

1. Introduction

The word *zhi* in the Chinese example in (1a) is called numeral classifier (I will call it CL henceforth). A CL occurs with a numeral and an NP, such as *san* ‘three’ and *bi* ‘pen’ in (1a), respectively. In (1b), *di* is also a CL.

- (1) a. Yaoyao kanjian-le san zhi bi.
Yaoyao see-PRF three CL pen
‘Yaoyao saw three pens.
- b. Yaoyao kanjian-le san di you.
Yaoyao see-PRF three CL oil
‘Yaoyao saw three drops of oil’.

Some languages have CLs and some do not. Some languages have the counterpart of the CL in (1b), but not that in (1a). From the English translations of the two examples in (1) we can see that English has the word *drop* to correlate with the CL *di* in (1b), but does not have a counterpart to the CL *ben* in (1a). CLs like *ben* are called individual CLs in Chao (1968), and CLs like *di* are called individuating CLs in this paper. Languages that have both types of CLs, such as Chinese, are called CL language.

Why do classifiers (CLs) exist in CL languages such as Mandarin Chinese? It has been widely assumed that the obligatory occurrence of a CL with a numeral and a noun in CL languages is related to the contrast between count and mass nominals. The goal of this paper

is to show that this traditional assumption is not fine-grained enough to cover the systematic contrasts of nominals in either Mandarin Chinese or other languages. Instead, I argue that two syntagmatic properties of nominals are syntactically significant: the ability of a noun to combine with a numeral directly, and the ability of a noun to be modified by a size or shape modifier. The two newly recognized properties or features can be attested in the co-occurrence restrictions of quantifiers and CLs. It is the interactions between these two features, rather than the alleged binary contrast between count and mass, that explain various syntactic contrasts of countability, cross-linguistically. I argue that although the positive value of the first feature alone is enough to define the count status of a nominal, it is the combination of the negative values of both features that defines the mass status of a nominal. This paper shows that the popular assertion that all nouns in Chinese are mass nouns is not accurate. Instead, all nouns in Chinese are non-count nouns, but they are further divided into mass and non-mass ones.

The paper also clarifies the distinctive functions of CLs of CL languages..

In addition to this introduction section and the last summary section, this paper is composed of five substantial parts. Section 2 proposes my new theory of the count-mass contrast, based on the two features. Section 3 studies the two features in Chinese nouns and Section 4 investigates the feature numerability of unit words. Section 5 further argues that the count and non-count contrast is syntactic, and Section 6 shows the problems of certain current syntactic analyses of CLs.

2. Decomposing countability

2.1 Identifying two new features syntagmatically

Since De Saussure (1916), two kinds of relationship between linguistic elements are recognized: paradigmatic and syntagmatic ones. A paradigmatic relationship is established by

a substitution test. For instance, the three words *of*, *by* and *for* establish a paradigmatic relation in the string *government {of/by/for} the people*, since each of them can substitute another. They may occur in the same syntactic position. A syntagmatic relationship is defined by the compatibility of co-occurring elements in the same construction, e.g., the relationship between *the* and *people* in the string *the people*. Paradigmatic and syntagmatic relationships have been metaphorically viewed as vertical and horizontal ones, respectively.

Many formal features such as tense and aspect of verbal expressions, gender and person of nominal expressions are defined paradigmatically. Selection features are typically syntagmatic features. For instance, the transitive verb *drink* c-selects a nominal, because it needs to occur with a nominal; and it s-selects a liquid-denoting nominal, because it needs to combine with this type of nominal.

Different kinds of syntagmatic relations exhibit different properties. In selection, the occurrence of the selected element is obligatory. But there are other syntagmatic relations that do not exhibit this kind of obligatoriness. For instance, gradability of adjectival expressions is defined by the possibility to occur with a degree word. In (2a), the adjective *nice* is gradable since it may occur with the degree word *quite*. (2b) tells us that the adjective *next* is not gradable, since it may not occur with *quite*.

- (2) a. the quite nice book b. the (*quite) next book

Another example of non-obligatory co-occurrence relation is seen in the feature of agentivity. Agentivity of a verbal expression is defined by the possibility to be modified by an agent-oriented adverb. For instance, the VP *shouted* in (3a) is agentive since it may occur with the agent-oriented adverb *deliberately*, and the VP *arrived* in (3b) is not agentive, since it may not occur with *deliberately*.

- (3) a. Kim shouted deliberately. b. Kim arrived (*deliberately).

In both the gradability and agentivity cases, a feature of an element is defined simply in the way of allowing X. Allowing does not mean requiring. Therefore the presence of X is not obligatory.

With this background in mind, I now introduce two features which are also defined syntagmatically, in order to analyze the count-mass contrast of nominals.

Some nominals may combine with a cardinal numeral directly, and some may not. In (4a), for instance, the noun *apple* combines with the numeral *one* directly. In (5a), however, the noun *oil* may not combine with the numeral.

- (4) a. one apple b. five apples c. zero apples
 d. 0.5 apples e. 1.0 apples f. five nouns
- (5) a. (*one) oil b. (*one) furniture

The contrast can also be seen in predication (adapted from Chierchia 2010: 104):

- (6) a. The boys are at least thirty. b. *The gold is at least thirty.
 c. The gold is at least thirty pounds.

