



Numeral classifiers in Mandarin Chinese: lexical or functional?

Yufeng Ruan

Nankai University (<yufeng.ruan@nankai.edu.cn>)

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Abstract:

Despite having been a classic research topic for over 300 years (Gao and Liu 2020: 136), the fundamental issue of whether numeral classifiers (Cls for short) in Mandarin Chinese belong to a lexical or functional category still remains controversial. To address this issue, this paper presents arguments from diachronic, syntactic, semantic, cognitive, and experimental perspectives. On one hand, Mandarin Chinese Cls exhibit lexical properties, as evidenced by their semantic selection restrictions in relation to nouns. On the other hand, they also display functional properties, supported by arguments such as their grammaticalization, their substitution by the general Cl *ge*, and their syntactic analogy with auxiliary verbs. Furthermore, Mandarin Chinese Cls are predominantly functional, as demonstrated by three supporting arguments from diachronic, cognitive, and experimental perspectives. Additionally, this paper also addresses the question of whether Individual Cls, compared to other types of Cls, offer a very limited semantic space for the whole nominal phrase.

Keywords: Numeral Classifiers, Mandarin Chinese, Categories, Individual Classifiers, Kind Classifiers

1. Introduction

Numeral classifiers (Cls for short) in Mandarin Chinese, such as *ben* ‘volume’ and *di* ‘drop’ shown in (1), have been a classic research topic for over 300 years, with the earliest study dating back to 1653 (Gao and Liu 2020: 136). Despite this long history, their categorical identity – whether they belong to a lexical or functional category – remains contentious. The prevailing view generally considers Mandarin Chinese Cls as lexical items (e.g., J. Li 1924; Wang 1943; Lü 1953; Zhang 1953; Lu 1956; Chao 1968; Zhu 1982; Ma 1990), while the generative grammar approach usually defaults to viewing them as functional elements (e.g., Cheng and Sybesma 1999; Cheng, Yang and An 2015; Yang 2017).

- (1) a. *san ben shu*
 three CL_{volume} book
 ‘three books’
 b. *si di shui*
 four CL_{drop} water
 ‘four drops of water’

Mainstream research tends to be traditional and often lacks a theoretical framework, while studies within generative grammar are theoretically grounded but rarely provide arguments for the functionality of Mandarin Chinese Cls (except for An and Cheng 2011), just as An, Wu and Cheng (2016: 2-3) describe: “Generative grammar research has established their syntactic structures without analyzing their properties.”

Therefore, we argue that the categorical status of Mandarin Chinese Cls lacks a systematic argumentation within a theoretical framework. This paper aims to address this gap by offering a comprehensive analysis based on generative grammar (Chomsky 1964, 1995, 2000) and from multiple perspectives, including diachronic, syntactic, semantic, cognitive, and experimental, in order to answer the following questions: 1. Do Mandarin Chinese Cls have a lexical property? 2. Do Mandarin Chinese Cls have a functional property? 3. If Mandarin Chinese Cls possess both lexical and functional properties, which one is predominant?

Before delving into the research, we will briefly review the classification of Mandarin Chinese Cls. This paper adopts the classification scheme proposed by Ruan (2018), who categorizes Mandarin Chinese Cls into seven types: Kind Cls, Individual Cls, Collective Cls, Partitive Cls, Container Cls, Standard Cls, and Individuating Cls. Unlike the existing literature (e.g., Chao 1968; N. Zhang 2013), this classification presents a hierarchical and dynamic system in which Kind Cls are considered parallel to the other six types, as illustrated in Figure 1. This parallel relationship emphasizes the distinctiveness of Kind Cls in semantics and syntax. Furthermore, this system has been established in consideration of the syntactic contrast between Individual Cls and Non-individual Cls, namely between Sortal Cls and Mass Cls/Massifiers, adopting the terminology of Cheng and Sybesma (2012).

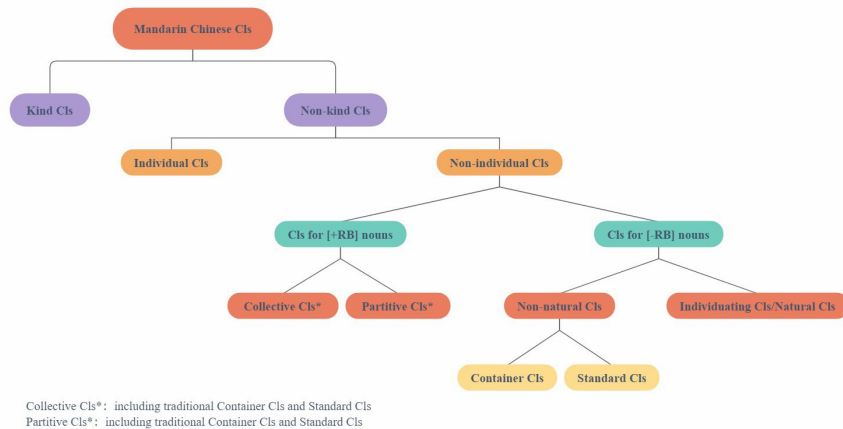


Figure 1. Classification of Numeral Classifiers in Mandarin Chinese

Additionally, we will introduce in this paper the concept of quantifying boundaries, which are linguistically encoded as Cls. Although this concept has been mentioned in the literature, it has not received sufficient attention.

This paper is organized as follows: Section 2 presents arguments in favor of the lexuality of Mandarin Chinese Cls. Section 3 provides evidence for their functional property. Based on these discussions, Section 4 explores whether Mandarin Chinese Cls are primarily lexical or functional. The final section presents our conclusions.

2. Lexical arguments

In the literature, many studies (e.g., Shao 1993; N. Zhang 2013; X. Li 2013) have noticed that there is a semantic selection between Mandarin Cls and nouns they combine with. This clearly says that Cls have a lexical meaning. Next, we will concentrate on this semantic selection. We will examine the cases where a single Cl selects multiple nouns and where a single noun selects multiple Cls. For the latter, we will further differentiate between cases where a noun selects various types of Cls and where a noun selects multiple Cls of the same type. Unlike previous studies, we will specifically discuss Kind Cls due to their distinctiveness (see Ruan 2018), after analyzing the semantic selection between Non-kind Cls and nouns.

