

Semantic Features of Counting Units in a Syntagmatic Perspective*

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This research studies various syntagmatic semantic relations of the unit words of a construction that is composed of a numeral, a unit word such as a measure word and classifier, and a noun. Four types of relations are examined: the contrastive relation between two unit words in a context, the semantic feature-selection relation between a verb and a unit word of a counting construction, the competing or disjunction relation of different elements within a counting construction in semantic feature projection, and the parallel relation of different elements of a counting construction with elements external to the counting construction.

Keywords: Mandarin Chinese, classifier, feature projection, selection, semantic feature, unit word

1. Introduction

All unit words, including classifiers (CLs) and measure words, have semantic features (s-features). “[C]lassifiers typically index some perceived characteristic of the phenomenon to which the classification refers.” (Allen 1977:285; Tai & Wang 1990; Wu & Bodomo 2009:488, among others). For instance, the individuating CL *grain* in *a grain of sand*, and the word *drop* in *a drop of water* in English encode different appearance properties (Sanches 1973:13). Similarly, the individual CL *tiao* in *yi tiao she* ‘one CL snake’, the CL *duo* in *yi duo hua* ‘one CL flower’, the CL *pian* in *yi pian shuye* ‘one CL leaf’, also encode different appearance properties. In typical situations, as stated in Tai & Wang (1990:38), “a classifier categorizes a class of nouns by picking out some salient perceptual properties, either physically or functionally based, which are permanently associated with entities named by the class of nouns” (see H. Zhang 2007 for the restrictions of this statement).

Since De Saussure (1916), two kinds of relationships 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 the co-occurring elements

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in the same construction, e.g., the relationship between *the* and *people* in the string *the people*. Paradigmatic and syntagmatic relationships have been viewed as vertical and horizontal (linear) ones, respectively.

Previous research has achieved a lot in the exploration of paradigmatic relations of semantic features of CLs in Mandarin Chinese. In this paper, I discuss the syntagmatic relations of semantic features of CLs, among various types of counting units in Mandarin Chinese.

The syntagmatic relations to be studied include the contrastive relation between two unit words in a context (Section 3), the s-selection relation between a verb and a unit word of a counting construction (Section 4), the competing or disjunction relation of different elements within a counting construction in s-feature projection (Section 5), and the parallel relation of different elements of a counting construction with elements external to the counting construction (Section 6).

2. Types of unit words in counting constructions

The goal of this section is to provide a background for the classification of unit words to be studied in this paper. Certain criteria for the classification are introduced here.

2.1 Mass nouns and non-mass nouns in Mandarin Chinese

In Zhang (2010), I propose that the contrast between count and mass is not a dichotomous contrast. Instead, there are two features to make the distinction: numerability ([+/-numerable]) and dimensionality ([+/-dimension]).

[+numerable] means that a noun may combine with a numeral directly. In (1a), the noun *apple* can combine with the numeral *three* directly, and therefore it has [+numerable]. In (1b), however, the Chinese noun *pingguo* ‘apple’ may not combine with the numeral *san* ‘three’ directly, and therefore the noun has [-numerable].

- (1) a. three apples
b. *三蘋果
 *san pingguo
 three apple

- c. 三個蘋果
 san ge pingguo
 three CL apple
 ‘three apples’

I claim that a count noun is defined exclusively by [+numerable]. It is generally recognized that such a combination possibility is the most reliable grammatical property of count nouns (e.g. Chierchia 2010:104). I further argue that this is the only defining grammatical property of a count noun, cross-linguistically. The syntagmatic property of count nouns is clearly linguistic, rather than extra-linguistic. It is thus not surprising that numerability is expressed in various ways, cross-linguistically and within the same language.

In Chinese, generally speaking, no noun may combine with a numeral directly, as seen in (1), and therefore, no noun is a count noun. Numerability of the language 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), every noun can combine with a numeral freely, and thus every noun can have [+numerable] and then be a count noun.

- (2) txabïa apeta [Yudja] (Lima 2010:7)
 three blood
 ‘three units of blood’
 (the unit is identified in the context: drops, puddles, or containers)

Similar situation occurs in Chinese idioms and compounds, where a numeral is not followed by any unit words. In the examples in (3a, b), a kind CL is implied, and in (3c, d, e, f), an individual CL is implied.

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| <p>(3) a. 五香粉
 wu-xiang-fen
 five-spice-powder
 ‘five-spice-power’</p> | <p>b. 五毒俱全
 wu-du-ju-quan
 five-poison-all-complete
 ‘having all five kinds of sins’</p> |
| <p>c. 三角關係
 san-jiao-guanxi
 three-angle-relation
 ‘triangle relation’</p> | <p>d. 一心不能二用
 yi xin bu neng er yong
 one hear not able two use
 ‘don’t absent-minded’</p> |

- e. 三人行必有我師
 San ren xing bi you wo shi.
 three person walk must have my teacher
 ‘One can always find a teacher around.’
- f. 三房兩廳
 san fang liang ting
 three room two sitting.room
 ‘3 bedrooms & 2 sitting room’

In languages such as English, in an unmarked situation, words like *cat* are [+numerable], and words like *oil* and *furniture* are [-numerable]. It is also well-known that certain words are count in one language, but non-count in another language.

[+dimension] means that a noun may be modified by a size (e.g. *big*) or shape (e.g. *round*) modifier. Although all nouns in Chinese have [-numerable], they are not the same, with respect to dimensionality. Semantically, nouns that allow a dimension modifier, such as *he* ‘river’ in (4a), denote elements showing natural atomicity, whereas those that disallow such a modifier, such as *you* ‘oil’ in (5a) and *minzhu* ‘democracy’ (6a), denote massive objects or immaterial notions.¹

- (4) a. 長長的河
 changchang de he
 long DE river
 ‘long river’
- b. 大氣球
 da qi-qiu
 big air-ball
 ‘big balloon’
- c. 方西瓜
 fang xigua
 square watermelon
 ‘square watermelon’
- (5) a. *長(的)油
 *chang (de) you
 long DE oil
- b. *大(的)蒸汽
 *da (de) zhengqi
 big DE steam

¹ In Chinese, *da* ‘big’ and *xiao* ‘small’ are ambiguous in size-denoting and degree denoting. The latter reading can be seen in the examples in (i). We do not consider such uses of the adjectives.