The numeral *thirty* is the predicate of the nominal *the boys* in (6a), whereas it may not be a predicate of the nominal *the gold* in (6b). Comparing (6b) and (6c), we see that the numeral needs the support of the measure word *pounds* to function as the predicate of the string *the gold*. Following the assumption that the copula in a nominal predicate construction is a

tense-bearer and the surface order of the subject-copula string is derived by the raising of the subject from its base-position, I assume that in (6a), the subject nominal is merged with the numeral predicate directly in its base-position, whereas this is impossible in (6b). The contrast is related to the nominal type of *boy* and that of *gold*.

I use the feature numerability to represent the contrast between nominals that may combine with a numeral directly and nominals that may not do so. Accordingly, [+numerable] means allowing a numeral, and [-numerable] means disallowing a numeral. Therefore, the nominals in (4) and (6a) are [+numerable] and those in (5) and (6c) are [-numerable].

The numerals in the nominals in (4), which are all [+numerable], are different. In this analysis, numerability cares about the ability to occur with a numeral only, and no special status is given to the contrast between singularity and plurality, or among integer, zero, and other numerals.

The feature of numerability is attested in the fact that certain elements intrinsically bring about a relevant effect. In Dutch, the presence of a collective affix such as *-werk* makes the noun unable to occur with any numeral (de Belder 2010; 2011: 218) and thus the affix is a marker of [-numerable] in my analysis. In (7a), the nominal *suiker* ‘sugar’ has [+numerable], since it occurs with the numeral *drie* ‘three’. In both (7b) and (7c), *-werk* occurs. In the presence of the numeral *drie* ‘three’, (7b) is not acceptable. The acceptability contrast indicates that it is the suffix that brings about the feature [-numerable] to the nominal (COL = COLLECTIVE).

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|--------|-----------------------|----|------------------------------|----|----------------------------|
| (7) a. | <i>drie suiker-en</i> | b. | * <i>drie suiker-werk-en</i> | c. | <i>suiker-werk</i> [Dutch] |
| | three sugar-PL | | three sugar-COL-PL | | sugar-COL |
| | ‘three sugars’ | | | | ‘confectionery’ |

In addition to numerability, we also identify the feature dimensionality. Some words may be modified by a size-denoting expression (e.g., *big*, *small*) or shape-denoting expression (e.g., *long*, *round*, *square*, *thin*) and some may not. Following Dixon (1982), I call the two types of expressions dimension expressions. In (8a), (8b), and (8c), the dimension adjectives *big*, *large* and *square* modify the nouns *apple*, *furniture*, and *watermelon*, respectively. In (8d), (8e), (8f), and (8g), however, *large*, *big*, *square* may not modify *oil*, *music*, *noun*, and *wine* (see Jespersen 1924: 198, Quine 1960: 104, McCawley 1979 [1975]: 170, Bunt 1985: 199).

- (8) a. a big apple b. large furniture c. square watermelon
 d. *large oil e. *large music f. *big noun g. *square wine

The contrast is also found in predication, as seen in (9) (from Chierchia 2010: 110):

- (9) a. The violets are small. b. The furniture is small. c. *The snow is small.

In (9a), the dimension adjective *small* is the predicate of *the violets*. Similarly, in (9b), the adjective is the predicate of *the furniture*. In (9c), however, the adjective may not be the predicate of *the snow*.

I use the feature dimensionality to represent the contrast between nominals that may be modified by a dimension modifier and nominals that may not do so. Thus, [+dimension] means allowing a dimension modifier, and [-dimension] means disallowing a dimension modifier. The nominals in (8a), (8b), (8c), (9a), and (9b) are [+dimension] and other nominals in (8) and (9) are [-dimension].

When a nominal has [+dimension], we know that its denotation must have “a certain

shape or precise limits” (Jespersen 1924: 198). The shape or limits are definable or measurable in certain dimensions (e.g., length, size, volume and shape), and therefore, atomicity is exhibited. In contrast, a nominal with [-dimension] denotes either material, which in itself independent of shape or size, such as *silver, water, butter, gas, air*, or immaterial notions, such as *leisure, music, traffic, success, tact, commonsense* (Jespersen 1924: 198). In my understanding, the former group of nouns can occur with a standard or container measure, as seen in (10a) and (11a), whereas the latter group cannot, as seen in the rest examples in (10) and (11).

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|---------|------------------|----|--------------------|----|------------------|
| (10) a. | a kilo of butter | b. | *a kilo of leisure | c. | *a kilo of nouns |
| (11) a. | a bowl of butter | b. | *a bowl of leisure | c. | *a bowl of nouns |

Similar to numerability, dimensionality is also attested in the fact that certain elements intrinsically bring about a relevant effect. For instance, *shui* ‘water’ alone may not be modified by *xiao* ‘small’, as seen in (12a); but if it is followed by a CL such as *di*, the whole compound *shui-di* can be modified by *xiao*, as seen in (12a’). Similarly, *ni* ‘mud’ alone may not be modified by *xiao*, as seen in (12b); but if it is followed by a CL such as *kuai*, the whole compound *ni-kuai* can be modified by *xiao*, as seen in (12b’) (more about this issue is discussed in Zhang 2011b).