2.1 Semantic selection between Non-kind Cls and nouns

2.1.1 One Cl in combination with many nouns

Non-kind Cls in Mandarin, i.e., Individual Cls, Collective Cls, Partitive Cls, Container Cls, Standard Cls, and Individuating Cls, select different nouns, but not all of them, as shown in (2a) through (2f), respectively.

(2)	a.	<i>san</i> three	<i>ben</i> CL _{volume}	<i>shu/zazhi/*xiangjiao</i> book/magazine/banana	Individual Cls
		‘three books/magazines/uninterpretable’			
	b.	<i>san</i> three	<i>pai</i> CL _{row}	<i>zhuozhi/xuesheng/*shui</i> ¹ table/student/water	Collective Cls
		‘three rows of tables/students/uninterpretable’			
	c.	<i>san</i> three	<i>duan</i> CL _{section}	<i>shengzi/kewen/*guojia</i> rope/text/country	Partitive Cls
		‘three sections ² of rope/text/uninterpretable’			
	d.	<i>san</i> three	<i>wan</i> CL _{bowl}	<i>shui/niunai/*jianyi</i> water/milk/suggestion	Container Cls
		‘three bowls of water/milk/uninterpretable’			
	e.	<i>san</i> many	<i>gongjin</i> CL _{kilo}	<i>pingguo/youl/*yijian</i> apple/oil/opinion	Standard Cls
		‘many kilos of apples/oil/uninterpretable’			

¹ The Cl *pai* ‘row’ cannot combine with the noun *shui* ‘water’ unless the latter undergoes the Universal Package operation.

² The translation ‘section’ here has more than the meaning of the English word *part*, so it is not possible to match *duan* ‘section’ with *guojia* ‘country’.

f.	<i>san</i> three	<i>di</i> CL _{drop}	<i>shui/niunai/*shu</i> water/milk/book	Individuating Cls
	'three drops of water/milk/uninterpretable'			

In other words, these six types of Cls in Mandarin are subject to combining with a subset of nouns,³ which implies that they have the ability of semantic selection on nouns. This demonstrates in turn that these types of Cls are lexical (regardless of partially or totally). Otherwise, if they were completely functional, they would be able to combine with all nouns, as well as, for example, the English word *the*, which is treated as a functional word.

2.1.2 One noun in combination with many Cls

The cases where a single noun occurs with various Cls can be sorted into two situations: one is where the same noun occurs with different types of Cls, as illustrated in (3) and (4); the other is where the same noun selects various Cls within the same type, as shown in (5) and (6).

2.1.2.1 One noun in combination with different types of Cls

(3)	a.	<i>yi</i> one 'one book'	<i>ben</i> CL _{volume}	<i>shu</i> book	Individual Cls
	b.	<i>yi</i> one 'one pile of books'	<i>dui</i> CL _{pile}	<i>shu</i> book	Collective Cls
	c.	<i>yi</i> one 'one page of book'	<i>ye</i> CL _{page}	<i>shu</i> book	Partitive Cls
	d.	<i>yi</i> one 'one box of books'	<i>xiang</i> CL _{box}	<i>shu</i> book	Container Cls
	e.	<i>yi</i> one 'one kilo of books'	<i>gongjin</i> CL _{kilo}	<i>shu</i> book	Standard Cls
(4)	a.	<i>yi</i> one 'one drop of oil'	<i>di</i> CL _{drop}	<i>you</i> oil	Individuating Cls
	b.	<i>yi</i> one 'one bottle of oil'	<i>ping</i> CL _{bottle}	<i>you</i> oil	Container Cls
	c.	<i>yi</i> one 'one gram of oil'	<i>ke</i> CL _{gram}	<i>you</i> oil	Standard Cls

The obvious contrast in terms of interpretation shown by (3) entails that the five Cls are different in meaning, even if one of them is without meaning, i.e., having a pure functional

³ Here 'nouns' refer to quantifiable nouns. Ruan (2018) has noticed that not all of Mandarin Chinese nouns are quantifiable.

feature. As native speakers, our linguistic intuition says that they do have a distinct reading from each other. The same is true of (4).

This viewpoint is compatible with Wu and Bodomo (2009: 488), who have confirmed the content feature of Mandarin Cls. In addition, on this content feature, they have asserted that “meaningfulness can be said to be one of the defining properties of classifiers”. However, to reply to this “defining” aspect of Cls, we would say no, as would Cheng and Sybesma (2012: 637). According to us, although the feature of “meaningfulness” really exists, it is not the decisive one among all features of Cls (see Section 4 for why).

2.1.2.2 One noun in combination with different Cls of the same type

Now we move on to looking into (5).

(5)	a.	<i>yi</i> one	<i>ben</i> CL _{volume}	<i>shu</i> book	Individual Cls
		'one book (in regular shape)'			
	b.	<i>yi</i> one	<i>juan</i> CL _{roll}	<i>shu</i> book	
		'one book (in the ancient roll form)'			
	c.	<i>liang</i> two	<i>dui</i> CL _{pile}	<i>shu</i> book	Collective Cls
		'two piles of books'			
	d.	<i>liang</i> two	<i>pai</i> CL _{row}	<i>shu</i> book	
		'two rows of books'			
	e.	<i>san</i> three	<i>pian</i> CL _{slice}	<i>huluobo</i> carrot	Partitive Cls
		[']three slices of carrot'			
	f.	<i>san</i> three	<i>kuai</i> CL _{chunk}	<i>huluobo</i> carrot	
		'three chunks of carrot'			
	g.	<i>si</i> four	<i>ping</i> CL _{bottle}	<i>shui</i> water	Container Cls
		'four bottles of water'			
	h.	<i>si</i> four	<i>wan</i> CL _{bowl}	<i>shui</i> water	
		'four bowls of water'			
	i.	<i>wu</i> five	<i>mi</i> CL _{meter}	<i>shengzi</i> rope	Standard Cls
		'five meters of rope'			
	j.	<i>wu</i> five	<i>limi</i> CL _{centimeter}	<i>shengzi</i> rope	
		'five centimeters of rope'			
	k.	<i>liu</i> six	<i>duo</i> CL	<i>yun</i> cloud	Individuating Cl
		'six 3-D units of cloud'			
	l.	<i>liu</i> six	<i>pian</i> CL _{piece}	<i>yun</i> cloud	
		'six 2-D pieces of cloud'			

In (5c)-(5d), different Collective Cls are used, which generate two different meanings. Therefore, it clearly shows that Collective Cls possess a lexical meaning. The same is true of Individual, Collective, Container, Standard, and Individuating Cls. (5) shows that Mandarin Cls⁴ have a lexical property.