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

c. *方(的)麵粉
*fang de mianfen
square DE flour

(6) a. *方(的)民主
*fang (de) minzhu
square DE democracy

b. *薄(的)資本主義
*bo (de) zibenzhuyi
thin DE capitalism

In Zhang (2010), I also claim that the notion of mass is not the direct negation of count. It is the combination of two syntagmatic properties that defines mass: [-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. They are non-count and non-mass nouns.

Like agentivity of VPs (i.e., whether an agent-oriented adverb is allowed) and gradability of APs (i.e., whether a degree word is allowed), numerability and dimensionality are defined syntagmatically.

In this analysis, Chinese nouns can be divided into mass and non-mass nouns. The former is [-dimension] and the latter is [+dimension].

2.2 Seven types of unit words in counting constructions

A counting construction is composed of three basic elements: a numeral, such as *san* ‘three’ in (7), a noun, such as *putao* ‘grape’ in (7), and a unit word between them, such as the CL *ke* in (7a), the standard measure *gongjin* ‘kilo’ in (7b), and container measure *wan* ‘bowl’ in (7c).

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| <p>(7) a. 三顆葡萄
san ke putao
three CL grape
‘three grapes’</p> | <p>b. 三公斤葡萄
san gongjin putao
three kilo grape
‘three kilos of grapes’</p> |
| <p>c. 三碗葡萄
san wan putao
three bowl grape
‘three bowls of grapes’</p> | |

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*. Unlike Croft (1994:162-163), who considers individual CLs as real CLs and excludes other types of CLs in his study, Chao (1968) covers all types of unit words. Since this study targets counting constructions, I also consider all types of unit words.²

Kind CLs have no occurrence restrictions. They occur with all types of nouns. Standard and container measure occur with both [+dimension] nouns and the material type of [-dimension] nouns, as seen in (8a) and (9a), but not immaterial nouns, as seen in the rest examples in (8) and (9).

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|-----|----|---|----|--|
| (8) | a. | 三公斤奶油
san gongjin naiyou
three kilo butter
'three kilos of butter' | b. | *三公斤悠閒
*san gongjin youxian
three kilo leisure |
| | c. | *三公斤名詞
*san gongjin mingci
three kilo noun | | |
| (9) | a. | 三碗奶油
san wan naiyou
three bowl butter
'three bowls of butter' | b. | *三碗悠閒
*san wan youxian
three bowl leisure |
| | c. | *三碗名詞
*san wan mingci
three bowl noun | | |

So the three types of unit words, kind CLs, standard and container measures, are not sensitive to the contrast between [+dimension] and [-dimension]. In the following data, the nouns in the a-examples are [+dimension] and the b-examples are [-dimension].

² I put aside Chao's (1968:698) quasi-measures, which include some standard measures and nouns with deleted unit words. I also ignore other types of "measures" in Chao (1968), which are not unit words of nominals.

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|--|---|
| <p>(10) a. 十種蘿蔔
shi <u>zhong</u> luobo
ten CL carrot
'ten types of carrot'</p> | <p>b. 十種麵粉
shi <u>zhong</u> mianfen [kind CL]³
ten CL flour
'ten types of flour'</p> |
| <p>(11) a. 十公斤蘿蔔
shi <u>gongjin</u> luobo
ten kilo carrot
'ten kilos of carrots'</p> | <p>b. 十公斤麵粉
shi <u>gongjin</u> mianfen [standard measure]⁴
ten kilo flour
'ten kilos of flour'</p> |
| <p>(12) a. 十箱蘿蔔
shi <u>xiang</u> luobo
ten box carrot
'ten boxes of carrots'</p> | <p>b. 十箱麵粉
shi <u>xiang</u> mianfen [container measure]
ten box flour
'ten boxes of flour'</p> |

Unit words that select [-dimension] nouns are individuating CLs (2.4), as shown in (13). Such CLs occur with mass nouns (e.g. Croft 1994:162).

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| <p>(13) a. 十堆土
shi dui tu
ten CL earth
'ten piles of earth'</p> | <p>b. 五股蒸汽
wu gu zhengqi
five CL steam
'five puffs of steam'</p> |
| <p>c. 五張紙
wu zhang zhi
five CL paper
'five pieces of paper'</p> | <p>d. 五滴油
wu di you
five CL oil
'five drops of oil'</p> |

³ Kind CLs, also called varietal CLs (Allen 1977), are abstract. Other types of CLs can also be abstract. All abstract words may display the property that the denoted entities can be in different places at the same time. This is the so-called space-continuity effect of abstract entities (Zemach 1970). (ia) means that umbrellas of one type are located in different places at the same time, and (ib) means that one item of news is located in different places at the same time. The same effect is also seen in (ic), where neither a unit word nor a kind-denoting word occurs.

(i) a. You ren ba zhe yi zhong yusan fang-dao-le jiaoshi-li he canting-li.

b. You ren ba zhe yi tiao xiaoxi tie-dao-le jiaoshi-li he canting-li.

c. I keep this idea both in my papers and in my talks.

Following Zemach (1970), De Belder (to appear: Section 1.1) claims that only kinds, but not other types of units, have this space-continuity effect. Obviously, examples like (ib) falsify this claim. Therefore, we include both kind units and other units in our study.

⁴ Other than the well-recognized standard measures such as *gongjin* 'kilo', the words *nian* 'year', *yue* 'month', and *ri* 'day' may be ambiguous between unit words and regular nouns (J. Tang 2005:457). See S. Tang (2010) for a recent research of the issue.

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|----|---|----|--|
| e. | 五灘油
wu tan you
five CL oil
'five puddles of oil' | f. | 五泡尿
wu pao niao
five CL urine
'five units of urine' |
| g. | 六劑藥水
liu ji yao-shui
six CL medicine-liquid
'six units of medicine liquid' | | |

Semantically, individuating CLs are associated with the idea that “the noun refers to some kind of mass and the classifier gives a unit of this mass” (Denny 1986:298, cited in Aikhenvald 2003:318).