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|---------|-------------|-----|--------------------------|
| (12) a. | *xiao shui | a’. | xiao shui-di |
| | small water | | small water-CL |
| | | | ‘small drop(s) of water’ |
| b. | *xiao ni | b’. | xiao ni-kuai |
| | small mud | | small mud-CL |

		‘small chunk(s) of mud’
c.	*da yun	c’. da yun-duo
	big cloud	big cloud-CL
		‘big piece(s) of cloud’

It is important to be pointed out that words such as *big* and *small* and their Chinese counterparts have an intensifying usage. As stated in Morzyski (2009: 176), “an adjective that normally expresses size characterizes the degree to which the gradable predicate holds”, as shown in the examples in (13).

(13) a.	big idiot	b.	big smoker
	da hao xingshi	d.	xiao xian shenshou
	big good situation		small show skill
	‘very good situation’		‘show the skill a little bit’

The intensifying readings are not size readings, and thus the adjectives in such a use are not dimension adjectives.

2.2 Defining count and mass by the two features

Traditionally, the notion of count is in direct contrast to the notion of mass. Different from this binary analysis, I use the two values of the two features, numerability and dimensionality, to describe the count-mass contrast.

The feature numerability alone may distinguish a count noun from a non-count noun. If a nominal may combine with a numeral directly in the context, it has [+numerable] and thus is a count one in that context. Otherwise, it is a non-count one. According to Chierchia (1998:

353; 2010: 104), being able to combine with a numeral is the signature property of a count nominal.

But numerability alone is not enough to identify whether a noun is a mass noun. A non-count noun is not necessarily a mass noun. On the one hand, well-recognized mass nouns, such as the word *oil* may be neither combined with a numeral directly (see (5a)), nor modified by a dimension adjective (see (8d)). On the other hand, words such as *furniture* may be modified by a dimension modifier (see (8b)), although they cannot combine with a numeral directly (see (5b)). Such nouns are non-count and non-mass. I claim that although the feature [+numerable] alone is enough to define the count status of a nominal, it is the combination of both [-numerable] and [-dimension] that defines the mass status of a nominal.

The four possible combinations of the two values of the features are summarized in (14):

(14)

	[numerable]	[dimension]	example	
a.	+	+	<i>apple</i> in (4a), (8a)	count
b.	+	-	<i>noun</i> in (4f), (8f)	count
c.	-	+	<i>furniture</i> in (5b), (8b)	non-count, non-mass
d.	-	-	<i>oil</i> in (5a), (8d)	mass

Among the four possibilities: (14a) and (14b) are both count, (14d) is mass, and (14c) is non-count and non-mass. Although count is not mass and mass is not count, what is new in this analysis is the independent status of (14c). The existence of this group of nouns indicates that non-count nominals do not have to be mass nouns. Also, from a different perspective, having the feature [+dimension] means that the noun is not a mass noun, but it does not mean that the noun must be a count noun (contra Wiltschko 2005, among others). *Duckling* and the

German word *Eichhörnchen* ‘squirrel’ can occur as non-count nouns, in addition to count nouns (see de Belder, to appear, fn. 12), although they can be modified by dimension modifiers (e.g., *small duckling*). Moreover, the independent status of (14b) indicates that not all count nouns denote entities that have physical dimensions, since not all count nouns may be modified by a dimension modifier.

I claim that the two features, numerability and dimensionality, are universal in defining count and mass nouns, assuming numerals and dimension modifiers are available in all languages. Also, they are the only criteria to be considered in analyzing the count-mass contrast.

2.3 Attesting the two features in co-occurrence restrictions

The linguistic reality of numerability and dimensionality is independently attested in co-occurrence restrictions of articles, quantifiers, and CLs.

It is well-known that indefinite articles and some quantifiers occur with count nouns in English. For instance, *every* and *many* occur with nouns that have [+numerable], and *much* occurs with nouns that have [-numerable].

(15) a. {every} apple b. {many/*much} apples

(16) a. *{every} oil b. {*many/much} oil c. {*many/much} furniture

In Chinese, some CLs are sensitive to the dimension feature of the noun. Some CLs take nouns with [-dimension] only. For instance, no liquid-denoting noun may be modified by a dimension adjective, as seen in (17a). Such a noun is [-dimension]. It can occur with the CL *di*, as seen in (17b).

- (17) a. *chang {you/shui/xue/niao/yanlei}
 long oil/water/blood/urine/tear
- b. san di {you/shui/xue/niao/yanlei/*putao}
 three CL oil/water/blood/urine/tear/grape
 ‘three drops of {oil/water/blood/urine/tear/*grape}’

In contrast, *putao* ‘grape’ can be modified by a dimension adjective, as seen in (18a) below. Such a noun is [+dimension]. It may not occur with *di*, as seen in (17b) above. Other CLs that reject nominals with [+dimension] include *ji* (for liquid medicine), *pao* (for urine), *tan* (for any liquid). I call such CLs (part of Chao’s 1968 partitive CLs) individuating CLs, which select [-dimension].

- (18) a. da putao
 big grape
 ‘big grape’
- b. san ke {putao/*you/*xue/*yanlei}
 three CL grape/oil//blood/tear

Words like *putao* can be selected by another kind of CLs, called individual CLs in Chao (1968). The CL *ke* in (18b) is such a CL. It selects nouns with [+dimension]. Other CLs such as *ben*, *tou*, and *zhi* are also individual CLs. Moreover, collective CLs, such as *zu* ‘group’, *qun* ‘crowd’, *da* ‘dozen’, *shuang* ‘pair’, *dui* ‘pair’, and partitive CLs, such as *ye* ‘page’, *duan* ‘paragraph’, and *zhang* ‘chapter’ (they are also Chao’s 1968 partitive CLs), also occur with nouns with [+dimension].