This is partially in congruence with Cheng and Sybesma's (2012: 637) standpoint, in the sense that we also suggest that all Mandarin Cls have "a lexical aspect", including Individual ones⁵. However, we do not believe that Individual Cls, compared to other types⁶, are distinct in providing a very little space for the semantics of the entire phrase. Our argument is that there is a clear difference in meaning between the Individual Cls *ben* 'volume' and *juan* 'roll' (as shown in (5a) and (5b)), just like the difference between the Collective Cls *dui* 'pile' and *pai* 'row' (as shown in (5c) and (5d)). The Individual Cl *ben* 'volume' denotes a regular shape, whereas the Individual Cl *juan* 'roll' represents an ancient roll form.

In addition, there are other minimal pairs of Individual Cls, as shown in (6). The Individual Cl *zhi* 'stalk' describes the entire shape of a flower, whereas the Individual Cl *duo* focuses only on the shape of the blossom, as illustrated in (6a) and (6b). The more interesting case is (6c)-(6e). At first glance, it seems that there is no interpretational contrast between the Individual Cls *tou* 'head', *kou* 'mouth', and *zhi* that serve the same noun *zhu* 'pig'. However, the contrast really exists.

(6)	a.	<i>liang</i> two	<i>zhi</i> CL _{stalk}	<i>hua</i> flower	Individual Cls
		'two flowers on their stalks'			
	b.	<i>liang</i> two	<i>duo</i> CL	<i>hua</i> flower	
		'two flowers (not focusing on the stalks)'			
		(N. Zhang 2013: 132)			
	c.	<i>yi</i> one	<i>tou</i> CL _{head}	<i>zhu</i> pig	Individual Cls
		'one pig'			
	d.	<i>yi</i> one	CL _{mouth}	<i>kou</i> pig	<i>zhu</i>
		'one pig'			
	e.	<i>yi</i> one	<i>zhi</i> CL	<i>zhu</i> pig	
	'one pig'				
	(Ruan 2023a; Ruan 2023b)				

According to Zhen (2007: 124), the Cl *tou* 'head' is the original specific Cl for *zhu* 'pig'. The Cl *kou* 'mouth', which originally occurred with the noun *ren* 'person', has been extended to apply to the noun *zhu* 'pig', emphasizing the importance of pigs for family wealth. According to H. Zhang (2011: 29-31), *zhi*, can modify not only biological pigs but also non-biological ones, such as those depicted in cartoons. Based on diachronic analysis and corpus data, Ruan

⁴ Kind Cls are also lexical, see Section 2.2.

⁵ Sortal Cls in Cheng and Sybesma's terminology.

⁶ In fact, Cheng and Sybesma (2012: 636-637) did not discuss every type of Cl in terms of semantics, but only briefly mentioned them.

(2023a; 2023b) finds that the Cl *tou* ‘head’ is typically used as counting units for the noun *zhu* ‘pig’, whereas *zhi*⁷ carries the semantic features [+cute, +nimble], and *kou* ‘mouth’ highlights the economic importance of pigs for human beings. However, with China’s economic development and improved living standards, the use of the Cl *kou* ‘mouth’ has declined significantly.

In fact, this semantic difference of various Individual Cls for the same noun is also supported by others, such as Her (2012: 1217), who argues that different Individual Cls may focus on various properties or perspectives of the same entity denoted by the relevant noun. Additionally, as for the nature of the semantics denoted by Individual Cls, linguists such as Her and Hsieh (2010), Cheng and Sybesma (1998; 1999; 2012) have stated that Individual Cls denote the inherent semantics of their related nouns.

Therefore, we maintain that Individual Cls, even like the other five types, make a significant semantic contribution to the nouns they modify. Furthermore, from a cognitive perspective, Individual Cls, like the other five types of Cls, display what quantifying boundaries look like for the referents of the nouns they combine with.

In conclusion, based on the restricted semantic selection between Cls and nouns, we propose that Mandarin Cls – excluding Kind Cls, which include Individual Cls, Collective Cls, Partitive Cls, Container Cls, Standard Cls, and Individuating Cls – have semantic content. In other words, they possess a lexical property.

2.2. Semantic selection between Kind Cls and nouns

In Mandarin, there is a special type of Cls called Kind Cls. Unlike the other six types of Cls, they can combine with all nouns, as illustrated in (7a). Although Kind Cls cannot be proven to have a lexical meaning through their co-occurrence with multiple nouns, insights into their lexical property can be gained by comparing them with the general Cl *ge*.

- (7) a. *san* *zhong* *shu/shui/xiangfa*...
 three CL_{kind} book/water/idea/...
 ‘three kinds of books/water/ideas’
- b. *san* *ge* *shu/shui/xiangfa*...
 three CL-General book/water/idea/...
 ‘three books/(bottles of) water/ideas’

The semantic contrast between (7a) and (7b) derives from the different Cls: the Kind Cl *zhong* and the general Cl *ge*. Since the latter is generally considered a functional element that has lost its lexical meaning (e.g., Jin and Chen 2002: 8), it can be deduced that Kind Cls have a lexical property.

3. Functional arguments

We begin by introducing five criteria for identifying a functional element proposed by Abenay (1987: 64-65):

1. Functional elements constitute closed classes; 2. Functional elements lack “descriptive content”. Their semantic contribution is second-order, regulating or contributing to the interpretation of their complement. They mark grammatical or relational features, rather than picking out a class of objects; 3.

⁷This Cl is not translatable, it mainly denotes the shape of animals (see H. Zhang 2011: 30).