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 (14a). 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 (14b). C. What counts as *one* matches the natural unit. In this case, an individual CL is used, as in (14c).⁵

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|---------|--|-----------------|
| (14) a. | 十堆蘿蔔
shi <u>dui</u> luobo
ten CL carrot
'ten piles of carrots' | [collective CL] |
| b. | 十片蘿蔔
shi <u>pian</u> luobo
ten CL carrot
'ten slices of carrot' | [partitive CL] |

⁵ Partitive CL is one of the various types of unit words for pseudo-partitive constructions. Pseudo-partitive constructions denote the quantity of entities (e.g. *three kilos of tea*), whereas partitive constructions (e.g. Fodor & Sag 1982, Jackendoff 1977) denote a part-whole relation within a definite domain (e.g. *three kilos of the tea*). The counting constructions discussed here, including those contain a partitive CL, are all pseudo-partitive constructions. The fractional CL *cheng* in Chinese is used in partitive constructions only. I do not discuss this CL in this book.

(i) Ba chang xuesheng yijing kao-le Tuofu.
eight CL student already test-PRF TOEFL
'80% of the students have taken the TOEFL test.'

- c. 十根蘿蔔
 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 (13a), the CL *dui* occurs with the mass noun *tu* ‘earth’, and it is thus an individuating CL. However, in (14a), *dui* occurs with the non-mass noun *luobo* ‘carrot’, and it is thus a collective CL. Similarly, when the CL *pian* occurs with *luobo* ‘carrot’, it denotes a part of a carrot and thus it is a partitive CL, as seen in (14b), but when it occurs with *shuye* ‘leaf’, as in (15a) below, it represents the natural unit of a leaf, and therefore it is an individual CL. Moreover, if the CL *pian* occurs with the mass noun *moutou* ‘wood’, as in (15b), it apportions the mass of wood, therefore it is an individuating CL. The two examples of the CL *duo* in (16) show the same point.

- (15) a. 三片樹葉
 san pian shuye [individual CL]
 three CL leaf
 ‘three leaves’
- b. 三片木頭
 san pian mutou [individuating CL]
 three CL wood
 ‘three pieces of wood’
- (16) a. 三朵花
 san duo hua [individual CL]
 three CL flower
 ‘three flowers’
- b. 三朵雲
 san duo yun [individuating CL]
 three CL cloud
 ‘three pieces of cloud’

In English, the CL *piece* is also ambiguous. It is an individuating CL in (17a), but a partitive CL in (17b) (see Lehrer 1986:115):

- (17) a. a piece of paper b. a piece of celery

The CL *ge* in Mandarin Chinese functions like a chameleon. This CL can be used as an individual CL, when it occurs with nouns with [+dimension], as seen in (18a); a kind CL, as in (18b), or an individuating CL, as in (18c) (adapted from Lü et al. 1999 [1980]:599), when it occurs with a noun denoting an immaterial notion. But it never occurs with a material-denoting mass noun, as seen in (18d). The acceptability of the former group, where *ge* occurs with a mass noun, indicates Chao's (1968:508-509) generalization that "Mass nouns do not take the individual classifier *g*" (sic.) is not accurate.⁶

- (18) a. 三根項鍊
 san ge xianglian
 three CL necklace
 'three necklaces'
- b. 世界上有兩個不同的民主。
 Shijie-shang you liang ge butong de minzhu.
 world-on have two CL different DE democracy
 'There are two kinds of democracy in the world.'

⁶ Many papers have been published on *ge*. See Myers (2000) for a review. The word *ge* in data like the following is also a CL, followed by a nominalized element (Öta 2003 [1958]:363, Chao 1968:320). The word *ta* here has been analyzed as an indefinite D-element in Lin & Zhang (2006):

(i) Zanmen wan ta (yi) ge tongkuai!
 we play it one CL satisfaction
 'Let's play as much as we like.'

Ge may also occur in other contexts in which no numeral may occur. *Ge* in such uses is thus not a unit word. For instance, it can occur to the left of an adjective, as in (ii-a); or to the left of negation, as in (ii-b) (Öta 1958:sec 21.4, Zhu 1982:49):

(ii) a. Akiu pǎo-le *(ge) kuài. b. Akiu xiào *(ge) bù-tíng.
 Akiu run-PRF GE fast Akiu laugh GE not-stop
 'Akiu ran fast.' 'Akiu laughed endlessly.'

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

In (iii), *ge* also rejects a numeral. In (iv), *ge* precedes a pronoun (Cheng & Sybesma 1999:538) or proper name (Öta 2003 [1958]:75; Cheng & Sybesma 1999:523).

(iii) Wo he (*yi) ge shuǐ jiu lái. (iv) Na *(ge) Hufei zhen bu xianghua.
 I drink one GE water then come that CL Hufei truly not decent
 'I'll come after I drink some water.' 'That Hufei is really unreasonable.'

However, examples like (iv) may show that the uses of pronouns and proper names have the syntax of common nouns (Öta 2003 [1958]:75; X. F. Zhang 2008:413; De Clercq 2008). The *ge* in (iv) is claimed to function as an indefinite determiner (see Wang 1989:110).

- c. 這一個 {情況/事故/辦法}
 zhe yi ge {qingkuang/shigu/banfa}
 this one CL situation/accident/method
 ‘this situation/accident/method’
- d. *三個 {油/紙/蒸汽/血/肉/布/錢/眼淚}
 *san ge {you/zhi/zhengqi/xie/rou/bu/qian/yanlei}
 three CL oil/paper/steam/blood/meat/cloth/money/tear

Unit words are for counting. In counting, there is no restriction to numerals. In my study, I do not consider words that may not be preceded by any numeral other than *yi* ‘one’, such as those in (19) (Chao 1968:603, Li & Thompson 1981:111). In such constructions, the word *yi* is probably not a numeral, since it can be replaced by the adjective *man* ‘full’ (Y. M. Li 2000:54), whereas real numerals cannot. The element following such a use of *yi* is analyzed as a noun instead of a CL in B. Li (2009) (more examples: 一頭大汗, 一腔熱血, 一肚子氣, 一地面粉).

