(8) a. Ta chi-le yi kou na wan mifan.
he eat-PRF one CL^{mouth} that bowl rice
'He ate one mouthful rice from that bowl.'

b. Ta chou-le liang kou xiangyan.
he smoke-PRF two CL^{mouth} cigarrete
'He smoked the cigarette twice.'

c. Ta kan-le wo yi yan.
he look-PRF I one CL^{eye}
'He had a look at me.'

Fourth, the oral communication events denoted by *gaosu* 'tell', *ma* 'scold', *heng* 'snort', *xiao* 'laugh', *jiao* 'call, shout', *han* 'shout', *rang* 'shout', and *hou* 'shout' use the word *sheng* 'sound' as their classifier, for either a single occurrence or multiple continuous occurrences of the eventuality:

(9) Ta jiao-le ni san sheng.
he call-PRF you three CL^{sound}
'He called you three times.'

Fifth, events with hands involved, e.g. *la* 'pull', *zhua* 'grasp', *nie* 'pinch', *qia* 'nip', and the abstract *bang* 'help', use the verb *ba* 'hold' as a classifier:

(10) a. Ta la-le Lao Li yi ba.
he pull-PRF Lao Li one CL[hold]
'He pulled Lao Li once.'
b. Qing ni bang wo yi ba!
please you help I one CL[hold]
'Please give me some help/help me once!'

Sixth, events of exhaustively reading a certain book, watching a certain movie or play, reciting a certain text, and listening a certain music or song, require the classifier *bian*.

(11) a. Ta kan-le *Aoman Yu Pianjian* liang bian.
he read-PRF pride and prejudice two CL
'He read *Pride and Prejudice* twice.'
b. Ta ting-guo san bian zhei shou ge.
he listen-PRF three CL this-one CL song
'He listened this song three times.'

Notice that like classifiers in nominals, classifiers used in eventuality counting, in many cases, are nouns or verbs elsewhere. Historically, all classifiers were developed from words of other categories.

As noted by Shao (1996: 108), nearly all verbal classifiers can be used as nominal classifiers in construal with deverbal or eventuality-denoting nominals. For instance, *tang* is a verbal classifier in (12a), but it is used as a nominal classifier in (12b):

(12) a. Akiu qu-le na jia shangdian liang tang. (= (4b))
Akiu go-PRF that CL shop two CL
'Akiu has been to that shop two times.'
b. na tang lüxing hen youqu.
that CL trip very interesting
'That trip was interesting.'

The data in this section show that like nominal classifiers, which agree with the types of the counted entities, the verbal classifiers of repetitives agree with the types of the counted eventualities.

One contrast between measuring and counting is that the former does not require individuation, whereas the latter does. Individuation makes classification possible, and the type-agreement of classifiers in Chinese in both nominal and verbal domains is the result of the classification. In the absence of individuation, no classification is possible, and thus no type-agreement is seen, cross-linguistically. In the nominal domain, measure words do not agree with the type of the entities measured. The choice of a measure unit is either universal, like kilo, or realistic to our world knowledge. For instance, cups are used for measuring soup and sand, and bags for sand but usually not for soup. Similarly, in the verbal domain, the units of duratives do not agree with the type of the eventualities measured. Thus cross-categorially, measuring expressions do not have the gender-like agreement, while counting ones can have.

Although the occurrence of the gender-like agreement indicates the existence of individuation, the absence of the agreement does not show the absence of individuation. In English we usually do not see classification of either entities or eventualities. This however, does not mean that there is no individuation in the language. The division between count and mass nouns, and the use of the plural morphemes for the former, indicate the individuation of countable nouns in the language. It has also been claimed that counting of mass-like entities with the word *piece* entails a process of individuation, and thus news and furniture are

individuated in expressions such as *a piece of news* and *a piece of furniture*. In such cases, a mass-to-count shift occurs. The word *piece* corresponds to the Chinese general nominal classifier *ge*. Likewise, in the verbal domain, the consistent use of the word *time* for counting of various eventualities, as in *kiss the person three times* and *read the book three times*, indicates the existence of individuation. The word *time* corresponds to the Chinese general verbal classifier *ci*.

However, individuation and classification are different. The latter requires the former, whereas the former does not imply the latter. In English, individuation occurs, but not classification: we still use the word *piece* to count both news and furniture, and use the word *time* to count both kissing and reading. In Chinese, both news and furniture are not only individuated but also classified. The former is counted by the classifier *tiao*, whereas the latter is counted by the classifier *jian*, in addition to the general *ge* for both. Also, kissing is counted by *xia* (7), whereas reading is counted by *bian* (11a), in addition to the general *ci* for both. We summarize our above discussion as follows:

		individuation	classification
counting	N *three books*	English/Chinese	Chinese
	V *read the book three times*	English/Chinese	Chinese
measuring	N *three cups of wine*		
	V *drink wine for three hours*		

3. The distributions of duratives and repetitives

In this section we propose a complement-raising hypothesis to account for the common distribution constraints on Ds and Rs in Chinese.[9]

3.1 Two shared distribution constraints on Rs and Ds

The first constraint is that R/Ds cannot occur with any indefinite complement which is initiated with a numeral, regardless of the external order of the complement, the verb, and the R/D. In contrast, the corresponding construction where the complement is a proper noun, a nominal initiated with a demonstrative, or an indefinite nominal with a peripheral modifier, is acceptable. Proper nouns and nominals initiated with a demonstrative are definite in general. Indefinites with a peripheral modifier have been argued to be exclusively specific (Zhang 2001a).[10] [11]

We consider four sets of word orders.

[9] Li (1987) distinguishes two types of duratives: those embedded in the predicates and those as main predicates. In this paper we do not discuss main predicate use of duratives.

[10] Tang (1993: 293) claims that R/Ds cannot occur with an indefinite object. The claim is too strong, since R/Ds do allow indefinite objects with a specific reading, as the data in (18) show. (i) also seems to be fine, if the object has a specific reading.

(i) Akiu ma-le [yi ge xiaohair] {zuzu liang ge xiaoshi/san ci}
Akiu scold-PRF one CL child full two CL hour/three time
'Akiu scolded a child for full two hours/three time.'

Note that like *ein* in German and *un* in French, *yi* has properties of an indefinite determiner. *Yi*-nominals can be specific. See Zhang (2001b).

[11] I do not discuss the construction which contains a bare noun complement in this section. Bare nouns can have generic, definite, and nonspecific indefinite reading, but usually cannot have a presupposed indefinite reading in Mandarin Chinese (Cheng & Sybesma 1999, Tsai 2001). They can be preposed if they are interpreted as generic and definite. In section 5 we will see that if the functional word *de* occurs, the object must be either a proper noun or a bare noun.