3. The two features in nouns

3.1 Numerability of nouns

Occasionally, we see people claim that numeral CL languages do have count nouns, or people feel reluctant to admit that there is no count noun in such languages. However, we still need to consider “If we assume that classifier languages have count nouns (similar to English *silverware*, cf. constructions like *three pieces of silverware*), then it is unclear what necessitates the use of classifiers.” (Krifka 2008: 5)

If we put unit words such as *dui* ‘pile’ aside, it is undeniable that no noun in Chinese is able to combine with a numeral directly, as shown in (19). Therefore, all nouns in the language have the feature [-numerable]. This means that no noun in the language is a count noun.

- (19) a. *san xianglian b. *san you
 three necklace three oil

The occurrence of a unit word such as a CL is obligatory between a numeral and a noun in Chinese. In contrast to Chinese, in some languages such as Hopi (Whorf 1956 [1941]: 141; Greenberg 1990a [1972]: 176), Halkomelem Salish (Wilhelm 2008: 64), and Yudja (an indigenous language spoken in Brazil; see Lima 2010), all nouns can combine with a numeral unconditionally. (20) is an example (Lima 2010: 7).

- (20) txabia apeta [Yudja]
 three blood
 ‘three units of blood’
 (the unit is identified in the context: drops, puddles, or containers)

In Yudja, there are neither CLs nor plural markers. When a numeral and a noun are combined, the exact unit of counting depends on the discourse context (Lima 2010: 13). Lima reports the naturalness of data like (20) in the absence of either Universal Sorter or Universal Packager effects. We can see that all nouns in such languages may have the feature [+numerable].

Between the above two patterns, in languages such as English, some nouns may combine with numerals directly (e.g., *apple*) and some may not (e.g., *oil*), as seen before.

3.2 Dimensionality of nouns

Although all nouns in Chinese are non-count nouns, they are not the same, with respect to dimensionality. In 2.3, we see that nouns with [+dimension] are selected by individual CLs, and nouns with [-dimension] are selected by individuating CLs. As shown in (21), nouns such as *he* ‘river’ can be modified by a dimension adjective such as *changchang* ‘long’. In contrast, material nouns such as *you* ‘oil’ in (22a) and immaterial nouns such as *minzhu* ‘democracy’ in (23a), reject such adjectives (putting aside the intensifying reading of such adjectives; see the discussion of (13)).

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|---------|-------------------------|----|---------------------|----|---------------------|
| (21) a. | changchang de he | b. | da qi-qiu | c. | fang xigua |
| | long DE river | | big air-ball | | square watermelon |
| | ‘long river’ | | ‘big balloon’ | | ‘square watermelon’ |
| (22) a. | *changchang (de) you | b. | *da (de) zheng-qi | c. | *fang de mianfen |
| | long DE oil | | big DE steam-air | | square DE flour |
| (23) a. | *changchang (de) minzhu | b. | *bo (de) zibenzhuyi | | |
| | long DE democracy | | thin DE capitalism | | |

The constraint is shown not only in modification, but also in predication. The string *hen chang* ‘very long’ may not be the predicate of the mass noun *you* ‘oil’ in (24a), but it can be the predicate of the non-mass noun *he* ‘river’ in (25a). The string *hen da* ‘very big’ may not be the predicate of the mass noun *zheng-qi* ‘steam-air’ in (24b), but it can be the predicate of the non-mass noun *qi-qiu* ‘balloon’ in (25b).

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|---------|---|----|---|
| (24) a. | *You hen chang.
oil very long | b. | *Zheng-qi hen da.
steam-air very big |
| (25) a. | He hen chang.
river very long
‘The river is very long.’ | b. | Qi-qiu hen da.
air-ball very big
‘The balloon is very big.’ |

This contrast shows that the feature dimensionality can divide Chinese non-count nouns into the mass-type, which has [-dimension], and the non-mass-type, which has [+dimension].

Greenberg (1972: 26) claims that nouns in CL languages have the characteristics of a mass noun. The idea is also seen in Hansen (1972), Krifka (1995), Doetjes (1996), Chierchia (1998), among many others. According to our new analysis of the count-mass contrast, however, not all nouns in Chinese are mass nouns.

4. The two features in unit words

4.1 Classification of unit words

All unit words tell us what counts as one in counting. Unit words include CLs and measure words. The latter group is composed of standard measures such as *kilo* and container measures such as *cup* in *three cups of tea*.

Among various types of CLs, kind CLs have no occurrence restrictions. They occur with all types of nouns. Standard and container measures occur with either [+dimension] nouns or material type of [-dimension] nouns, but reject nouns denoting immaterial notions (see (10) and (11)). So these three types of unit words are not sensitive to the contrast between [+dimension] and [-dimension]. In the following data, the nouns in the a-examples are [+dimension] and those in the b-examples are [-dimension].