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|---|--|
| <p>(19) a. {一/*三}身泥土
 {yi/*san} shen nitu
 one/three body mud
 ‘a bodyful of mud’</p> | <p>b. {一/*三}臉油
 {yi/*san} lian you
 one/three face oil
 ‘a faceful of oil’</p> |
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Summarizing, we have the following seven types of unit words in Mandarin Chinese:

- (20) a. Standard measure
 b. Container measure
 c. Individual CL
 d. Individuating CL
 e. Partitive CL
 f. Collective CL
 g. Kind CL

3. Semantic features of unit words in a contrastive relation

The first syntagmatic semantic relation of unit words to be studied is the contrastive relation between two unit words in a context.

Unit words can be focused and can bear contrastive stress (contra R. Yang 2001:63). The semantic features of different unit elements can be contrastive, when the units occur with the same noun. In (21a), for instance, the standard measure *gōngjīn* ‘kilo’ is in contrast to the standard measure *bàng* ‘pound’. In (21b), the container measure *wǎn* ‘bowl’ is in contrast to the container measure *sháo* ‘spoon’. In (21c), the individuating CL *juǎn* ‘roll’ is in contrast to the individuating CL *zhāng* ‘piece’.

- (21) a. 露露买了三公斤櫻桃，而不是三磅櫻桃。
Lùlù mǎi-le sān gōngjīn yīngtáo, ér bùshì sān bàng yīngtáo.
Lulu buy-PRF three kilo cherry but not three pound cherry
‘Lulu bought three kilos of cherries, not three pounds of cherries.’
- b. 露露喝了三碗湯，而不是三勺湯。
Lùlù hē-le sān wǎn tāng, ér bùshì sān sháo tāng.
Lulu drink-PRF three bowl soup but not three spoon soup
‘Lulu ate three bowls of soup, not three spoons of soup.’
- c. 露露拿了三卷紙，而不是三張紙。
Lùlù ná-le sān juǎn zhǐ ér bùshì sān zhāng zhǐ.
Lulu take-PRF three roll paper but not three CL paper
‘Lulu took three rolls of paper, not three pieces of paper.’
- d. 露露摘了三枝花，而不是三朵花。
Lulu zhāi-le sān zhī huā, ér bù shì sān duǒ huā.
Lulu pick-PRF three CL flower but not be three CL flower
‘Lulu picked up three flowers with stems, but not three flowers without stems.’
- e. 露露在桌上放了三堆郵票，而不是三套郵票。
Lulu zài zhuō-shàng fàng-le sān duī yóupiào, ér bù shì sān tào yóupiào.
Lulu at table-on put-PRF three pile stamp but not be three set stamp
‘Lulu put three piles of stamps on the table, not three sets of stamps.’

- f. 露露切了三塊蘿蔔，而不是三片蘿蔔。
 Lulu qie-le san kuai luobo, er bu shi san pian luobo.
 Lulu cut-PRF three CL carrot but not be three CL carrot
 ‘Lulu cut three chunks of carrot, not three slices of carrot.’
- g. 露露吃過三種巧克力，而不是三塊巧克力。
 Lulu chi-le san zhong qiaokeli, er bu shi san kuai qiaokeli.
 Lulu eat-EXP three kind chocolate but not be three CL chocolate
 ‘Lulu has eaten three kinds of chocolate, not three pieces of chocolate.’

All of these examples show that unit words have their own semantics. They are not purely functional, although they are regarded as nominal auxiliaries (Chao 1948, 1968:584; Z. Lu 1951:42) or numeral auxiliaries (Ōta 2003 [1958]:146).

4. Semantic features of unit words and the s-selection of verbs

The second syntagmatic semantic relation of unit words to be studied is the s-selection relation between a verb and a unit word of a counting construction.

The semantic features of unit elements can satisfy the s-selection of the verb that selects the counting construction, such as the verbs in (22a) and (22b).

- (22) a. 露露 {抬起了/*畫了} 三公斤櫻桃。
 Lùlù {táiqǐ-le / huà-le} sān gōngjīn yīngtáo.
 Lulu carry-PRF / draw-PRF three kilo cherry
 ‘Lulu {carried/*drew} three kilos of cherries.’
- b. 露露 {擦乾了/*儲存了} 三灘水。
 Lùlù {cā-gān-le / chǔcún-le} sān tān shuǐ.
 Lulu wipe-dry-PRF / store-PRF three CL water
 ‘Lulu {wiped/*stored} three puddles of water.’

One can carry kilos of cherries, or draw a picture of cherries, but not draw a picture of certain kilos of cherries. There is a semantic incompatibility between the verb *huà* ‘draw (pictures)’ and the measure term *gōngjīn* ‘kilo’, as seen in (22a). Likewise, one can wipe off puddles of water, or store bottles or jars of water, but not store puddles of water. There is also an incompatibility between the verb *chǔcún* ‘store’ and the CL *tān* ‘puddle’, as seen in (22b).

Projecting s-features from CLs is straightforward. The shape features of the whole complex nominals are projected from the CLs.

- (23) a. 一張紙
yī zhāng zhǐ
one CL_{piece} paper
'one piece of paper'
- b. 一捲紙
yī juǎn zhǐ
one CL_{roll} paper
'one roll of paper'
- (24) a. 一片冰
yī piàn bīng
one CL_{piece} ice
'one piece of ice'
- b. 一塊冰
yī kuài bīng
one CL_{chunk} ice
'one chunk of ice'

In (23) and (24), the NP denotes mass and thus has no shape features. The CL alone satisfies the s-selection of the context. As seen in (25), the CL *juan*, which denotes a unit in a roll-shape, satisfies the s-selection of the complex verb *ya-bian* 'press-flat', whereas the CL *zhang*, which denotes a flat-shape unit, does not.

- (25) a. 黛玉壓扁了一{*張/卷}紙。
Daiyu ya-bian-le yi {*zhang/juan} zhi. (*individuating/individuating CL)
Daiyu press-flat-PRF one cl/cl paper
'Daiyu pressed a {*piece/roll} of paper flat.'
- b. 鼻子流出了一{滴/*把}鼻涕。
Bizi liu-chu-le yi {di/*ba} biti. (individuating/*individuating CL)
Nose flow-out-PRF one CL/CL snot
'A drop of snot ran out of the nose.'
- c. 露露在數那一{疊/*張}鈔票。
Lulu zai shu na (yi) {die/*zhang} chaopiao. (collective/*individual CL)
Lulu PRG count that one CL/CL bill
'Lulu is counting that pile of money bills.'
- d. 露露在院子裡種了一{根/*截}蔥。
Lulu zai yuanzi-li zhong-le ji {gen/*jie} cong. (individual/*partitive CL)
Lulu at yard-in grow-PRF several CL/CL onion
'Lulu grows a few onions in the yard.'
- e. 距離有兩{站/*條}路。
Juli you liang {zhan/*tiao} lu. (partitive/*individual CL)
distance have CL/CL road
'The distance is as long as two {bus stops/roads}.'