Functional elements permit only one complement, which is, in general, not an argument. The arguments are CP, PP, and DP. Functional elements select IP, VP, NP; 4. Functional elements are usually inseparable from their complement; 5. Functional elements are generally phonologically or morphologically dependent. They are generally stressless, often affixes or clitics, and sometimes even phonologically null.

It should be noted that, unlike X. Li (2013), who tested the [\pm function] feature of Cls against each criterion one by one, we select only those criteria that are of particular interest to us. After all, not all criteria need to be met for a Cl to be considered functional. In addition, other methods may also be used to verify whether a Cl is functional.

Next, we provide four arguments in favor of the claim that Mandarin Cls have a functional property. The first two arguments pertain to grammaticalization (Section 3.1), the third regards substitution (Section 3.2), and the fourth concerns the analogy between Cls and verbal auxiliary (Section 3.3).

3.1 Grammaticalization from nouns to Cls

Grammaticalization is widely understood as the process by which a linguistic element gradually loses lexical properties and acquires functional properties, eventually becoming fully functional (e.g., Shen 1994). This process indicates the development of functional features ([\pm function]), and we can demonstrate the functionality of Cls through grammaticalization.

To attest grammaticalization effortlessly, we focus on the reduction of lexical features rather than the increase of functional features, as the former is more easily observable. To verify lexical features effectively, we first investigate Container Cls, as they are particularly distinct from other types of Cls (except Kind Cls) due to their clear derivation from nouns. This suggests that Container Cls typically possess a [\pm N] feature (unless they are fully functional⁸), making them a representative example of Cls with a lexical feature.

3.1.1 Grammaticalization from nouns to Container Cls

We begin by observing some instances in (8), adapted from X. Li (2013: 25), ex. (16).

(8)	a.	<i>yi</i> one 'one bottle of water'	<i>ping</i> CL _{bottle}	<i>shui</i> water	<i>ping</i> as CL
	b.	<i>yi</i> one Intended: 'one bottle'	<i>*(ge)</i> CL-General	<i>ping</i> bottle	<i>*ping</i> as N
	c.	<i>yi</i> one 'one box of apples'	<i>xiang</i> CL _{box}	<i>pingguo</i> apple	<i>xiang</i> as CL
	d.	<i>yi</i> one Intended: 'one box'	<i>*(ge)</i> CL-General	<i>xiang</i> box	<i>*xiang</i> as N
	e.	<i>yi</i> one 'one bag of biscuits'	<i>dai</i> CL _{bag}	<i>binggan</i> biscuit	<i>dai</i> as CL

⁸ If they are completely functional, it means that Cls have a functional feature, which is what we expect.

f.	<i>yi</i> one Intended: 'one bag'	*(<i>ge</i>) CL-General	<i>dai</i> bag	* <i>dai</i> as N
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As seen in (8a) and (8b), contrary to X. Li's (2013: 25) grammatical judgments, we argue that elements such as *ping* 'bottle', *dai* 'bag', *xiang* 'box' in Mandarin can be used only as Cls, not as nouns. For instance, the nominal counterpart of the Cl *ping* 'bottle' is *ping-zi* 'bottle'. In a word, Container Cls like *ping* 'bottle' are full-time Cls. This view aligns with Tang (2005: 456), who used $[\pm N]^9$ and $[\pm CL]$ to describe the potential features that Container Cls may exhibit.

The different grammatical judgments on *ping*-like Cls between X. Li (2013) and us reveal that these Cls are undergoing the grammaticalization from nouns. This grammaticalization in turn demonstrates that *ping*-like Cls are losing lexical content, which then tells us that Container Cls like *ping* 'bottle' possess a [+function] feature.

However, there exist other Container Cls, unlike *ping* 'bottle', which can be used as both Cls and nouns, as shown in (9). Following the previous way of thinking, what we can conclude is that Container Cls like *wan* 'bowl' do not undergo the grammaticalization from nouns. But notice that we cannot say that this type of Cls lacks a [+function] feature, since grammaticalization is not a necessary condition for being functional. Indeed, the functional feature can be a born one.

(9)	a.	<i>yi</i> one 'one bottle of water'	<i>wan</i> CL _{bowl}	<i>shui</i> water	<i>wan</i> as CL
	b.	<i>yi</i> one 'one bowl'	*(<i>ge</i>) CL-General	<i>wan</i> bowl	<i>wan</i> as N
	c.	<i>yi</i> one 'one pot of dumplings'	<i>guo</i> CL _{pot}	<i>jiaozi</i> dumpling	<i>guo</i> as CL
	d.	<i>yi</i> one 'one pot'	*(<i>ge</i>) CL-General	<i>guo</i> pot	<i>guo</i> as N
	e.	<i>yi</i> one 'one bucket of wine'	<i>tong</i> CL _{bag}	<i>jiu</i> wine	<i>tong</i> as N
	f.	<i>yi</i> one 'one bucket'	*(<i>ge</i>) CL-General	<i>tong</i> bucket	<i>tong</i> as N

In short, for Container Cls, the subtype like *ping* 'bottle', which is derived from nominal grammaticalization, clearly exhibits a functional property; whereas the subtype like *wan* 'bowl', which can be both Cls and nouns, may also be partially functional.

⁹The symbol $[\pm N]$ used by Tang (2005) expresses whether a Cl can be used as a noun.

3.1.2 Grammaticalization from nouns to other types of Cls

The same is true of the other five types of Mandarin Cls (except Kind Cls), if we think that within every type, there are always three possible subtypes: Cls grammaticalized from nouns, Cls undergoing nominal grammaticalization, and Cls non-grammaticalized from nouns. This classification aligns with the views of linguists such as 王 (1958) and 周 (1959), who claim that the majority of numeral classifiers in Mandarin Chinese originate from nouns by means of grammaticalizing these nouns.