- | | | | | |
|---------|--------------------------|----|----------------------------|---------------------|
| (26) a. | shi <u>zhong</u> luobo | b. | shi <u>zhong</u> mianfen | [kind CL] |
| | ten CL carrot | | ten CL flour | |
| | ‘ten types of carrot’ | | ‘ten types of flour’ | |
| (27) a. | shi <u>gongjin</u> luobo | b. | shi <u>gongjin</u> mianfen | [standard measure] |
| | ten kilo carrot | | ten kilo flour | |
| | ‘ten kilos of carrots’ | | ‘ten kilos of flour’ | |
| (28) a. | shi <u>xiang</u> luobo | b. | shi <u>xiang</u> mianfen | [container measure] |
| | ten box carrot | | ten box flour | |
| | ‘ten boxes of carrots’ | | ‘ten boxes of flour’ | |

When these three types of unit words occur with nouns of [+dimension], they do not represent the natural units of the elements encoded by the nouns.

Unit words that select [-dimension] nouns are individuating CLs (Section 2.3), as shown in (29). Such CLs occur with mass nouns (e.g., Croft 1994: 162). Semantically, individuating CLs are associated with the idea that the noun refers to some kind of mass and the CL gives a unit of this mass (Aikhenvald 2003: 318).

- (29) a. shi dui tu b. wu gu zheng-qi c. wu zhang zhi
 ten CL earth five CL steam-air five CL paper
 ‘ten piles of earth’ ‘five puffs of steam’ ‘five pieces of paper’
- d. wu di you e. wu tan you f. wu pao niao
 five CL oil five CL oil five CL urine
 ‘five drops of oil’ ‘five puddles of oil’ ‘five units of urine’
- g. liu ji yao-shui
 six CL medicine-liquid
 ‘six units of medicine liquid’

Unit words that occur with [+dimension] nouns are divided into three types. A. What counts as one is bigger than the natural unit of the element denoted by the non-mass noun. In this case, a collective CL is used, as in (30a). Collective CLs (called group measures in Chao 1968: 595) include the so-called arrangement CLs, such as *pai* ‘row’ and *luo* ‘stack’, and number set CLs, such as *shuang* ‘pair’, *dui* ‘pair’, and *da* ‘dozen’. B. What counts as one is smaller than the natural unit. In this case, a partitive CL is used, as in (30b). C. What counts as one matches the natural unit. In this case, an individual CL is used, as in (30c).

- (30) a. shi dui luobo [collective CL]
 ten CL carrot
 ‘ten piles of carrots’
- b. shi pian luobo [partitive CL]
 ten CL carrot
 ‘ten slices of carrot’

- c. shi gen luobo [individual CL]
 ten CL carrot
 ‘ten carrots’

Generally speaking, the same form of a unit word can belong to different types, depending on the type of the associated noun, and the semantic function of the unit. In (29a), the CL *dui* occurs with the mass noun *tu* ‘earth’, and it is thus an individuating CL. However, in (30a), *dui* occurs with the non-mass noun *luobo* ‘carrot’, and it is thus a collective CL.

4.2 Unit words as the unique numerability bearers in Chinese

All unit words may combine with a numeral directly, although under certain conditions, the numeral *yi* ‘one’ can be implicit.

The conditions of silent *yi* are studied by D. Yang (1996). Silent *yi* can follow *mei* ‘each’ and the demonstrative *zhe* ‘this’ or *na* ‘that’. When *yi* is covert, its occurrence in syntax can be attested by the singular reading of the whole nominal.

- (31) Shufen xiang mai zhe (yi) ben shu.
 Shufen want buy this one CL book
 ‘Shufen wants to buy this book.’

Therefore all unit words have the feature [+numerable].

Since no noun in Chinese has the feature [+numerable] and all unit words have the feature, the latter are the unique numerability bearer in the language. We can see that numerability does not have to be anchored to lexical or root elements (for a non-lexical approach to the count-mass contrast, see Allen 1980, Borer 2005, Pelletier 2009; for a lexical

approach to the contrast, see Doetjes, to appear).

The analytical realization of numerability is parallel to the situation that tense information can be realized by either verbs or auxiliaries in English. Formal features in general can be distributed in various types of elements.

5. Comparing with the dichotomous-contrast analysis

The study of the contrast between count and mass nouns dates back to Aristotle. Developing the insights of many previous studies, I have made the following two main claims with respect to the contrast.

First, a count noun is defined exclusively by [+numerable], i.e., the possibility to combine with a numeral directly. It has been generally recognized that such a combination possibility is the “signature” grammatical property of count nouns (e.g., Chierchia 2010: 104). I have now further argued that this is the only defining grammatical property of a count noun, cross-linguistically. This syntagmatic definition means that the count/non-count distinction is clearly linguistic, rather than extra-linguistic. It is thus not surprising that countability is expressed in various ways, cross-linguistically and within the same language. In Chinese, generally speaking, no noun may combine with a numeral directly, and therefore, no noun is a count noun. Numerability is instead represented exclusively by unit words, including CLs and measure words. In languages such as Yudja (Lima 2010) and Halkomelem Salish (Wilhelm 2008: 64), no CL exists, and every noun can combine with a numeral directly. Thus every noun can be a count noun. Between these two patterns, in languages such as English and Dëne (Wilhelm 2008), in an unmarked situation (i.e., without a shift), some words are [+numerable], and others are [-numerable].