- (26) a. 該團隊研發了三{種/*劑}新型感冒藥。
 Gai tuandui yanfa-le san {zhong/*ji} xin-xing ganmao-yao.
 (kind/individuating CL)
 That group invent-PRF three CL/CL new-type cold-medicine
 ‘That group invented three kinds of new type of cold medicine.’
- b. 露露吃光了三{*種/劑}新型感冒藥。
 Lulu chi-guang-le san {*zhong/ji} xin-xing ganmao-yao.
 Lulu eat-finish-PRF three CL/CL new-type cold-medicine
 ‘Lulu finished three doses of the new type of cold medicine.’
- (27) a. 眼睛慢慢的留下來一{滴/*灘}眼淚。
 Yanjing manmande liu-xialai yi {di/*tan} yanlei.
 (individuating/individuating CL)
 eye slowly flow-out one CL/CL tear
 ‘A drop of tear ran down from his eyes.’
- b. 路上積了一{*滴/灘}水。
 Lu-shang ji-le yi {*di/tan} shui.
 road-on accumulate-PRF one CL/CL water
 ‘A {*drop/puddle} of water has accumulated on the road.’

Again, unit words have their own semantics. The semantic function of such unit elements is more than a numerability-bearer.

5. Projecting s-features from container measure constructions

The third syntagmatic semantic relation of unit words to be studied is the competing or disjunction relation of different elements within a counting construction in s-feature projection.

5.1 The issue

The projection of the s-features of unit elements is not simple. When we consider container measure constructions, we confront some fundamental issues of the computation of language system.

Syntactic projection has been understood as representing the syntactic features, especially categorical-features (c-features), of a mother by those of the head daughter. The features of the non-head daughter play no role in the projection (Chomsky

1995:244, López 2001). This section clarifies a hitherto unclear issue: is it possible to project semantic features (s-features) from an element that is not a syntactic head? A positive answer and relevant constraints will be presented.

Not much work has been devoted to the projection of s-features. This is probably because of the assumption that “the only features accessible to the syntax are those that can affect syntactic processes, i.e., grammatical features but not ‘purely semantic features’” (Schütze 2001:128, following Emonds 1985). However, as we will see in this paper, identifying the mismatch between syntactic and s-feature projection will help us have a better understanding of the relation between syntax and semantics.

The Chinese examples in (28) through (30) all have a container measure nominal as internal argument. In the a-sentences, the verb s-selects the containee, whereas in the corresponding b-sentences, the verb s-selects the container (the elements that are in an s-selection relation are underlined). In (28a), for example, the verb *he* ‘drink’ s-selects an argument with a [+liquid] feature. *Ping* ‘bottle’ does not satisfy this selection, whereas *píjiu* ‘beer’ does. In contrast, in (28b), the verb *kai* ‘open’ s-selects an argument with a [-liquid] feature. *Ping* ‘bottle’ satisfies this selection, whereas *píjiu* ‘beer’ does not.

- (28) a. 寶玉喝了三瓶啤酒。
 Baoyu he-le san ping píjiu.
 Baoyu drink-PRF three bottle beer
 ‘Baoyu drank three bottles of beer.’
- b. 寶玉開了三瓶啤酒。
 Baoyu kai-le san ping píjiu.
 Baoyu open-PRF three bottle beer
 ‘Baoyu opened three bottles of beer.’
- (29) a. 寶玉釀了三瓶米酒。
 Baoyu niang-le san ping mi-jiu.
 Baoyu brew-PRF three bottle rice-wine
 ‘Baoyu brewed three bottles of rice-wine.’
- b. 寶玉密封了三瓶米酒。
 Baoyu mifeng-le san ping mi-jiu.
 Baoyu seal-PRF three bottle rice-wine
 ‘Baoyu sealed three bottles of rice-wine.’

- (30) a. 寶玉讀了三包報紙。
 Baoyu du-le san bao baozhi.
 Baoyu read-PRF three bag newspaper
 ‘Baoyu read three bags of newspaper.’
- b. 寶玉拆開了三包報紙。
 Baoyu chaikai-le san bao baozhi.
 Baoyu open-PRF three bag newspaper
 ‘Baoyu opened three bags of newspaper.’

The container measure constructions above have a containee reading in the a-sentences, but a container reading in the b-sentences.

As we know, the verb in such examples takes the whole counting construction, rather than either the container-denoting measure word or the containee-denoting noun, as its complement. The verb does not form a constituent with either the container measure or the containee-denoting noun. But the s-selection of the verb is satisfied by one of the two elements.

Since Selkirk (1977:310ff, also Akmajian & Lehre 1976), the contrast between the two readings of such a construction in English has been studied. (31a) and (32a) have a containee reading, whereas (31b) and (32b) have a container reading.

- (31) a. She drank a bottle of that good wine.
 b. She broke a bottle of that good wine.
- (32) a. A cup of sugar was strewn on the floor.
 b. A cup of sugar smashed on the floor.

Selkirk (1977), Akmajian & Lehre (1976), Corver (1998), and Rothstein (2009) all propose contrastive syntactic structures for the two readings of container measure constructions in English (also see Grimshaw 2007.). Their proposals are falsified in Zhang (2011a). As for the issue in Chinese, we have seen two analyses: Hsieh’s (2008) containee-as-container analyses and Li’s (2010) individual-quantity analysis.