However, there is no place for discussing them one by one diachronically, but still we can provide some instances from the literature (Jin and Chen 2002; N. Zhang 2013; Del Gobbo 2014). One instance is the Cl *tiao*¹⁰. It was originally a noun that meant *shuzhi* ‘tree-branch’ (Xu 2003). According to Tian (2013), *tiao* initially modified only *shuzhi* ‘tree-branch’; then extended to nouns like *tiaowen* ‘legal clause’ in the Wei, Jin and Southern and Northern Dynasties; then to nouns like *lu* ‘road’ in the Sui, Tang and Five Dynasties, and later to nouns like *haohan* ‘hero’ in the Song, Yuan, Ming, and Qing Dynasties. On the other hand, according to N. Zhang (2013: 76), the Cl *tiao* originally modified *shuzhi* ‘tree-branch’, then concrete nouns like *huanggua* ‘cucumber’, and later abstract nouns like *yijian* ‘opinion’, as shown in (10). This expanding range of nouns that *tiao* can modify implies that this Cl gradually loses its lexical meaning.

- (10) a. *yi tiao shuizhi*
one CL tree-branch
‘one tree branch’
- b. *liang tiao lu* *wu tiao shengzi*
two CL road five CL rope
‘two roads’ ‘five ropes’
- c. *si tiao xinwen* *wu tiao tiao*
four CL news five CL opinion
‘four pieces of news’ ‘five opinions’

The same is true of the Cl *zhang*¹¹. Originally, *zhang* meant “to draw a bow”. It initially occurred with *gong* ‘bow’ and *nu* ‘crossbow’ only, then with nouns like *wang* ‘net’ whose referents are spreadable, followed by nouns like *zhi* ‘paper’, *ditan* ‘carpet’ whose referents can be rolled up, and later with nouns like *chuang* ‘bed’, *zhuozi* ‘table’ whose referents have flat tops (Jin and Chen 2002: 11; Del Gobbo 2014: 35-36), as illustrated in (11).

- (11) a. *three zhang gong* *three zhang nu*
three CL bow three CL crossbow
‘three bows’ ‘three crossbows’
- b. *liang zhang wang* *san zhang zhangpeng*
two CL net three CL tent
‘two nets’ ‘three tents’
- c. *si zhang zhi* *wu zhang ditan*
four CL paper five CL carpet
‘four pieces of paper’ ‘five carpets’

¹⁰ Its main use in Mandarin is to denote a shape that is long and three-dimensional.

¹¹ Its main use in Mandarin is to denote a two-dimensional or three-dimensional shape with a flat surface.

- | | | | | | | | |
|----|-------------|--------------|---------------|--|--------------|--------------|---------------|
| d. | <i>wu</i> | <i>zhang</i> | <i>chuang</i> | | <i>liu</i> | <i>zhang</i> | <i>zhuozi</i> |
| | five | CL | bed | | six | CL | table |
| | 'five beds' | | | | 'six tables' | | |

Summarizing, the other types of Mandarin Cls (excluding Kind Cls), either have a functional feature or may potentially have one. This conclusion is based on the process of grammaticalization from nouns and the assumption that the feature [+function] can also be inherent.

3.2 Substitution of Cls by the General Cl *ge*

It is widely recognized that the general Cl *ge* in Mandarin can replace many specific Cls (Zhu 1982; Lü 1990, 1944, 1999; He 2002), as shown in (12).

- | | | | | | |
|------|----|--|--------------------------------------|------------------------|-------------------|
| (12) | a. | <i>san</i> | <i>ben/ge</i> | <i>shu/zazhi</i> | Individual Cls |
| | | three | CL _{volume} /CL-General Cl | book/magazine | |
| | | 'three books/magazines' | | | |
| | b. | <i>san</i> | <i>ping/ge</i> | <i>shui/niunai</i> | Container Cls |
| | | three | CL _{bottle} /CL-General Cl | water/milk | |
| | | 'three bottles of water/milk' | | | |
| | c. | <i>san</i> | <i>gongjin/*ge</i> | <i>pingguo/you</i> | Standard Cls |
| | | many | CL _{kilo} /CL-General Cl | apple/oil | |
| | | 'many kilos of apples/oil' | | | |
| | d. | <i>san</i> | <i>duan/*ge</i> | <i>shengzi/kewen</i> | Partitive Cls |
| | | three | CL _{section} /CL-General Cl | rope/text | |
| | | 'three sections of rope/text' | | | |
| | e. | <i>san</i> | <i>pai/*ge</i> | <i>zhuozi/xuesheng</i> | Collective Cls |
| | | three | CL _{row} /CL-General Cl | table/student | |
| | | 'three rows of tables/students' | | | |
| | f. | <i>san</i> | <i>pian/ge</i> | <i>zhi/yun</i> | Individuating Cls |
| | | three | CL _{piece} /CL-General Cl | paper/cloud | |
| | | 'three pieces of paper' 'three clouds' | | | |
| | g. | <i>san</i> | <i>zhong/ge</i> | <i>bingdu/yijian.</i> | Kind Cls |
| | | three | CL _{kind} /CL-General Cl | virus/opinion | |
| | | 'three kinds of virus/opinions' | | | |

Observing (12), from a typological perspective, it can be seen that *ge* can substitute a variety of specific Cls, including Individual, Container, Individuating, and Kind Cls¹². While based on the literature (Lü 1999 [1980]; He 2002 [2000]), from a statistical angle, *ge* can combine with nouns¹³ in a range from 33.94% to 40.22%.

Of particular interest are Individual Cls, whose relation with *ge* has been frequently discussed in the literature (e.g., Zhu 1982; Lü 1999 [1980]). Lü (1999 [1980]) argues that *ge* is a general Individual Cl. First, it can replace some specific Cls, for instance, *yi zhi/ge erduo* 'one ear', *yi suo/ge xuexiao* 'one school'. Second, it can be used for nouns that have no specific Cls to occur with, such as *yi ge guojia/shehui/shijie* 'one country/society/world', *yi ge ci/jüzi* 'one word/

¹² This does not mean that *ge* can always alternate with these four types of Cls.

¹³ These nouns are not all the nouns in Mandarin, but rather those that have been registered by authors based on their frequent usage. Lü (1999 [1980]) collected 439 nouns, while He (2002 [2000]) recorded 1273.

sentence'. In fact, Lü's "specific Cls" here refers exactly to specific Individual Cls. Furthermore, Zhu (1982) even proposes that almost all the "Individual Nouns"¹⁴ can be counted by *ge*. This equals saying that almost all the Individual Cls can be replaced by the general Cl.