Second, the notion of mass is not the direct negation of count. Instead, it is the combination of the two syntagmatic properties: [-numerable] and [-dimension]. Words such

as *oil* in English and their counterparts in Chinese are mass nouns. This refined analysis makes it possible to precisely identify elements that may not combine with a numeral directly but may allow a dimension adjective, e.g., *furniture* in English and *pingguo* ‘apple’ in Chinese. Such words do not denote massive objects. As put it in Chierchia (2010: 144), “we know right off the bat that *furniture* cannot be treated on a par with *water*.” Such words have been identified as “count mass nouns” (Doetjes 1996: 44, 2010: 44), “object mass nouns” (Barner & Snedeker 2005), and “fake mass nouns” (Chierchia 2010: 110). The similarity between such words and the Chinese counterparts of English count nouns has been mentioned in Doetjes (1996: 35), Krifka (2008: Sec. 6.5), Cowper & Hall (2009: 1), and Chierchia (2010: 111, fn. 12), among others. In Doetjes (1996: 34), “count mass nouns” are for the words which are semantically count but behave like a mass noun syntactically. If one assumes that there is a binary contrast and then gives a name to the elements that do not fit in the contrast, I do not think the scientific mission has been completed.

Although it has been widely believed that all nouns are mass nouns in Chinese, the difference between English typical mass nouns and Chinese non-mass nouns, with respect to dimensionality, has been noted in Gil (2008: 8). He finds that unlike the former, the latter can be modified by “size and shape adjectives”. In my analysis, both *furniture* and *pingguo* are [-numerable] and [+dimension]. Therefore, *da pingguo* ‘big apple’ is as natural as *big furniture*.

The close interaction between the notions numerability and dimensionality has long been realized in the literature, but the nature of the relation between them has not been clarified (see Jespersen 1924: 198). Quine (1960: 104) notes that the unacceptability of **spherical water* and **spherical wine*. On the other hand, it is obvious that count nouns such as *suggestion* also reject *spherical*. Bunt (1985: 199) also points out that mass nouns such as *water* may not be modified by adjectives such as *large*. However, McCawley (1975: 170)

finds that *furniture* and *footwear*, which have also been treated as “mass” nouns, admit size modification “much more readily than hard-core mass nouns such as *rice*”.

The most recent and thorough discussion of the relation between the count-mass contrast and size adjectives is de Belder (to appear; 2011). Her discussion does not cover other dimension modifiers such as *thick*, *thin*, *round*, though. Crucially, she claims that “if something acquires the [Size] feature, it automatically becomes countable.” (to appear: Sec. 2.2.5) So for her analysis, size features entail the count status. This is different from my analysis, which gives an equal status to numerability and dimensionality: neither entails the other, and thus there are four possibilities. One empirical consequence of her analysis is that she fails to capture the fact that non-count nouns such as *furniture* may have size feature. This kind of nouns are predicted to be “illicit” in her theory (de Belder to appear: Sec. 2.1; 2011: 83 (34)), contrary to the fact.

The idea that count and mass is not a dichotomous contrast and thus we need more features to represent them is also seen in Muromatsu (2003) and Acquaviva (2010). However, in the absence of syntactic criteria to analyze the empirical issues, the idea in the works is immature. But it does pave the way for the research in this paper.

The proposed two features, numerability and dimensionality, are different, but are both related to the countability of nominals. This is parallel to our understanding that tense and aspect features are different, but are both related to the temporal properties of linguistic elements.

6. Reflections on theories of the relation between CLs and countability

6.1 The syntactic foundations of the presence of CLs

The novel analysis of the count-mass contrast proposed in this paper opens a new window to see the syntactic foundations of the existence of individual CLs in CL languages.

Counting is possible in the presence of a unit. The unit tells us what counts as one in the context. The general function of a unit word is to specify the unit for counting. Such a word is [+numerable]. In Chinese, when a noun occurs with a CL, it is the CL rather than the noun that is the bearer of numerability.

Individual CLs are syntactically different from nouns. Thus the fact that numerability is realized on CLs rather than nouns is a syntactic issue. The syntactic nature of the existence of individual CLs can be seen in another fact: the occurrence of such CLs is sensitive to syntactic categories in English. Counting in verbal phrases in English requires the occurrence of CLs (Krifka 2007: 39), but not in nominals, as seen in (32). There is no CL in the nominal counting construction *three trips to Paris* in (32a), but the CL *times* is obligatory in the verbal counting construction in (32b). Like nominals in Chinese, verbal phrases in English are not numerability bearers, and thus need CLs in counting. If we consider the representation of numerability in verbal phrases, English should be treated as a CL language.

(32) a. Bill made three trips to Paris. b. Bill traveled to Paris three *(times).

This numerability-bearer analysis of CLs calls for a review of our current understanding of CLs in CL languages.

6.2 How special are the CLs of CL languages?

All seven types of unit words listed in 4.1 “are closely related in grammar and function” (Croft 1994: 152). Like measure words, CLs are also counting units or “unit counters” (Allen 1977: 293).

It has been widely believed that all nouns in CL languages are mass nouns, and therefore, the basic function of CLs is to divide mass into units (e.g., Quine 1969; Greenberg 1972: 26;

Link 1991; Borer 2005: 101; Krifka 2008: Sec. 6.3). Accordingly, the syntactic projection headed by a CL has been called DivP (Borer 2005). In the previous discussion, I have shown that CL languages can distinguish mass from non-mass nouns. As a consequence, the general function of CLs is not dividing or individuating.

Let us examine how the dividing assumption misrepresents the basic function of CLs.