I. Both R/D and C are postverbal: V-R/D-C & V-C-R/D

In the following data, both the R/D and the complement (C) occur postverbally. The order between them is free. As shown in (13) and (14), numeral-initial complement is not allowed. In contrast, the corresponding construction where the complement is a proper noun (15)/(16), a nominal initiated with a demonstrative (17), or an indefinite nominal with a peripheral modifier (18), is acceptable.

(13) a. * Wo kan-le liang ben shu san xiaoshi.
I read-PRF two CL book three hour

b. * Wo kan-le san xiaoshi liang ben shu.

(14) a. * Wo kan-le liang ben shu san bian.
I read-PRF two CL book three time

b. * Wo kan-le san bian liang ben shu.

(15) a. Ta biaoyang-le Lao Li wu fenzhong.
he praise-PRF Lao Li five minute
'He praised Lao Li for five minutes.'

b. Ta biaoyang-le wu fenzhong Lao Li.

(16) a. Ta qu-le Beijing yi tang.
he go-PRF Beijing one CL
'He made a trip to Beijing.'

b. Ta qu-le yi tang Beijing.

(17) a. Ta ti-le nei zhi mao yi jiao.
he kick-PRF that-one CL cat one CL[foot]
'He gave that cat a kick.'

b. Ta ti-le yi jiao nei zhi mao.

(18) a. Akiu piping-le [dai yanjing de san ge xuesheng] {wu fenzhong/liang ci}.
Akiu criticize-PRF wear glass DE three CL student five minute/two time
'Akiu criticized three students who wore glassed for five minutes/twice.'

b. Akiu piping-le {wu fenzhong/liang ci} [dai yanjing de san ge xuesheng].

II. Preverbal R/D and post-verbal C: R/D-V-C

(19) a. Akiu yijing san ci fan {zhe/*liang} ge cuowu le.
Akiu already three CL make this/two CL mistake PRT
'Akiu has made this mistake three times.'

b. Akiu san tian dou zai kan *(zhe) liang ben shu.
Akiu three day all PROG read this two CL book
'Akiu has read the two books for three days.'

(20) a. Baoyu liang ge xiaoshi dou zai du {*Aoniejin*/Daiyu xie de san shou shi}.
Baoyu two CL hour all PRG read *Onegin*/Daiyu write DE three CL poem
'Baoyu read {*Onegin*/three poems that Daiyu wrote} for two hours.'

b. Baoyu san ci yaoqing-le {Daiyu/xue wuli de liang ge xuesheng}
Baoyu three CL invite-PRF Daiyu/study physics DE two CL student
'Baoyu invited {Diayu/two students who studied physics} three times .'

It is important to distinguish a R/D reading from a range reading of temporal expressions. In (21), the temporal expressions provide a range. The two sentences mean that in the time range X encoded by the temporal expression, quantity Y is achieved.

(21) a. Akiu yi tian diao-le liang tiao yu.
Akiu one day fish-PRF two CL fish
'Akiu fished fish in one day.'
≠ 'Akiu fished two fish for one day.
b. Akiu yi ci (jiu) kan-le liang chang dianying.
Akiu one CL then watch-PRF two CL movie
'Akiu watched two movies together.'
≠ 'Akiu watched two movies once.'

Thus instead of counting and measuring, in this case, the rate of the activity load is expressed. Since rate needs to relate to two figures, the quantity Y must be encoded by a NumP (Li 1998). This can be seen from the unacceptability of the following data, where the object is a definite DP rather than a NumP:

(22) a. * Akiu yi tian diao-le na liang tiao yu.
Akiu one day fish-PRF that two CL fish
b. * Akiu yi ci (jiu) kan-le na liang chang dianying.
Akiu one CL then watch-PRF that two CL movie

In addition, unlike R/Ds, range-temporal expressions cannot occur postverbally.

III. Preverbal C & postverbal R/D: C-V-R/D
Constructions containing a preverbal complement which is initiated with a numeral are not acceptable, even without a R/D. In Chinese, indefinite complements which are initiated with a numeral cannot be fronted (Qu 1994, esp. Zhang 2001a), as shown in (23b).

(23) a. Wo kan-le {zhei/liang} ben shu.
I read-PRF this.one/two CL book
'I read {his book/two books}.'
b. Wo {zhei/*liang} ben shu kan-le.
I this.one/two CL book read-PRF
c. Baoyu {Daiyu xie de san shou shi/*Aoniejin*} du-guo-le.
Baoyu Daiyu write DE three CL poem/*Onegin* read-EXP-PRF
'Baoyu has read {three poems that Daiyu wrote/*Onegin*}.'

Naturally, (24b), which has a numeral-initial preverbal complement, is ruled out for this independent reason.

(24) a. Akiu na bu dianying kan-le {wu bian/wu fenzhong}.
Akiu that CL movie watch-PRF five CL/five minute
'Akiu watched that movie {five times/for five minutes.'
b. * Akiu liang bu dianying kan-le {wu bian/wu fenzhong}.
Akiu two CL movie watch-PRF five CL/five minute

IV. Both R/D and C are preverbal: R/D-C-V & C-R/D-V
Both orders are acceptable with a sentential negation if the C is not numeral-initial, and neither is acceptable in an affirmative clause:

(25) a. Akiu {*Aoniejin*/*liang shou shi} lian {yi bian/yi fenzhong} dou mei kan.
Akiu *Onegin*/ two CL poem even one minute/one CL all not read
'Akiu did not read *Onegin* for one minute/once.'

b. Akiu lian {yi bian/yi fenzhong} {*Aoniejin*/*liang shou shi} dou mei kan.

(26) a. * Akiu *Aoniejin* {yi bian/yi fenzhong} kan-le.
Akiu *Onegin* one CL/one minute read-PRF

b. * Akiu {yi bian/yi fenzhong} *Aoniejin* kan-le.

I have no explanation for the negation requirement. I thus leave the issue open.

The above four sets of data all show that R/Ds cannot occur with a numeral-intial complement.

The second constraint is that R/Ds cannot occur to the immediate left of pronouns (Lü et al 1980: 28), as shown in (27) through (29).

(27) a. Ta ti-le wo yi jiao.
he kick-PRF I one CL^{foot}
'He gave me a kick.'

b. * Ta ti-le yi jiao wo.

(28) a. Ta qu-le nar yi tang.
he go-PRF there one CL
'He made a trip there.'

b. * Ta qu-le yi tang nar.