5.2 The containee-as-container analyses

Hsieh (2008:51) claims that the head of a container measure construction is consistent, i.e., it is always the last noun. For example, in the containee reading of *san*

ping kele ‘three bottle coke’, *kele* ‘coke’ is the head, whereas in the container reading of this string, she claims that “when *ping* is used, *kele* ‘coke’ is considered to refer to the coke bottles and can thus be broken into pieces. In other words, it is marked with the [+solid] feature because the existence of *ping*.” In her analysis, *baozhi* ‘newspaper’ in (30b) should mean newspaper bags. Obviously, this analysis is ad hoc. Since *ping* also occurs in the containee reading of *san ping kele* ‘three bottle coke’, how can we make sure that in this case, the noun *kele* is not [+solid]? Moreover, if lexical items change their formal features when they are combined with other elements, the Inclusiveness constraint (Chomsky 1995) is violated. Furthermore, if *kele* in *san ping kele* ‘three bottle coke’ means coke bottles, bottles will be counted by the container measure *ping* ‘bottle’, however, bottles are never counted by *ping* ‘bottle’. Instead, they are counted by the CL *ge* or other bigger container measures such as *xiang* ‘box’.

5.3 The individual-quantity analysis

X. P. Li (2010), following Rothstein (2009), correlates the container reading with an individual reading, which is assumed to have a right-branching structure, and correlates the containee reading with a quantity reading, which is assumed to have a left-branching structure. However, our following examples show that the two correlations are not justified. In the two examples in (33), *shi ping jiu* ‘ten bottle wine’ has a containee reading, and the word *zuzu* ‘as much as’ provides a quantity context in (33a), and thus a quantity reading is available. In X. P. Li’s approach, the expression has a left-branching structure. However, the reduplicate form of *ping-ping* ‘bottle-bottle’ provides an individual context (X. P. Li 2010:115) in (33b) and thus *shi ping jiu* should have an individual reading. Likewise, container reading of *shi ping jiu* in (34) can have either a quantity reading, as in (34a), or individual reading, as in (34b).

- (33) a. 武松足足喝了十瓶酒。
 Wusong zuzu he-le shi ping jiu. [Containee, quantity]
 Wusong as.much.as drink-PRF ten bottle wine
 ‘Wusong drank as much as ten bottles of wine.’
- b. 武松喝了十瓶酒，瓶瓶都很苦。
 Wusong he-le shi ping jiu, ping-ping dou hen ku.[Containee, individual]
 Wusong drink-PRF ten bottle wine bottle-bottle all very bitter
 ‘Wusong drank ten bottles of wine, and every bottle was very bitter.’

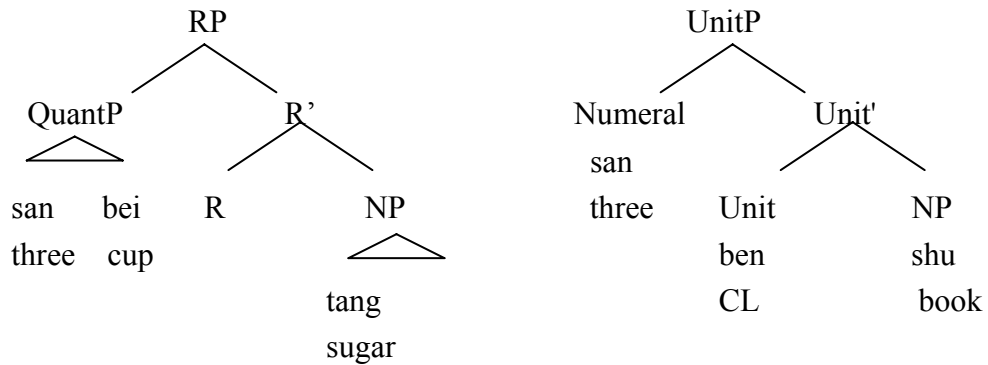
- (34) a. 武松拎來了足足十瓶酒。
 Wusong lin-lai-le zuzu shi ping jiu. [Container, quantity]
 Wusong bring-come-PRF as.much.as ten bottle wine
 ‘Wusong brought as many as ten bottles of wine.’
- b. 武松打碎了十瓶酒，瓶瓶都很滿。
 Wusong dasui-le shi ping jiu, ping-ping dou hen man.[Container, individual]
 Wusong break-PRF ten bottle wine bottle-bottle all very full
 ‘Wusong broke ten bottles of wine, and every bottle was very full.’

The discussion in this subsection shows that the two contrasts are independent each other: container vs. containee reading, and quantity vs. individual reading.

5.4 Projecting s-features from the same structure

I have argued in Zhang (2011b) that the left-branching configuration in (35a) is the structure of container measure constructions, while the right-branching configuration in (35b) is the structure of the constructions of individual CLs such as *ben* (for books) and individuating CLs such as *di* (for liquid), in the language.

- (35) a. Container measure construction b. individual & individuating CL construction



One argument for the left-branching structure of container measure constructions is related to the scope of a pre-measure modifier. Two incompatible modifiers may co-occur if they scope over different constituents. In each of the two examples in (36), the pre-measure modifier occurs with an incompatible modifier to the left the containee NP:

- (36) a. 露露吃了五大籃小櫻桃。
 Lulu chi-le wu da lan xiao yingtao. [containeer]
 Lulu eat-PRF five big basket small cherry
 ‘Lulu ate five big baskets of small cherries.’
- b. 露露推倒了五大籃小櫻桃。
 Lulu tui-dao-le wu da lan xiao yingtao. [container]
 Lulu push-fall-PRF five big basket small cherry
 ‘Lulu pushed down five big baskets of small cherries.’

The acceptability of this type of data indicates that the scope of the pre-measure modifier excludes the containee NP, which has its own modifier. This fact shows that there is a constituent boundary between the container measure and the containee NP, regardless of the container or containee reading. In the two structures in (35), it is (35a), but not (35b), that captures the fact that the modifier of the unit word does not c-command the containee NP.

Unlike the container measure constructions in (36), constructions of another type of unit words may not have incompatible modifiers, as seen in (37). The unit word is the CL *li* in (37). When this CL is modified by *da* ‘big’, as in (37a), the noun may not be modified by the antonym *xiao* ‘small’, although another modifier *bai* ‘white’ is fine, as seen in (37b).

- (37) a. *五大粒小櫻桃
 *wu da li xiao yingtao
 five big CL small cherry
- b. 五大粒白櫻桃
 wu da li bai yingtao
 five big CL white cherry
 ‘five big white cherries’

The structure in (35b) may capture the contrast in (37). A pre-CL adjective is hosted in a functional projection that dominates UnitP. So the pre-CL *da* ‘big’ in (37) must c-command *xiao* ‘small’ in (37a) or *bai* ‘white’ in (37b). A semantic conflict occurs in the former, but not in the latter.