We have introduced five types of CLs in 4.1:

- (33)a. san zhong yang [kind CL]
three CL sheep
'three kinds of sheep'
- b. san di shui [individuating CL]
three CL water
'three drops of water'
- c. san qun yang [collective CL]
three CL sheep
'three groups of sheep'
- d. san pian xigua [partitive CL]
three CL watermelon
'three slices of watermelon'
- e. san ben shu [individual CL]
three CL book
'three books'

From the translations of (33a), (33b), (33c) and (33d), we can see that English also has kind CL such as *kind*, individuating CL such as *di* 'drop', collective CLs such as *group* and

partitive CLs such as *slice*.

Among the five types of CLs, the individuating CL in (33b) indeed divides a massive object into units (also see the examples in (29)). CLs like this are called “Partitive Measures” in Chao (1968), and “Classifiers for massive objects” in Gerner & Bisang (2010: 606). Such CLs are also found in non-CL languages such as English, as seen in the word *drop* in the translation of (33c). Obviously, individuating CLs cannot distinguish CL languages from other languages.

What English does not have is individual CLs. There is no English counterpart for *ben* in (33e). It is this type of CLs that distinguishes CL languages from non-CL languages such as English. In non-CL languages, individual CLs are not overtly represented by linguistic expressions. In such languages, it has been assumed (Quine 1969: 36) that the semantics of an individual CL is integrated either in the numeral (see Wilhelm 2008: 55) or the noun (see Chierchia 1998).

Crucially, individual CLs do not divide or individuate anything. They do not occur with mass nouns. As pointed out by Bale & Barner (2009: 7), “default classifiers [such as the individual CL *ge* in Mandarin Chinese] often combine with nouns that already are interpreted as containing individuals.” Such CLs neither individuate anything nor create new units for the individuals any more, unlike collective or partitive CLs. Therefore, the popular belief that it is the individuating (discreet set-creating) function of CLs that is special in CL languages needs reconsideration. A more precise generalization is that in addition to the various ways of specifying a unit for counting, CLs in CL languages may also represent the natural unit of entities that show atomicity, whereas the CLs of other languages do not have this semantic function. In other words, the CLs in CL languages are special in their ability to represent the natural units of the entities denoted by non-mass nouns.

If the general function of CLs is not dividing, we need to reconsider Borer’s (2005)

syntactic analysis of the count-mass contrast. In her analysis, the absence of dividing structure (DivP) derives “mass” reading, and the presence of dividing structure derives “count” reading. The two features proposed in this paper calls for a richer structure to represent the count-mass contrast.

6.3 The unreliability of the *de* and pre-CL adjective arguments

In this section, I argue against the assumed correlation between the count-mass contrast and two phenomena in Mandarin Chinese: the occurrence of an adjective to the left of a unit word and the occurrence of the functional word *de* to the right of a unit word (Cheng & Sybesma 1998, 1999).

I have argued that in Chinese, neither nouns nor CLs make a distinction between count and non-count ones themselves, since all nouns are non-count elements (3.1) and all CLs are count elements (4.2). But the selection of CLs may distinguish mass nouns from non-mass nouns. Individual, collective, and partitive CLs occur with non-mass nouns and individuating CLs occur with mass nouns (other unit words, i.e., kind CLs, standard and container measures, occur with both mass and non-mass nouns).

Cheng & Sybesma (1998, 1999) try to make a distinction between count CLs and mass CLs (called massifiers). The names are used to show that in Chinese, the contrast between count and mass nouns can be distinguished at the level of CLs, if not at the level of nouns.

In Cheng (2009: 3), it seems that the count CLs are equivalent to individual CLs and all other kinds of unit words are mass CLs. Developing the ideas in certain previous literatures, Cheng & Sybesma (1988, 1999) formalize the following two criteria.

Criterion A. A pre-CL adjective may occur with a mass noun, as seen in (34a), but not with a “count” noun, as seen in (34b) (Cheng & Sybesma 1998: 390, 1999: 516). The term count noun in their analysis is called non-mass and non-count noun in this paper.

- (34)a. yi da zhang zhi b. *yi da wei laoshi
 one big CL paper one big CL teacher
 ‘one big piece of paper’
- c. yi da tiao hao-han d. san da zhi laohu e. san chang tiao xianglian
 one big CL good-guy three big CL tiger three long CL necklace
 ‘one big good guy’ ‘three big tigers’ ‘three long necklace’

It is true that (34b) is not acceptable. But isolated cases like this do not affect the observation that other examples of the same type are acceptable, as shown in (34c, d, e) (see Cheng & Sybesma 1998: 390 fn. 4 for their acknowledgement of counter-examples). Tang (2005), Hsieh (2008), and X. P. Li (2011: 34), among others, all present a lot of counter-examples to this claim on pre-CL adjectives. More examples can be found in Zhu (1982: 52), Lu (1987), and Luo (1988). Therefore, the adjective criterion is empirically problematic.

Criterion B. *De* may occur between a measure word and a mass noun, but not between a CL and a “count” noun (Chao 1968: 555, 588; Zhu 1982: 51; Cheng & Sybesma 1998: 388, 1999: 515). A typical pair of examples is (35):

- (35)a. san wan de tang b. *san ge de laoshi
 three bowl DE soup three CL DE teacher
 ‘three bowls of soup’ ‘three teachers’

Again, the unacceptability of (35b) is one of few isolated cases. In fact, all types of CLs can be followed by *de* in an appropriate context. The choice of the context has nothing to do

with the count-mass contrast. Instead, it has to do with the syntactic position of *de*. In Zhang (2011a), I show that there are two sources of *de*: one introduces a constituent directly and the other surfaces in a comparative ellipsis construction. Constructions of individual, individuating, and kind CL host the latter *de* only, whereas those of the rest types of unit words (partitive and collective CLs, standard and container measures) host *de* of either source. Note that the division here does not match with Cheng & Sybesma’s distinction between count and mass CLs. If one just considers the phonological form of *de* without considering its structural position, then, *de* may occur with all types of CLs or unit words, as shown in (36).