Both the literature and our observations confirm that the Cl *ge* is really general due to its extensive usage. Therefore, we propose that Mandarin Cls – at least Individual, Container, Individuating, and Kind Cls – have a functional property, since they can be replaced by the general Cl *ge*.

However, the ungrammatical examples in (12c), (12d), and (12e) also indicate that *ge* is not omnipotent. In addition, we should keep in mind the idea that the legal cases in (12) do not guarantee that all similar cases are grammatical, for example, *di* 'drop', an Individuating Cl in the phrase *san di shui* 'three drops of water', cannot be replaced by *ge*.

From both of the above behaviors, it can be deduced that the Mandarin Cl *ge* is not entirely "general" but is still undergoing grammaticalization. Despite this, we speculate that it tends to replace more and more Cls. This is consistent with N. Zhang's (2013: 48) assertion that "With the progress of grammaticalization, especially in the northern dialect of Mandarin, *ge* is found to occur with more and more nouns". The tendency of *ge* at least provides evidence in support of the claim that Mandarin Cls have a functional property, since they can be or will be substituted by the general Cl.

To conclude, in Mandarin, Individual, Container, Individuating, and Kind Cls have a functional property, whereas Standard Cls, Partitive, and Collective Cls may also be functional. Overall, Mandarin Cls possess a functional property.

3.3 Analogy between Cls and verbal auxiliary

We assume that if Mandarin Cls behave like verbal auxiliaries in terms of, for example, syntax, semantics, and even philosophy, then they can be treated as functional units.

Before making the analogy between them, it is useful to define verbal auxiliaries. Following N. Zhang (2013: 209), they are a type of formative that "helps' the main verb of a clause in expressing certain moods, aspects, tenses or voices". N. Zhang's definition of verbal auxiliaries is clearly based on a syntactic perspective. According to her, there are six common behaviors related to structural and semantic aspects, which are summarized below:

1. Neither auxiliaries of clauses nor Cls of numeral expressions may function as an argument or predicate;
2. Neither auxiliaries of clauses nor Cls of numeral expressions may have any thematic relation to any nominal;
3. Both auxiliaries of clauses and Cls of numeral expressions select substantive categories. The former selects verbal phrases and the latter selects nominal phrases;
4. They can both be absent or have null forms in certain constructions and in certain languages;
5. They both license ellipsis, like many other head elements (although not all kinds of them may do so);
6. They both have a place-holder property.

In fact, the first two points are in relation to entailment, if we take into account the principle of one-to-one relation between argument and thematic roles. While the last three points can clearly be proven by linguistic instances. What we want to emphasize is the third point, because it should be universally valid. As an aside, we would like to explain it from a philosophical angle: all things in our world¹⁵ can be sorted into three types: property, quantity, and relation. Property can be concretized by means of quantity. Hence, property and quantity can be thought of as a couple: the former plays a central role, while the latter an assistant one.

¹⁴ According to us, Zhu's *Individual Nouns* refer to nouns whose referents naturally have discrete units.

¹⁵ For the sake of simplicity, only the world we live in is considered; other possible worlds are not included.

Applying this standpoint to languages, a universal rule emerges: there are couples of linguistic elements where one denotes property while the other expresses quantity. The former can be instantiated through the latter. In addition, the former are nuclear while the latter are auxiliary. Verbal phrases and verbal auxiliaries are a perfect example, so are nominal phrases and Cls. In brief, in both couples, the former are “concretizees”, while the latter are “concretizers”.

By the way, our concept of “couples of linguistic formatives” is compatible with that of Cheng and Sybesma (1999: 518) where our “linguistic couples” are described as “division of labor”, which forms “a property of Universal Grammar”. For example, the couple of NPs and Ds in Italian, an Indo-European language; the couple of NPs and Cls in Chinese, a Sino-Tibetan language. In both cases, the former (i.e., NPs) describe, while the latter (i.e., Ds and Cls) refer.

To sum up, based on the analogy with verbal auxiliaries from multi-perspectives, Mandarin Cls exhibit a functional property.

4. Mandarin Chinese Cls: lexical or functional?

Sections 2 and 3 indicate that Mandarin Chinese Cls have both lexical and functional properties. This raises the question of which property predominates. Our reply is that Mandarin Cls are functional rather than lexical, as supported by the following arguments from various perspectives.

4.1 Diachronic argument

From a diachronic perspective, it is well-known that Mandarin Cls, like some other categories, involve the phenomenon of grammaticalization. This entails that Mandarin Cls have at least a functional property. Furthermore, with this progress of grammaticalization from nouns to Cls, the functional property of these Cls will become stronger and stronger.

Contrary to this, one may say that not all of them behave the same in terms of grammaticalization. Indeed, we also admit that every type of Cl undergoes various degrees of grammaticalization and exhibits different capacities for noun selection. This variability also applies to every Cl within the same type.

However, the above variability does not conflict with the existence of the general Cl *ge*, which shows an impressive “popular” ability to combine with a wide range of nouns, regardless of whether these nouns have specific Cls. Its potential to combine with more and more nouns reinforces our proposal that Mandarin Cls are preferred to be treated as a functional element.

4.2 Cognitive argument

From a cognitive perspective, in order to quantify the entities denoted by nouns, one needs to first identify the quantifying boundaries of these entities. And then if we want, we can describe in detail what these boundaries look like, such as shape, dimensionality (bi-dimension/three-dimension). Note that this additional description is not indispensable. In short, identifying quantifying boundaries is more important than providing additional description about what they look like.

Accordingly, from a semantic perspective, the identification of quantifying boundaries corresponds to the fundamental function of Cls that has been widely considered as counting units (e.g., X. Li 2013; N. Zhang 2013), while the description of the additional information of quantifying boundaries equals to the content meaning that Cls does not have to possess. Thus, we argue that Mandarin Cls are fundamentally functional, irrespective of their content meaning.