If the contrast between the containee reading and the container reading of a container measure construction is neither a contrast in syntactic structure nor a contrast in the lexical semantics of a certain word in the construction, what is the nature of the contrast? It is clear that the s-features of the whole nominal are those of

the containee in the containee reading, but are those of the container in the container reading. I thus claim that the contrast is related to the s-feature projection.

In each container measure construction, there are only two s-feature holders, the containee noun and the container measure. It must be the case that the s-features of either element are projected to the whole complex nominal, so that the nominal can satisfy the selectional restriction of the relevant verb or predicate. We have shown that the structure in (35a) can be a possible structure for such a construction in Chinese. In these structures, the containee noun and the container measure are also hosted in the two daughters of a certain node (RP in (35a)). In fact, in all other structures proposed in the literature, the containee noun and the container measure are hosted in the two daughters of a certain node, respectively. We know that in every binary branching structure there is only one syntactic head. If s-features can be projected from either the container measure or the containee noun, we see that s-features may be projected from an element that is not a syntactic head (This also covers the s-feature projection in the data in Section 4).

5.5 Two separate routes of s-feature projection

Generally, s-features are projected from the syntactic head exclusively. In (38), for instance, the semantic features of *whale*, which is not the head of the nominal *whale milk*, are not projected, and thus the selectional restriction of *drinks* is satisfied by the s-feature [+liquid] of *milk*, and the feature [-liquid] of *whale* does not affect the computation.

(38) Henry drinks [whale milk].

In contrast to this situation, one situation in which s-features are projected from the non-head element exclusively has been recognized in the literature. This is the case when the head is not specified with the relevant features, especially when the head is a functional category. Let us look at four specific cases.

Simple DP

In a simple DP headed by a determiner, the s-features of the complement are projected (Cowper 1987:330). In (39), the head of the object DP is *the*. However, it is the s-features of the NP *beer* (i.e., [+liquid]) that are projected to the whole DP, satisfying the s-selection of the verb *drank*. The D-head *the* has no relevant s-features.

(39) Henry drank the beer.

This issue is discussed in Jackendoff (1968:431-432). Here are his examples:

(40) a. I proved {the theorem/*the boy}

b. I socked {*the theorem/the boy}

(41) a. I proved {some of the theorem/*some of the boy}

b. I socked {*some of the theorem/some of the boy}

(42) a. I proved {a bunch of theorems/*a bunch of boys}

b. I socked {*a bunch of theorems/a bunch of boys}

In all of these examples, only the noun *theorem* or *boy* is specified with the semantic features that are selected by the verb.

Jackendoff uses these examples to show that if one insists that only the s-features of the head be projected, the noun *theorem* or *boy* should be analyzed as the head of all of the object nominals in (40) through (42). However, such an analysis is “unnatural for other reasons” (p. 432). Our current theory of the syntactic structures of nominals also rules out the syntactic head status of the two nouns in these examples. Jackendoff thus claims that “selectional restrictions are not applied to only the head noun of a noun phrase. Instead, the selection is performed on the basis of the semantic reading of the entire noun phrase” (p. 432). The same conclusion is also found in McCawley (1968:134). We can see that it is s-features, rather than c-features, that are the issue here.

Possessive DP

In a possessive DP, the s-features of the possessee NP are projected, although the NP is not the syntactic head of the DP. In (43), the possessee NP *beer* satisfies the s-selection of the verb *drank*. The D head of the DP has no relevant s-features (i.e. [+/-liquid]).

(43) Henry drank Mary’s beer.

Degree Phrase

In a Degree Phrase, the head is a degree word and its complement is an AP (or AdvP). It is the s-features of the AP that are projected. For instance, the verb *feel* s-selects an element that denotes a stage-level state. In (44), the requirement is satisfied by the AP *tired*, not the degree head element *very*, which has no relevant s-features.

(44) Henry felt [very tired].

Modification Construction

McCawley (1968:133) discusses the following three examples:

- (45) a. *My *buxom* neighbor is the father of two.
 b. *My sister is the father of two.
 c. My neighbor is the father of two.

(45a) violates the same selectional restriction as does (45b), but the violation of the selectional restriction in (45a) has nothing to do with the head noun *neighbor*, since (45c) contains no selectional violation. In this case, it is the semantic features of the modifier *buxom* rather than those of the head that violate the selectional restriction of the predicate *is the father of two*. We can see that the head noun *neighbor* is not specified with a gender feature, and thus it must be the case that the feminine feature of the modifier *buxom* is projected to the whole subject nominal.

Cowper's (1987) convention

In all of the cases discussed in 4.1 through 4.4, s-features are projected from an element whose sister has no relevant s-features, or underspecified with the relevant features. This kind of feature projection is predicted to be possible in Cowper's (1987:324) following convention:

- (46) In a structure $[\alpha \beta\gamma]$, or $[\alpha \gamma\beta]$, α projection of β , features from γ will percolate to α iff β is not specified for those features.

Cowper does not restrict her convention to syntactic features, since she mentions

(p. 330) that in the phrase *the dog*, the features [+animate], [-human], etc., of the NP *dog* are percolated to DP, simply because the D head *the* is not specified for these features.

In this section, we have seen that s-features are projected from either the syntactic head exclusively, as in (38), or the non-head element exclusively, as in (39) through (45a). The two possible projecting routes show the general availability of the two ways of s-feature projection.

However, container measure constructions are special, as pointed out by Akmajian & Lehrer (1976:406), in the fact that the container-denoting element and the containee-denoting element have conflict semantic features (e.g. [-liquid] vs. [+liquid]), with respect to the selecting verbs. Since such constructions are acceptable in both a container and containee readings, I claim, s-features must be projected from either the head or the non-head sister. It is clear that the convention in (46) is not applicable to container measure constructions, in which both sisters of the structure host relevant s-features.