- (36) Shufen chi-le yi-bai {ge/gongjin/bao/pian/dui/zhong} de pingguo.
 Shufen eat-PRF one-hundred CL/kilo/bag/slice/pile/kind DE apple
 ‘Shufen ate 100 apples or 100 {kilos/bags/slices/piles/kinds} of apples.’

Therefore, Cheng & Sybesma’s (1998, 1999) claim that one type of CLs (the “count” type) may not be modified by an adjective, and may not be followed by *de*, whereas the other type (the “mass” type) can, is descriptively inadequate.

As mentioned above, several works, including Tang (2005: 432, 440-446), Hsieh (2008: 34), X. P. Li (2011), etc. have already presented a lot of counter-examples to falsify the alleged distinction. Wu & Bodomo (2009: 489) point out that the alleged two types of CLs can occur with the same NP (See also Borer 2005: 98), as shown in (37). *Ben* in (37a) and *li* in (37b) are count CLs, and *xiang* in (37a’) and *wan* in (37b’) are mass CLs, in Cheng & Sybesma’s system.

- (37) a. san ben shu a'. san xiang shu
 three CL book three box book
 ‘three books’ ‘three boxes of books’
- b. san li mi b'. san wan mi
 three CL rice three bowl rice
 ‘three grains of rice’ ‘three bowls of rice’

Her & Hsieh’s (2010: 541) following examples show that the two constraints on the so-called count CLs (i.e., individual CLs) can even be violated at the same time. The CLs *ke* in (38a) and *tiao* in (38b) are typical individual CLs, but they are both preceded by a modifier and followed by *de*.

- (38) a. yi da ke de gaolikai b. yi da tiao de yu
 one big CL DE cabbage one big CL DE fish
 ‘one big cabbage’ ‘one big fish’

In conclusion, the alleged two criteria cannot make any distinction in CLs in Chinese, regardless of whether the assumed distinction correlates with the count-mass contrast.

7. Summary

Based on Mandarin Chinese, in this paper, I have argued for a more refined syntactic analysis of the count-mass contrast. I list my main conclusions as follows:

A. The count-mass contrast of linguistic elements is decomposed into two features: [numerable] and [dimension]. [+numerable] means a noun can combine with a numeral directly, and thus it is a count noun. [-numerable] nouns are non-count nouns. Nouns in

Chinese are non-count nouns in general. [+dimension] means a noun can combine with a shape or size modifier, and thus it is a non-mass noun. A mass noun is defined by both [-numerable] and [-dimension]. Not all nouns in Chinese are mass nouns.

B. Some CLs select mass nouns and some select non-mass nouns. The latter type of CLs, i.e., individual CLs, distinguishes CL languages from other languages. Like other types of unit words, all CLs specify units and tell us what counts as one in counting. The semantic function of individual CLs is to represent the natural units of the elements denoted by non-mass nouns. Such a CL has no dividing function at all.

C. The feature [+numerable] may be distributed in different types of elements cross-linguistically and within the same language. In Mandarin Chinese, nouns do not have this feature, whereas unit words do. In languages such as English, the feature is found in both count nouns and unit words such as measure words.

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Abbreviations

CL	classifier
PRF	perfect aspect
DE	associative particle
COL	collective
PL	plural

Index items

classifier, countability, count, mass, plural, measure, Chinese, dimension, numerable, size, unit word, de, syntagmatic, atomicity, immaterial, quantifier, selection, non-count, non-mass, collective classifier, partitive classifier, kind classifier, individual classifier, individuating classifier

One table

(14)

	[numerable]	[dimension]	example	
a.	+	+	<i>apple</i> in (4a), (8a)	count
b.	+	-	<i>noun</i> in (4f), (8f)	count
c.	-	+	<i>furniture</i> in (5b), (8b)	non-count, non-mass
d.	-	-	<i>oil</i> in (5a), (8d)	mass

Biography of the author

Niina Ning Zhang is a professor at National Chung Cheng University, Chiayi, Taiwan. Her major research interests include syntactic theories of generative grammar, morphology, the

syntax-semantics interface, and the syntax of Mandarin Chinese. She has published works on the syntax of coordination and the syntax of numeral classifier constructions.

Abstract

This chapter studies the relationship between classifiers and the count-mass contrast. It shows that the contrast between count and mass is not binary. Instead, there are two independently attested features: numerability, the ability of a noun to combine with a numeral directly, distinguishes count from non-count nouns, and dimensionality, the ability of a noun to be modified by a size or shape modifier, distinguishes mass from non-mass nouns. Assuming numerals and size and shape modifiers are universally available, we are able to identify count and mass nominals in any language. Although all nouns in Chinese are non-count nouns, there is still a mass/non-mass contrast, with mass nouns selected by individuating classifiers and non-mass nouns selected by individual classifiers.

Keywords

classifier, countability, count, mass, plural, measure, Chinese