4.3 Experimental argument

Many experiments support the view that the essential role of Cls is (semantically) providing counting units (for the related nouns), rather than clarifying what these units look like. These experiments involve child acquisition, SLL (Second Language Learning), and aphasia (N. Zhang 2013: 82):

According to Chien, Lust and Chiang (2003: 96), “Different studies have shown different results regarding the order of classifier acquisition, but they all pointed to the conclusion that children first acquire the general classifier *ge* and use it as a “syntactic place-holder”; (p.113) “supporting the well-established finding from earlier production studies that young children predominately use the general classifier *ge* for almost any noun, we found that hearing the general classifier *ge* did not make young children search for a particular referent.” According to P. Li, Huang, and Hsiao (2010: 224), to be a unit for counting is the primary function of Cls, and to sort elements is a secondary function of (only) some Cls. The primary function is acquired earlier than the secondary one. According to (Polio 1994), non-native adult learners of Mandarin also overuse *ge*. According to (Tzeng, Chen, and Hung 1991), the aphasia studies indicate that brain damage patients neutralize Cls to *ge* more often than normals do. According to Myers (2000: 204), the finding of the aphasia study “is consistent with our claim that *ge* is chosen by default when memory-access problems prevent accessing the exemplars that guide the selection of specific classifiers.”

All of the above data demonstrate that the functional role of Cls is acquired earlier and more easily than their lexical role. This implies that the functional role of Cls is fundamental. In other words, Mandarin Cls are fundamentally functional. Again, from an experimental perspective, the functional property outweighs the lexical one.

5. Conclusions

Based on generative grammar, we systematically explored the categorial status of numeral classifiers in Mandarin Chinese from diachronic, syntactic, semantic, cognitive, and experimental perspectives. We draw the following conclusions:

1. Mandarin Chinese Cls exhibit both lexical and functional properties. The arguments in favor of their lexical property lie in their semantic selection restrictions in relation to nouns. Unlike previous research, this study introduced a novel approach by distinguishing between Kind Cls and Non-kind Cls (Ruan 2018). We first analyzed the combination of an identical Non-kind Cl with multiple nouns and an identical noun with multiple Non-kind Cls, then examined the co-occurrence of an identical Kind Cl with multiple nouns. Although Kind Cls do not impose semantic restrictions on nouns, we demonstrated their functionality through the general Cl *ge*. The arguments supporting the functional property of Mandarin Chinese Cls include the grammaticalization of Cls from nouns, the substitution of Cls by the general Cl *ge*, and the syntactic analogy between Cls and auxiliary Cls. The distinctiveness of Kind Cls was particularly highlighted throughout the aforementioned argumentation, which points to directions for future research.
2. Mandarin Chinese Cls are fundamentally functional. We provided this view with arguments from diachronic, cognitive, and experimental perspectives. Furthermore, we predict that as Cls continue to evolve, their functionality will become increasingly prominent.

Additionally, we discussed whether Individual Cls have a very limited semantic space, providing three different types of minimal pairs of Individual Cls: *ben* ‘volume’ and *juan* ‘roll’; *zhi* ‘stalk’ and *duo* ‘blossom’; *tou* ‘head’, *kou* ‘mouth’ and *zhi* (Ruan 2023a, 2023b). We propose that Individual Cls have a significant semantic contribution to the whole nominal phrase. Due to space limitations, this paper offers only a preliminary exploration of this issue.

Given the internal diversity of Mandarin Chinese Cls and the ongoing linguistic evolution, a broad qualitative analysis alone is insufficient. To accurately understand the current categorial identity of Mandarin Chinese Cls, future research should include both qualitative and quantitative analyses of each Cl type, with a particular focus on Kind and Individual Cls.

References

- Abney, Steve. 1987. *The English noun phrase in its sentential aspect*. PhD diss. Cambridge, MA: Massachusetts Institute of Technology.
- An, Fengcun, and Gong Cheng. 2011. “Hanyu liangci xingtai jufa shuxing yanjiu [Study on the Morphosyntactic Properties of Chinese Classifiers].” *Hanyu xuexi* 2: 37-44.
- An, Fengcun, Yusi Wu, and Gong Cheng. 2016. “Hanyu liangci chansheng jiqi gongneng yanbian guocheng de jufa fenxi [Syntactic Analysis of the Emergence and Functional Evolution of Chinese Classifiers].” *Jiefangjun waiguoyu xueyuan xuebao* 39 (2): 1-10.
- Chao, Yuen-Ren. 1968. *A grammar of spoken Chinese*. Berkeley-Los Angeles, CA: University of California Press.
- Cheng, Lisa L.-S., and Rint Sybesma. 1998. “Yi-wan tang, Yi-ge tang: Classifiers and Massifiers.” *Tsing-Hua Journal of Chinese Studies* 28 (3): 385-412.
- Cheng, Lisa L.-S., and Rint Sybesma. 1999. “Bare and Not So Bare Nouns and the Structure of NP.” *Linguistic Inquiry* 30 (4): 509-542.
- Cheng, Lisa L.-S., and Rint Sybesma. 2012. “Classifiers and DP.” *Linguistic Inquiry* 43 (4): 634-650.
- Cheng, Gong, Daran Yang, and Fengcun An. 2015. “Liangci jiegou yu jiabufen jiegou de tongyi fenxi [Unified analysis of classifier constructions and pseudo-partitive constructions].” *Dangdai yuyanxue* 17 (01): 56-70, 126.
- Chien, Yu-Chi, Barbara Lust, and Chi-Ping Chiang. 2003. “Chinese Children’s Comprehension of Count-Classifiers and Mass-Classifiers.” *Journal of East Asian Linguistics* 12: 91-120.
- Chomsky, Noam. 1965. *Aspects of the Theory of Syntax*. Cambridge, MA: MIT Press.
- Chomsky, Noam. 1995. *The Minimalist program*. Cambridge, MA: MIT Press.
- Chomsky, Noam. 2000. “Minimalist Inquiries: The Framework.” In *Step by Step: Essays on Minimalist Syntax in Honor of Howard Lasnik*, ed. by Roger Martin, David Michaels, and Juan Uriagereka, 89-155. Cambridge, MA: MIT Press.
- Del Gobbo, Francesca. 2014. “Classifiers.” In *The handbook of Chinese linguistics*, ed. by C.-T. James Huang, Y. H. Audrey Li, and Andrew Simpson, 26-48. Oxford: Wiley Blackwell.
- Gao, Yanan, and Hongfei Liu. 2020. “Hanyu liangci de yanjiu dongxiang he tansuo kongjian [The Research Trend and Exploration Space of Chinese Classifiers].” *Liaoning daxue xuebao (zhexue shehui kexueban)* 48 (2): 136-142.
- He, Jie. 2000. *Xiandai hanyu liangci yanjiu*. Beijing: Minzu Press.
- Her, One-Soon. 2012. “Structure of Classifiers and Measure Words: A Lexical Functional Account.” *Language and Linguistics* 13(6): 1211-1251.
- Her, One-Soon, and Chen-Tien Hsieh. 2010. “On the Semantic Distinction Between Classifiers and Measure Words in Chinese.” *Language and Linguistics* 11 (3): 527-551.
- Jin, Fufen, and Guohua Chen. 2002. “Hanyu liangci de yufahua [On Grammaticalization of Chinese Classifiers].” *Journal of Tsinghua University (Philosophy and Social Sciences)* S1: 8-14.
- Li, Jinxi. 1924 [1955/1992]. *Xinzhū Guoyu Wenfa*. Beijing: The Commercial Press.