(29) a. Lao Wang ma-le wo shi tian.
Lao Wang scold-PRF I ten day
'Lao Li scolded me for ten days.'

b. * Lao Wang ma-le shi tian wo.

In phrasal phonology, it is well-known that unlike other nominals, Chinese pronouns are always grouped with their preceding selecting verbs in prosodic domain parsing (Cheng 1987, among others). Syntactically, it is possible that Chinese pronouns adjoin to their selecting verbs. If this is true, pronouns will never be separated from their selecting verbs. Thus the unacceptability of the b-sentences of (27) through (29) is captured.

The data related to the first constraint show that firstly, R/Ds cannot co-occur with any complement that is initiated with a numeral, and secondly, the position of R/Ds is free with respect to verbs and non-pronoun complements.

3.2 Previous approaches

In Chao (1968: 312, 616) R/Ds are analyzed as "cognate objects." In Lü et al (1980: 28) and Ma (1983), R/Ds are treated as objects. However, the two possible positions of R/Ds with respect to an object/complement are not seen in the Mandarin Chinese ditransitive construction:

(30) a. Wo gei-le Lao Li yi ben shu.
I give-PRF Lao Li one CL book
'I gave Lao Li a book.'

b. * Wo gei-le yi ben shu Lao Li.

Sybesma (1999: 127) claims that R/Ds are indirect objects or complements, and accordingly (31c) parallels to (31a,b):

(31) a. Wo fang-le yixie shu *(zai) zhuozi shang.
I put-PRF some book at table on
'I put some books on the table.'

b. Wo song-le zhei ben shu *(gei) Zhang San.
I send-PRF this CL book for Zhang San
'I sent this book to Zhang San.'

c. Wo kan-le *Zhanzheng Yu Heping* liang ge xiaoshi.
I read-PRF war and peace two CL hour
'I read *War and Peace* for two hours.'

This complement-hypothesis cannot explain the following difference: while the complements in (31a,b) need a preposition, the complements in (32a,b) do not allow a preposition; in contrast, D/Rs never use a preposition. Thus R/Ds do not pattern with complements in the language.

(32) a. Wo fang-le (*zai) zhuozi shang yixie shu.
I put-PRF at table on some book

b. Wo song-le (*gei) Zhang San zhei ben shu.
I send-PRF for Zhang San this CL book

c. Wo kan-le liang ge xiaoshi *Zhanzheng Yu Heping.*
I read-PRF two CL hour war and peace
'I read *War and Peace* for two hours.'

On the other hand, R/Ds, as numeral-initial nominals, can occur preverbally, as in (19) and (20). As we have shown in (23b), numeral-initial complements/objects cannot occur preverbally in Chinese. Again, R/Ds do not pattern with complements in the language.

Soh (1998) studies the construction where R or D occurs postverbally, and proposes a base-order and two derived orders, as in (33) (Note: The position of a subject is irrelevant here. (ii) is not derived from (i)).

(33) Base order: R/D V C
Derived orders: (i) V R/D t_v C
(ii) V C R/D t_v t_c

He considers data of definite complements only. Assuming that conjunctions of names are quantifiers (Clark 1992), he discusses the scope contrasts in (34) and (35):

(34) a. Wo qing-guo [quanbu de xuesheng] [liang ci].
I invite-EXP all DE student two time
'I have invited all students twice.'
(all students >> twice, twice >> all students)

b. Wo qing-guo [liang ci] [quanbu de xuesheng].
I invite-EXP two time all DE student
'Twice, I have invited all students.'
(*all students >> twice, twice >> all students)

(35) a. Wo qing-guo [ZS he LS] [liang ci].
I invite-EXP ZS and LS two time
'I have invited ZS and LS twice.'
(ZS & LS >> twice, twice >> ZS & LS)

b. Wo qing-guo [liang ci] [ZS he LS].
I invite-EXP two time ZS and LS
'Twice, I have invited ZS and LS.'
(*ZS & LS >> twice, twice >> ZS & LS)

If the complement precedes the R, both group and distributive meaning are available. When the complement follows the R, only a group reading is available.

Soh uses the following Scope Principle to account for the above data:

(36) The Scope Principle (Aoun and Li 1993:21)
An operator A may have scope over a quantifier B iff A c-commands a member of the chain containing B.

When the surface order is [V C R/D], as in (34a) and (35a), the complement may have wide and narrow scope readings with respect to the R/D. This is because, in (33ii), the complement c-commands the R/D in its moved position and the R/D c-commands the trace of the complement. In contrast, when surface order is [V R/D C], as in the b-sentences above, only the R/D may have scope over the complement. This is because, in (33i), the R/D c-commands the complement. The complement cannot have scope over the R/D because the complement does not c-command the R/D.

Soh further shows how the other four logically possible analyses fail to account for the scope fact. The analyses are (i) rightward movement of complement; (ii) leftward movement of R/D (Tang 1990); (iii) rightward movement of R/D; and (iv) the two orders are not derivationally related (Huang 1994a). We accept Soh's analysis in this respect.

Though Soh's analysis is plausible, it does not address the issue why indefinite complements initiated with a numeral cannot occur with R/Ds.

3.3 Complement-Raising and the Unitary "Left" Merge Position of Adverbials in Chinese

As we mentioned before, indefinite complements initiated with a numeral cannot be fronted in Chinese. We have also shown in 3.1 that such complements never occur with R/Ds. I thus make the following claim:

(37) In Chinese, repetitives and duratives occur only when complement-raising occurs.

This claim is independently supported by the following two facts. First, R/Ds can occur inside an idiom which has a V-O structure, as shown in (38b). Other types of adverbials such as manners cannot, as shown in (38c).

(38) a. Akiu chui-le niu-pi
Akiu blow-PRF cow-skin
'Akiu boasted.'

b. Akiu chui-le {san ci/liang xiaoshi} niu-pi.
Akiu blow-PRF three CL/two hour cow-skin
'Akiu boasted {three times/for two hours}.'

c. * Akiu cui-le deyide niu-skiu.
Akiu blow-PRF triumphantly cow-skin

The non-adjacency of the two idiom chunks means that the V-O order is derived. In other words, if the base-order is also V-O, as assumed generally, the surface V-R/D-O order is derived by raising of the verb and the object separately. Following Huang (1994b), we assume that verbs undergo a short movement to a position lower than I in Chinese.

Second, when a R/D occurs preverbally, a scope ambiguity occurs. This would be unexpected if the surface order were derived directly from the base-order without complement-raising, according to Soh's rational.