This is in contrast to the projection of syntactic features. C-features may not be projected from non-head sisters (Chomsky 1995:244). Similarly, Cole et al. (1993:110) show the impossibility of syntactic feature projection from complements in reflexive binding, and citing Harbert (1990), they also show the impossibility for wh-features to be projected from complements of verbs (p. 111). Likewise, López (2001) demonstrates the impossibility for Case features and theta-features to be projected from complements. Cole et al. (1993:110, 113 fn.2) propose a feature percolation condition on syntactic features: “No feature can be percolated out of a lexical complement structure.” Brody (1998) calls the principle that a projection inherits all the properties of its head and nothing else Principle of Uniqueness.

6. Distributed projection of s-features

The fourth syntagmatic semantic relation of unit words to be studied is the parallel relation of different elements of a counting construction with elements external to the counting construction.

If s-features can be projected from either the syntactic head or the syntactic non-head element, it is possible that the two sets of s-features may be projected at the same time. Two s-features in contradiction may also be both projected if they are not in a syntagmatic relation with the same element. We explore this possibility in examples such as (47).

- (47) 露露吃了多麼大的一碗小櫻桃？
 Lulu chi-le duome da de yi wan xiao yingtao?
 Lulu eat-PRF how big DE one bowl small cherry
 ‘How big bowl of small cherries did Lulu eat?’

In (47), the verb *chi* ‘eat’ selects *xiao yingtao* ‘small cherry’, rather than the container measure *wan* ‘bowl’. But the wh-question is targeted at the dimension feature of the container measure, since the speaker asks the size of the bowl, rather than the size of cherries. We can see that the semantic features of both the container and the containee are active. Both sets of features are in construal with other elements in the construction, but not with the same element. The features of the unit word establish a dependency with the question word *duome da* ‘how big’, whereas the features of the containee nominal *xiao yingtao* ‘small cherry’ establish a dependency with the transitive verb *chi* ‘eat’.

Now we consider collective CL constructions.

- (48) a. 這一排小汽車太長了。
 Zhe yi pai [xiao qiche]_i tai gui le.
 this one row small car too expensive PRT
 A: ‘Each of the cars in this row is expensive.’ (distributive)
 B: ‘The total cost of this row of cars is expensive.’ (collective)
- b. 這一排小汽車太長了。開走幾輛吧！
 Zhe yi pai [xiao qiche]_i tai chang le. Kai-zou ji liang _i ba!
 this one row small car too long PRT drive-away several CL PRT
 ‘This row of small cars is too long. Drive some of them away!’

(48a) is ambiguous. In Reading A, the predicate *tai gui le* ‘too expensive PRT’ is the semantic predicate of the nominal *zhe yi pai xiao qiche* ‘this one row of cars’ in its distributive reading. In Reading B, the predicate *tai gui le* is the semantic predicate of the nominal *zhe yi pai xiao qiche* in its collective reading. This example is used here just to show the two possible readings of the nominal. Now, let us examine (48b). In this example, the predicate *tai chang le* ‘too long PRT’ is the semantic predicate of *zhe yi pai xiao qiche* ‘this one row of cars’ in its collective reading. The speaker complains about the length of the row of the cars, not the length of the individual cars. Only the semantic features of the collective CL *pai* are active. But the empty element to the right of the CL *liang* is co-indexed with *xiao qiche*, since the CL s-selects *qiche* ‘car’, rather than the unit word *pai* ‘row’. Also, the transitive verb *kai* ‘drive’ s-selects

cars rather than any unit word. The speaker asks the hearer to drive away a few cars, not a few rows of cars. We can see that the semantic features of the collective CL *pai* are not active here. Considering the whole example, for the nominal *zhe yi pai xiao qiche*, the semantic features of both the unit word and its associated nominal are active. Both sets of features are in construal with other elements in the construction, but not the same element, though. The features of the unit word establish a dependency with the predicate *tai chang le*, whereas the features of nominal *xiao qiche* ‘small car’ establish a dependency with the CL *liang* and the transitive verb *kai* ‘drive’.

If the s-features of both a syntactic head and a non-head element are projected at the same time, we see a pattern of distributed projection of s-features.

7. Theoretical discussion

We have shown that first, s-features can be projected from either a syntactic head or a non-head element, and second, s-features can be projected from both a syntactic head and a non-head element at the same time.

As shown by the literature cited before, this kind of flexibility is banned for syntactic features. The ban is also seen in Cole et al.’s (1993:90) following principle:

- (49) If the features of the daughter nodes conflict, the mother node will have the features of the head nodes.

Cole et al. (1993:113 fn 2) are careful in stating that this principle is for syntactic features, and they clearly indicate that they do not discuss non-syntactic features. We now can clarify that (49) does not work for semantic features, as seen in container measure constructions (Section 5) and collective CL constructions (Section 6). In both constructions, if the s-features of two daughters conflict, the s-features of the mother may be either those of the syntactic head or those of the non-head.

S-feature projection from a non-head element is independently observed, as shown in Section 5.5. Our claim that in container measure constructions and the collective CL construction, s-features are projected from a non-head element adds no new stipulation to our theory.

The discovery that s-features may be projected from either a syntactic head or a non-head element helps us to see a difference between the projection of syntactic features and the projection of s-features: they do not have to be projected from the same element. A mismatch is possible.

8. Summary

Empirically, this study has explored various syntagmatic semantic relations of the elements of counting constructions: the contrastive relation between two unit words in a context, the s-selection relation between a verb and a unit word of a counting construction, the competing or disjunction relation of different elements within a counting construction in s-feature projection, and the parallel relation of different elements of a counting construction with elements external to the counting construction.

Theoretically, this study has shown first, how unit words semantically interact with other elements in the structure, and second, how the two possible ways of s-feature projection reveal more about feature projection, and how s-feature projection is different from syntactic feature projection: they may be projected from different elements. This study is an endeavor to explore possible mismatches between syntax and semantics.

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從組合關係看數量結構單位詞的語意特徵

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本研究探討漢語普通話數量結構中單位詞的組合性語意關係。共討論了四種結構關係：對比關係；動詞與數量結構的選擇性關係；數量結構中兩個對立成分在語意投射上的競爭或排斥性關係；數量結構中兩個成分與結構外某成分的平行性依賴關係。

關鍵詞：漢語普通話，量詞，特徵投射，選擇性關係，語意特徵，單位詞