- Li, Peggy, Becky Huang, and Yaling Hsiao. 2010. "Learning that Classifiers Count: Mandarin-Speaking Children's Acquisition of Sortal and Mensural Classifiers." *Journal of East Asian Linguistics* 19 (3): 207-230.
- Li, Xuping. 2013. *Numeral classifiers in Chinese: The Syntax-Semantics Interface*. Berlin-Boston: De Gruyter Mouton.
- Lu, Zhiwei. 1956. *Beijinhua danyinci cihui*. Beijing: Kexue Press.
- Lü, Shuxiang. 1953. *Yufa xuexi*. Beijing: Zhongguo qingnian Press.
- Lü, Shuxiang. 1990 [1944]. "Ge-zi de yingyong fanwei, fulun danweici qian yi-zi de tuoluo." In *Lü Shuxiang Wenji* 2, 144-175. Beijing: Shangwu Press.
- Lü, Shuxiang. 1999 [1980]. *Xiandai Hanyu Babai Ci*. Beijing: Shangwu Press.
- Ma, Qingzhu. 1990. "Shuci, liangci de yuyi chengfen he shuliang jiegou de yufagongneng." *Zhongguo Yuwen* 3: 161-173.
- Myers, James. 2000. "Rules vs. Analogy in Mandarin Classifier Selection." *Language and Linguistics* 1 (2): 187-209.
- Polio, Charlene. 1994. "Non-Native Speakers' Use of Nominal Classifiers in Mandarin Chinese." *Journal of the Chinese Language Teachers Association* 29: 51-66.
- Ruan, Yufeng. 2018. *Numeral Classifiers in Mandarin Chinese*. Phd diss. Firenze: Università degli Studi di Firenze.
- Ruan, Yufeng. 2023a. "Liangci 'tou' 'kou' shiyong de lishi yanbian [The Diachronic Evolution of the Classifiers *tou* and *kou*]." *Yuyan wenzi bao* 11: 2.
- Ruan, Yufeng. 2023b. "'Yi tou zhu' haishi 'yi zhi zhu' [*Yi tou zhu* or *yi zhi zhu*]." *Yuyan wenzi zhoubao* 12: 2.
- Shao, Jingmin. 1993. "Liangci de yuyi fenxi jiqi mingci de shuangxiang xuanze [The Semantic Analysis of Classifiers and the Bidirectional Selection of Nouns]." *Zhongguo yuwen* 3: 181-188.
- Shen, Jiaxuan. 1994. "'Yufahua' yanjiu zongguan [A survey of studies on grammaticalization]." *Waiyu jiaoxue yu yanjiu* (4): 17-24.
- Tang, Chih-chen J. 2005. "Nouns or Classifiers: A Non-Movement Analysis of Classifiers in Chinese." *Language and Linguistics* 6 (3): 431-472.
- Tian, Xin. 2013. "You ge, tiao, wei tan geti liangci de fanhua." *Journal of Ningxia University (Humanities & Social Sciences Edition)* 35(4): 38-42.
- Tzeng, Ovid J.L., Sylvia Chen, and Daisy L. Hung. 1991. "The Classifier Problem in Chinese Aphasia." *Brain and Language* 41 [(2)]: 184-202.
- Wang, Li. 1985 [1943]. *Zhongguo xiandai yufa*. Beijing: Shangwu yinshu guan.
- Wang, Li. 1958. *Hanyu shigao*. Beijing: Beijing Kexue Press.
- Wu, Yicheng, and Adams Bodo. 2009. "Classifiers ≠ Determiners." *Linguistic Inquiry* 40 (3): 487-503.
- Xu, Shen. 2003. *Shuowen jiezi*. Beijing: Zhonghua shuju.
- Yang, Yongzhong. 2017. "Liangci he liangci jiegou zai fenxi [Revisiting Classifiers and Classifier Constructions]." *Waiyuoyu (shanghai waiguoyu daxue xuebao)* 40 (4): 34-43.
- Zhang, Huangmei. 2011. *Xiandai hanyu liangci fenlei yu mingliangci dapei yanjiu*. Master diss. Jinan: Shandong University.
- Zhang, Niina N. 2013. *Classifier Structures in Mandarin Chinese*. Berlin-Boston: De Gruyter Mouton.
- Zhang, Zhigong. 1953. *Hanyu yufa changshi*. Beijing: Zhongguo qingnian Press.
- Zhen, Yu. 2007. "Cong kou, tou kan hanyu yiming duoliang zuhe xianxiang [Phenomenon of one noun matching with different measure words in Chinese from the analysis of "kou" and "tou"]." *Fujian nonglin daxue xuebao* 10 (2): 124-128.
- Zhou, Fagao. 1959. *Zhongguo guodai yufa - Chengdai pian*. Taipei: Zhongyang yanjiuyuan lishi yuyan yanjiusuo.
- Zhu, Dexi X. 1982. *Yufa Jiangyi*. Beijing: The Commercial Press.

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