(39) Akiu san ci qing-le Baoyu he Daiyu.
Akiu three CL invite-PRF Baoyu and Daiyu
'Akiu invited Lao Wang and Lao Zhang three times.'
(B & D >> 3 times, 3 times >> B & D)

This ambiguity fact suggests that the object has been raised to he left of the R. If R is base-generated to the left of the verb, as assumed by Soh in (33), this in tern means that the object has been raised to the left of the base-position of the verb. It is possible that a remnant movement of XP occurs, namely, XP, which contains the R, the verb, and the gap position left behind by the object, is raised to the left of the object, deriving the surface R-V-C order:

(40) a. $[_{XP}$ R V C] C-raising →
b. C $[_{XP}$ R V $t_c]$ remnant movement →
c. $[_{XP}$ R V $t_c]$ C t_{XP}

If the occurrence of a R/D always requires preposing of the complement, the absence of numeral-initial complements can be explained.

Now the question is how to capture Soh's fact that the V-R/D-C is not ambiguous. In Soh's analysis, this absence of ambiguity means the absence of object raising, as depicted in his (33-i). However, we can claim that the absence of ambiguity in fact means that the object is raised to a position to right of the R/D. I thus revise Soh's (33) into the following:

(41) Base order: R/D V C
Derived orders: (i) V R/D C t_v t_c
(ii) V C R/D t_v t_c

The only change I made is to add a trace of the complement to (33i). In (41), the c-command relation between the R/D and the complement or the trace of the complement is not changed. Thus the scope fact presented above is still captured.

This analysis implies that there are multiple landing sites to the left of the base-position of the verb for object-raising, and they have different scope relations with R/Ds. The exact syntactic status of each of the landing sites of complements does not affect the argumentation here, although it remains as a research topic.

A hitherto noted asymmetry in the Chinese sentence structures is that all types of adverbials are preverbal, except D/Rs, which can occur postverbally. On the other hand, when D/Rs occur between a verb and its selected argument, as in the b-sentences in (15) through (18), as well as (38b), why is the non-adjacent Case-relation between the verb and the argument possible? Such considerations drive some authors to assume that D/Rs are complements in Chinese (see section 3.2). In the present approach, we link these considerations to the fact that D/Rs never occur with numeral-initial complements, which are not able to move. In both Soh's analysis and my revision we claim that the base-position of R/Ds is to the left of the verb, like all other types of adverbials in Chinese. The possible surface postverbal positions of R/Ds are derived by the obligatory complement-raising and the accompanying verb-raising. In this way, the apparent exceptional properties of R/Ds come from the assumed complement-raising. After the complement-raising and verb-raising, they are stranded at the postverbal position.

The remaining issue is why (37) holds. Generally speaking, raised complements are either foci (with a stress) or topics. When a D/R occurs, unless other elements bear a contrastive stress, it encodes foreground information. What is special in Chinese is that the occurrence of D/Rs requires syntactic operations to push all arguments into background

(topic) positions. Subjects, by default, function as topics. Complements can do so when they are raised. This is a tentative explanation. We leave the issue for future research.

In this section, we have shown that Ds and Rs are adverbials rather than complements: they do not show properties of complements. In addition, they do not occur with numeral-initial complements. Furthermore, if they are not pronouns, their position with respect to a complement is generally free. We have claimed that they are base-generated to the left of verbs, like other types of adverbials in Chinese, and is present only when complement-raising occurs in Chinese.

4. Individuating and Counting Atelic Activities by Compound Classifiers

In this section, we present compound classifiers in Chinese, showing how they disambiguate a type of ambiguity occurring in languages such as English.

4.1 Compound Classifiers

The general verbal classifier, *ci*, can be preceded by a nominal classifier (or a nominal which functions as a nominal classifier in certain cases) to form a "compound classifier."[12] Compound classifiers are used to count eventualities with respect to the kind of the entities which are related to the nominal-classifier. In (42a), *liang* in the compound classifier *liang-ci* is the classifier for counting cars, and the number of the car-passing event is counted with respect to cars. Similarly in (42b), *jia* in the compound classifier *jia-ci* is the classifier for counting airplanes, and the number of the airplane-repairing event is counted with respect to airplanes.

(42) a. Zhe tiao lu shang-zhou tongguo-le qiche san-bai liang-ci.
this CL road last-week pass-PRF car three-hundred CL^N-CL^V
'On this road, three hundred times of car-passing occurred last week, each time one car.'

b. Tamen qu-nian xiuli-le feiji sishi jia-ci.
they last-year repair-PRF airplane forty CL^N-CL^V.
'They repaired airplanes forty times last year, each time one airplane.'

Naturally, it is not only possible but also expected that at lease one car passed the road more than once, and each time was counted as one of the total three hundred times in (42a). Similarly, it is expected that at least one airplane was repaired more than once, and each time was counted as one of the total forty times in (42b). In fact compound classifiers are not used if such possibility is ruled out in reality. For instance, it is impossible to redo the writing (not copying) of the same letter. Thus (43) is not acceptable. For this reason, compound classifiers cannot be used with any verb of creation, if their internal nominal classifier agrees with the direct object of the verb.

(43) * Akiu zuotian xie-le xin sishi feng-ci.
Akiu yesterday write-PRF letter forty CL^N-CL^V

The nominal which the nominal classifier inside a compound classifier is linked to must be a bare noun with a kind-denoting reading. The nominal cannot be individual-

[12] In the compound classifier *ren-ci* 'person-CL_V' the noun *ren* is used as a nominal-classifier. Persons are generally counted by *ge*. See W. Zhang (1991: 265).

Compound classifiers have been found to have properties different from both nominal classifiers and verbal classifiers (W. Zhang 1991). For instance, they cannot be reduplicated. Since I have no explanation for such differences, I leave the issue aside.

denoting. For instance, the nominal can neither start with a numeral nor a demonstrative (44a,b). It cannot be a person's name or a personal pronoun (44c), either.[13]

(44) a. * Zhe tiao lu shang-zhou tongguo-le {yi/na} liang qiche san-bai liang-ci.
this CL road last-week pass-PRF one/that CL car three-hundred CL^N-CL^V
b. * Tamen qu-nian xiuli-le {yi jia /naxie} feiji sishi jia-ci.
they last-year repair-PRF one CL/those airplane forty CL^N-CL^V
c. * Baoyu shang ge yue piping-guo {Daiyu/wo} wushi ge-ci.
Baoyu last CL month criticize-EXP Daiyu/I fifty CL^N-CL^V
Intended: Baoyu criticized {Daiyu/me} fifty times last month.

The kind-denoting requirement naturally rules out verbs of creation in the construction, if the internal nominal classifier of the latter agrees with the direct objects of the verbs, since such direct objects must be individual-denoting.

Since the argument which the nominal classifier inside a compound classifier is linked to is kind-denoting, the eventuality expressed by the construction is atelic if the compound classifier phrase is absent.

It is clear that the constituent formed by a numeral and a compound classifier is a repetitive. Semantically, it expresses the occurrence times of eventualities rather than the number of any entities. I call such repetitives complex repetitives.

Based on these observations, I claim that the function of compound classifiers is to individuate and count atelic eventualities. This is carried out compositionally. Specifically, since there is a kind-denoting argument in the clause, the eventuality expressed by the clause is not telic. Thus compound classifiers individuate the eventuality by specifying the reference notion of the counting: x times with respect to y, and the kind of y is expressed by the bare noun argument. Complex repetitives encode the information of required reference notion by the agreement between their internal nominal classifier and the kind-denoting bare noun argument.

Like duratives and regular repetitives (section 3), such repetitives can also occur to the left of an argument, in addition to the post-argument position. In this case, they may occur to the left of the argument which their internal nominal classifier agrees with. The following data and (42) express the same meaning (see W. Zhang 1991: 264 for more data). They differ only in the order and the optional occurrence of the functional word *de*. We will discuss the issue of *de* in section 5.

(45) a. Zhe tiao lu shang-zhou tongguo-le san bai liang-ci (de) qiche.
this CL road last-week pass-PRF three hundred CL^N-CL^V DE car
'On this road, 300 times of car-passing occurred last week, each time one car.'
b. Tamen qu-nian xiuli-le sishi jia-ci (de) feiji.
they last-year repair-PRF forty CL^N-CL^V DE airplane.
'They repaired airplanes 40 times last year, each time one airplane.'

In this word order, the argument nominal which the nominal classifier in the compound classifier agrees with cannot be individual-denoting either. The data in (46) and those in (44) are equally unacceptable:

[13] If the phrase formed by a numeral and a compound classifier is a repetitive, the ban of a numeral-initial complement is captured in our discussion in section 3. However, such repetivitives are special in that they do not occur with even definite complements which their nominal-classifiers agree with.

(46) a. * Zhe tiao lu shang-zhou tongguo-le san-bai liang-ci (de) {yi/na} liang qiche
this CL road last-week pass-PRF three-hundred CL^N-CL^V DE one/that CL car
b. * Tamen qu-nian xiuli-le sishi jia-ci (de) {yi/na} jia feiji.
they last-year repair-PRF forty CL^N-CL^V DE one/that CL airplane
c. * Baoyu shang ge yue piping-guo wushi ge-ci (de) {Daiyu/wo}.
Baoyu last CL month criticize-EXP fifty CL^N-CL^V DE Daiyu/I

Viewing from a different perspective, we see that a compound classifier and its preceding numeral form a special kind of repetitives, in which the reference notion of the counting is explicitly expressed by the agreement between the nominal classifier and the kind-denoting argument. In fact, a reference point can also be overtly represented in measuring expressions. The adjectives *chang* 'long' in (47a) and *kuan* 'wide' in (47b) express such reference notions.

(47) a. liang mi chang *(de) bu
two meter long DE cloth
'the cloth that is one meter in length'
b. liang mi kuan *(de) bu
two meter wide DE cloth
'the cloth that is one meter in width'

However, counting and measuring represent the reference notion differently. On the one hand, in measuring nominal entities, a reference notion is expressed by an adjective, as in (47), whereas in counting eventualities, a reference notion is expressed by the agreement between their internal nominal classifier and the kind-denoting bare noun argument. On the other hand, when the reference-denoting element is overt, *de* is obligatory for measure words if the measure phrase precedes a noun, as in (47). However, *de* is optional in this case for counting, as we saw in (45) above.

It also needs to note that nearly all compound classifiers use the general *ci* rather than any other verbal classifiers. Thus event-counting by compound classifiers shows individuation of the atelic eventualities by the general verbal classifier *ci*, but it does not show any classification of the counted eventualities.

4.2 Pre-argument repetitives and the so-called entity-ambiguity

Krifka (1990) discusses the ambiguity of the following constructions:

(48) a. Four thousand ships passed through the lock last year.
Reading A: 4000 different ships.
Reading B: 4000 events, with fewer than 4000 ships involved, since some of them passed through the lock more than once
b. I have already washed 200 dishes today.
Reading A: 200 different dishes.
Reading B: 200 events, with fewer than 200 dishes involved, since some of them were washed more than once

In order to represent the ambiguity of (48), Krifka (1990) claims that the zero determiner in (49) is polysemous: it can be an individual-related zero determiner, giving the A-reading, or an event-related zero determiner, giving the B-reading:

(49) [$Ø_{Det}$ [4000 ships]] [pass through the lock]

Huang (1997: 80) claims that such data are subject to limitations that make them difficult to analyze in general syntactic terms. He suggests that "they are probably better dealt with as cases of vagueness, rather than ambiguity," and Reading B "is subject to certain pragmatic constraints."

Barker (1999) argues against Krifka's determiner-oriented analysis. Instead, he proposes a noun-oriented analysis. According to Barker, The B-reading in (48a) arises when context favors considering two stages of the same ship as distinct entities. He thus uses the notion "discourse entities" in contrast to the default understanding of entities in the world. He concludes that "recognizing that nominal identity conditions sometimes are determined lexically, and sometimes semantically and pragmatically, provides a simple and direct account of the ambiguity of (1) [= (48a)] without postulating multiple meanings for a silent determiner." (p. 690)

(48b) with Reading B is analogous to our (42b) and (45b), repeated here as (50a) and (50b):[14]

(50) a. Tamen qu-nian xiuli-le feiji sishi jia-ci.
they last-year repair-PRF airplane forty CL^N-CL^V.
'They repaired airplanes forty times last year, each time one airplane.'

b. Tamen qu-nian xiuli-le sishi jia-ci (de) feiji.

It is obvious that the use of the compound classifier, which contains the verbal classifier *ci*, restricts the counting to be that of eventuality rather than physical entitities. The existence of compound classifiers in Chinese and their disambiguating function indicate that the distinction between entity-counting and eventuality-counting can be structurally represented, overtly. We thus probably cannot adopt Krifka's polysemous representation of null determiners, before we see such distinctions are overtly represented in any language. Nor do we adopt Barker's partial-lexical-partial-semantic & pragmatic representations of nouns. If two stages of any single entity could be considered as distinct entities, we would predict that sentences like (44) and (46) be acceptable, contrary to the fact. In other words, it is wrong to claim that the noun is referential or entity-denoting in Reading B. We have shown that the data in (50), which are corresponding to Reading B exclusively, the post-numeral noun is a kind-denoting argument, and is thus never referential. The contrast between Reading A and Reading B is not that between "the default understanding of entities in the world" of the former and the "discourse entities" of the latter, as claimed by Barker. Instead, it is the contrast between the entity-denoting argument in the former and the kind-denoting argument in the latter. Since we can represent the relevant differences in syntax, we can also give up Huang's pure pragmatic approach.

The reading ambiguity comes from the ambiguity of the structural relation of the numeral: in Reading A, the numeral is in construal with the noun, as a part of the entity-denoting argument; whereas in Reading B, it is in construal with an event-individuation element, as a part of a repetitive, and the argument is a kind-denoting argument, in the form of a bare noun. The ambiguity arises from the invisibility of the event-individuation element, which is represented by compound classifiers in Chinese. The availability of compound classifiers in Chinese shows that the two readings are corresponding to two different syntactic structures.

[14] Note that numeral-initial nominals generally cannot occur as a preverbal subjects in Chinese, unless in a quantity context (Li 1998). I thus choose (48b), where the relevant issue is shown on the object, to make a comparison with its counterpart in Chinese.

For Reading A, the numeral is in construal with the noun, and the two form a nominal constituent. The constituent can be referential and (48b) can be followed by (51a), where the bound pronoun *each of them* takes *200 dishes* as its antecedent, or (51b), where the partitive expression *96 of them* requires a referential antecedent.[15]

(51) a. Each of them was big.
b. 96 of them were extremely dirty.

For Reading B, however, the noun is related to a reference point for the counting of the repetitive. In this sense, the noun is not referential, and thus it must be bare in both English and Chinese. Consequently, neither of the two sentences in (51) can follow (48b) in Reading B. Moreover, Reading B is never possible for direct objects of verbs of creation. This fact shows the correlation of the reading with a kind-denoting argument.

On the other hand, for Reading B, the repetitive can either precede the bare noun argument, as in (48) in English and (50a) in Chinese, or occur in another position, as in (50b) in Chinese. The two positions are both seen in regular repetitives in Chinese (see section 3). In English, since no compound classifier is seen, the whole repetitive to the left of a noun is represented by a numeral only, for Reading B. Consequently, the surface order is the same as the one for Reading A. The ambiguity thus arises.

At this moment, we do not know why event-individuation elements, which are overtly expressed by compound classifiers in Chinese, are invisible in languages such as English. The invisibility might be related to the invisibility of nominal classifiers in such languages. It might also be possible that the repetitives have been incorporated into the arguments.

In this section, we have seen how complex-repetitives individuate and count atelic eventualities in Chinese, and how their existence sheds light on the structure of the Krifka's (1990) ambiguous construction *four thousand ships passed through the lock last year*.

5. The Nominal-External *De*

In this section we argue that the measuring or the counting expressions to the left of *de* are nominal-external.

5.1 The distribution of *de* in counting and measuring constructions

In the nominal domain, *de* generally can occur with measure words (MEAS), but not with classifiers (Chao 1968, Paris 1981, Zhu 1982: 51, Ma 1990: sec 4.2.1), regardless of the choice of the classifiers. Thus the contrast is not related to classification.[16]

(52) a. liang wan (de) tang
two MEAS^{bowl} DE soup
'two bowls of soup'
b. liang {zhan/ge} (*de) deng
two CL/CL DE lamp
'two lamps'

[15] Krifka (1990: 516) and Barker (1999: 685) indeed discuss the issue of pronouns. However their following data do not tell much:

(i) a. Four thousand ships passed through the lock last year.
b. They each tooted their horn when they cleared the last gate.

In (i-b), since *they* is not a bound pronoun and *each* can also be interpreted as each time, the ambiguity of (i-a) remains.

[16] Measuring of mass nouns needs a functional word in languages like English, such as the preposition *of* in *three cups *(of) wine*, but not in languages such as German and Dutch. See Akmajian & Lehrer (1976), Selkirk (1977), among others. In Chinese, both strategies are available: with *de* and without *de*.

In the verbal domain, however, both duratives and repetitives allow *de*, if they precede the object, regardless of whether they occur post-verbally, as in (53) and (54), or preverbally, as in (55). Again the choice of the classifiers makes no difference (see section 3 for a discussion of the derivations of various orders).

(53) a. Wo chi-le liang xiaoshi (de) fan.
I eat-PRF two hour DE meal
'I ate for two hours.'

b. Wo jin-guo wu ci (de) du-chang.
I enter-EXP five CL DE gambling-house
'I have been to gambling houses five times.'

(54) a. Akiu du-le san xiaoshi (de) *Zhangzheng Yu Heping*.
Akiu read-PRF three hour DE war and peace
'Akiu read *War and Peace* for three hours.'

b. Akiu du-le san {bian/ci} (de) *Zhangzheng Yu Heping*.
Akiu read-PRF three CL/CL DE war and peace
'Akiu read *War and Peace* three times.'

(55) a. Ta lian yi tian (de) yingwen dou mei xue guo.
he even one day DE English all not learn EXP
'He did not even for one day learn English.'

b. Ta lian yi {tang/ci} (de) Beijing dou mei qu guo.
he even one CL/CL DE Beijing all not go EXP
'He did not even go to Beijing once.'

Complex repetitives, which contain compound classifiers, also allow *de*. We have presented the relevant data in (45).

5.2 Post-*de* nominals must be either kind-denoting or proper nouns

A generalization can be drawn from both the nominal and verbal domains of measuring and counting constructions: the nominal following *de* must be either a proper noun or a bare noun that has a kind-denoting reading. In section 4.1 we have shown that the nominal which the nominal classifier inside a compound classifier is linked to must be a bare noun with a kind-denoting reading. As for other counting and measuring constructions, we have seen that proper nouns are allowed in (54) and (55). If the post-de nominal is not a proper noun, neither a demonstrative nor a relative clause which has an extensional predicate is allowed to be in construal with the noun in such constructions:

(56) a. * na san wan de tang (Cheng & Sybesma 1997)
that three MEAS^{bowl} DE soup

b. * zhe wu bang de rou
this five pound DE meat

(57) a. * san wan de [Akiu zuotian zhu de] tang
three MEAS^{bowl} DE Akiu yesterday cook DE soup

b. * [Akiu zuotian zhu de] san wan de tang
Akiu yesterday cook DE three MEAS^{bowl} DE soup

(58) a. * Wo chi-le liang xiaoshi de na wan fan.
I eat-PRF two hour DE that MEAS^{bowl} meal
b. * Wo chi-le na wan liang xiaoshi de fan.

(59) a. * Wo chi-le liang xiaoshi de [Akiu zuotian zhu de] fan.
I eat-PRF two hour DE Akiu yesterday cooked DE meal
b. * Wo chi-le [Akiu zuotian zhu de] liang xiaoshi de fan.

(60) a. * Wo jin-guo wu ci (de) na ge du-chang.
I enter-EXP five CL DE that CL gambling-house
b. * Akiu du-le san bian (de) na ben shu.
Akiu read- PRF three CL DE that CL book

5.3 Pre-*de* measuring and counting expressions are nominal-external

In this section, I argue that in the construction where *de* occurs between a measure or counting expression and a noun, *de* is not generated within a nominal, and the whole string which starts with a numeral is not a nominal either. Instead, *de* heads a functional projection, and the expression to its left is an adverbial (R/D).

We will discuss all four possible types of data: *de* is preceded (i) by a measure unit of a mass noun (61a), (ii) by a durative (61b), (iii) by a repetitive (61c), and (iv) by a complex repetitive, which contains a compound classifier (61d).

(61) a. Akiu he-le san wan de tang.
Akiu drink-PRF three MEAS^{bowl} DE soup
'Akiu drank three bowls of soup.'
b. Akiu kan-le san xiaoshi de xiaoshuo.
Akiu read-PRF three hour DE novel
'Akiu read novels for three hours.'
c. Akiu he-guo san ci de lie-jiu.
Akiu drink-PRF three CL DE strong-alcohol
'Akiu drank strong alcohol three times.'
d. Akiu xiuli-le wushi liang-ci de zixingche.
Akiu repair-PRF fifty CL^{N}-CL^{V} DE bike
'Akiu repaired bikes fifty times, each time one bike.'

My claim is that in all of the four constructions, the post-verbal string, i.e., the string started with the numeral (the underlined part in (61)), is not a nominal complement. Let us call this string PoS (postverbal string which contains *de*), for convenience. I present four arguments: relativization, the ability to answer a wh-nominal question, the ability to form a headless nominal, and the occurrence between two identical verbs of the verb-copying construction.

First, unlike complement nominals (62), PoSs cannot be relativized:

(62) Wo jian-guo [[Daiyu mai de] liang tiao qunzi].
I see-EXP Daiyu buy DE two CL skirt
'I saw the two skirts that Daiyu bought.'

(63) a. * Wo jian-guo [[Akiu he de] san wan de tang].
I see-EXP Akiu drink DE three MEAS^{bowl} DE soup
b. * Wo jian-guo [[Akiu kan de] san xiaoshi de xiaoshuo].
I see-EXP Akiu read DE three hour DE novel
c. * Wo jian-guo [[Akiu he de] san ci de lie-jiu].
I see-EXP Akiu drink DE three CL DE strong-alcohol

d. * Wo jian-guo [[Akiu xiuli de] wushi liang-ci de zixingche].
I see-EXP Akiu repair DE fifty CL^N-CL^V DE bike

Second, PoSs cannot be used to answer wh-argument questions. Instead, they can only answer a question asking the whole predicate, as in (64). (65b) is not an appropriate answer to (65a), rather, it is a perfect answer to (64). Similarly, (66b) is not an appropriate answer to (66a). Instead, it is a perfect answer to (64). Likewise, in (67), Answer A, where no PoS shows up, is appropriate; whereas Answer B, where a PoS shows up, is not appropriate. Again, Answer B matches (64), instead. In (68), Answer A, where no PoS shows up, is appropriate; whereas Answer B, where a PoS shows up, is not appropriate. Once more, Answer B matches (64), instead.

(64) ni gangcai gan shenme le?
you just.now do what PRT
'What did you do just now?'

(65) a. ni gangcai he-le shenme?
you just.now drink-PRF what
'What did you drink just now?'
b. # wo he-le liang wan de tang.
I drink-PRF two $MEAS^{bowl}$ DE soup

(66) a. ni gangcai kan-le shenme?
you just.now read- PRF what
'What did you read just now?'
b. # wo kan-le liang xiaoshi de xiaoshuo.
I read-PRF two hour DE novel

(67) Ni he-le shenme?
you drink-PRF what
'What did you drink?
A: wo he-le lie-jiu.
I drink-PRF strong-alcohol
'I drank strong-alcohol.'
B: # wo he-le san ci de lie-jiu.
I drink-PRF three CL DE strong-alcohol
'I drank strong alcohol three times.'

(68) Ni xiu-le shenme?
you repair-PRF what
'What did you repair?
A: wo xiu-le wushi liang zixingche.
I repair-PRF fifty CL bike
'I repaired fifty bikes.'
B: # wo xiuli-le wushi liang-ci de zixingche.
I repair-PRF fifty CL^N-CL^V DE bike
'I repaired bikes fifty times, each time one bike.'

Third, unlike nominals, PoSs cannot occur in the form that is ended with *de*. Nominals can occur in a headless form, which is ended by *de*, if their modifiee has an antecedent in the context, as shown in (69). In (69), the modifiee *chenshan* 'shirt' has an antecedent in the previous conjunct. PoSs, however, cannot stand as a *de*-ended element. This fact suggests that the noun in a PoS is not the semantic head of the string.

(69) Baoyu mai-le san jian lanse de chenshan, Daiyu (mai-le) si jian heise de.
Baoyu buy-PRF three CL blue DE shirt Daiyu buy-PRF four CL black DE
'Baoyu bought three blue shirts, Daiyu bought four black ones.'

(70) a. * Baoyu he-le san wan de tang, Daiyu (he-le) si wan de.
Baoyu drink-PRF three MEAS^{bowl} DE soup Daiyu drink-PRF four MEAS^{bowl} DE
b. * Baoyu kan-le san xiaoshi de shu, Daiyu (kan-le) si xiaoshi de.
Baoyu read-PRF three novel DE book Daiyu read-PRF four hour DE
c. * Baoyu he-le san ci de lie-jiu, Daiyu (he-le) wu ci de.
Baoyu repair-PRF three CL DE strong-alcohol Daiyu drink-PRF five CL DE
d. * Baoyu xiu-le wushi liang-ci de zixingche, Daiyu (xiu-le) sishi liang-ci de.
Baoyu repair-PRF fifty CL^{N}-CL^{V} DE bike Daiyu repair-PRF forty CL^{N}-CL^{V} DE

A similar contrast is seen between (71) and (72):

(71) Fangzi, Daiyu zu-le liang jian da de.
room Daiyu rent-PRF two CL big DE
'Speaking of rooms, Daiyu rented two big ones.'

(72) a. * Tang, Akiu he-le san wan de.
soup Akiu drink-PRF three MEAS^{bowl} DE
b. * Xiaoshuo, Akiu kan-le san xiaoshi de.
novel Akiu read-PRF three hour DE
c. * Lie-jiu, Akiu he-guo san ci de.
strong-alcohol Akiu drink-PRF three CL DE
d. * Zixingche, Akiu xiu-le wushi liang-ci de.
bike Akiu repair-PRF fifty CL^{N}-CL^{V} DE

Fourth, in the verb-copying construction (Tsao 1987, among others), the element between the two identical verbs must be the direct object of the verb, as in (73). Our data in (74) show that PoSs cannot occur in this position, indicating that they are not direct objects.

(73) Akiu he jidan-tang he de wang-le yuehui.
Akiu drink egg-soup drink DE forget-PRF appointment
'Akiu drank the egg-soup so that he forgot the appointment.'

(74) a. * Akiu he san wan de tang he de wang-le yuehui.
Akiu drink three MEAS^{bowl} DE soup drink DE forget-PRF appointment
b. * Akiu kan san xiaoshi de Xiaoshuo kan de wang-le yuehui.
Akiu read three hour DE novel read DE forget-PRF appointment
c. * Akiu he san ci de lie-jiu he de wang-le yuehui.
Akiu drink three CL DE strong-alcohol drink DE forget-PRF appointment
d. * Akiu xiu wushi liang-ci de zixingche xiu de wang-le yuehui.
Akiu repair fifty CL^{N}-CL^{V} DE bike repair DE forget-PRF appointment

I conclude that PoS is not a nominal, and that the position of *de* is nominal-external. This implies that the measuring expression or repetitive to the left of *de* is also nominal-external. Specifically, I claim that *de* heads a functional projection, that the measuring or counting element to its left is simply an adverbial, and the bare noun to its right is a kind-denoting argument. Such an adverbial can be regarded as a non-primary predicate of the sentence (cf. Tang 1990, Cheng & Sybesma 1997), like some other types of adverbials. However, they do not modify the noun syntactically.

Zhu claims that in (75) the R and D each form a movable constituent with the object and thus the R and D each modify the object, concluding that R/Ds can modify their following objects in general (cited by Huang 1994b: 594).

(75) a. Ta lian yi tian shu dou mei kan.
he even one day book all not read
'He did not read a book even for one day.'
b. Ta lian yi ci ge dou mei chang-guo.
he even one CL song all not sing-EXP
'He did not even sing once.'

Data like this in fact do not support the modification claim, however. It is still possible that the argument is raised independently of the R/D, since not always the elements between *lian* and *dou* form a constituent. In the following example, *Akiu* and *zuotian* 'yesterday' occur between *lian* and *dou*, and they do not form a constituent:

(76) Lian Akiu zuotian dou lai-le.
even Akiu yesterday all come-PRF
'Even Akiu came yesterday.'

We have shown that PoS fails in all of our tests for a complement nominal. It must be hosted by a projection high up above the real complement nominal, which should be either a kind-denoting bare noun or a proper noun (see section 5.2).

Recall our conclusion in section 3 that in Chinese, R/Ds occur only when complement-raising occurs. Then if a R/D and *de* occur to the left of a complement, they should also be to the left of the base-position of the verb, since the complement has been raised to the left of the base-position of the verb. Accordingly, both *de* and the R/D must be complement-external. The conclusion in section 3 and the one here are independently argued for and turn out to be compatible each other.

Our analysis in this section also indicates that not only R/Ds, but also expressions for measuring mass-like entities are nominal-external, when they precede *de*, as in (52a)/(61a). We leave it open whether in this case the measure expression is raised to the surface position.

Generally speaking, the distributions of *de* include predicative modification, e.g., relative clauses (77a), non-predicative modification (77b), complement of nouns (77c), etc.

(77) a. Akiu mai *(**de**) na zhan tai-deng
Akiu buy DE that CL table-lamp
'the table-lamp that Akiu bought'
b. zhanxin *(**de**) tai-deng (cf. * na zhen tai-deng (hen) zhan-xin)
brand-new DE table-lamp that CL table-lamp very brand-new
'the brand-new table-lamp'
c. Akiu qu-le Riben *(**de**) xiaoxi
Akiu go-PRF Japan DE news
'the news that Akiu has gone to Japan'

The syntactic status of *de* is controversial. It has been claimed to be a nominal-internal complementizer which introduces a relative clause (Huang 1982, Ning 1993), "little n" (Zhang 1999), and D with bleached information of definiteness and specificity (Simpson 2001, to appear). All of these approaches presuppose that *de* is nominal-internal.

From the same nominal perspective, Cheng & Sybesma (1997) analyze the constructions where *de* occurs between a measuring expression and a mass noun, as the one in

(52a)/(61a), as involving relative clauses. Li (1987: 52) claims that *de* is possible in duratives because they are NPs. Huang (1994b: 598) calls the *de* following duratives and repetitives "the prenominal modifier marker," and claims that the relevant construction has gerundive nominalization involved. However, as we all know, Chinese verbs do not have gerundive morphology.

Recently, however, Den Dikken & Singhapreecha (2002) claim that *de* in Chinese is a meaningless linker or copular element, which, like *of* in English (78a), *de* in French (78b), and *thîi* in Thai (78c), is related to an operation of predicate-raising in the sense of Moro (1997, 2001)

(78) a. that idiot (**of** a) doctor

b. une pizza (**de**) chaude [French]
a-FEM pizza DE hot-FEM
'a hot pizza'

c. khon (**thîi**) kèng [Thai]
person THÎI smart
'the/a smart person'

This is similar to Kayne's (1999, 2002) proposal that the nominal-internal *of* in English and *de* in French are base-generated out of the relevant nominals. Our conclusion that *de* is nominal-external in counting and measuring constructions shows that *de* is not always related to the syntactic category of nominal.

6. Conclusions

We have firstly presented the gender-like agreement properties of verbal classifiers, which are parallel to that of nominal classifiers. Secondly, we have accounted for the incompatibility of R/Ds with numeral-initial complements, and their possible postverbal positions in Chinese by a complement-raising hypothesis. Thirdly, we have explained the cause of Krifka's (1990) ambiguity in *four thousand ships passed through the lock last year* by a structural ambiguity: the numeral is either in construal with *ships* or with an event-individuation expression to form a repetitive. In the latter case, *ships* is a kind-denoting bare noun. Such event-individuation expressions are represented by compound classifiers in Chinese. Finally, we have argued that measuring expressions and repetitives to the left of the functional word *de* are nominal-external.

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