

Chinese Children's Acquisition of Classifiers Revisited

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Abstract

The present study explored Chinese children's acquisition of the count and mass classifiers (Cheng and Sybesma 1998, Tai 1994) by conducting two tasks, a comprehension task (i.e., the Picture Identification Task), and a production task (i.e., the Picture Description Task). Forty-five Chinese-speaking preschoolers participated in the study, and they were further classified into three age groups: Group 1 (3-year-olds), Group 2 (4-year-olds), and Group 3 (5-year-olds).

The major findings of the present study are as follows. First, our subjects used count and mass classifiers significantly differently ($p < 0.05$). Different from Chien et al. (2003), it was found that our subjects performed better on count classifiers than on mass classifiers. Second, age effects were significant in response to overall count and mass classifiers ($p < 0.05$) (Chien et al. 2003, Hu 1993, Loke 1991, Ying et al. 1983). The age between three and four was found to be the critical stage in Chinese children's classifier development. Third, the results indicated that *ge* was the earliest acquired classifiers whereas standard measures caused the children major difficulties and were thus the latest acquired (Erbaugh 1986, Loke 1991).

Key words: Classifiers, Chinese, L1 acquisition, Preschoolers

1. Introduction

Classifiers are words used in various languages to indicate the syntactic or

semantic classification of words. Chinese is a language with numeral classifiers which are obligatory in a noun phrase containing a numeral or a demonstrative (Allan 1977). To be more specific, in English, count nouns can be counted by putting the numeral directly in front of the noun (e.g., *five apples*, *three horses*), but mass nouns can only be counted with the help of so-called measure words (e.g., *three pieces of cake*, *a school of fish*). In Chinese, by contrast, all nouns are like English mass nouns in the sense that, in order for a noun to be countable, a measure word or a classifier is required, as in (1) and (2).

- (1) *san* *ping* *jiu*
three CL-bottle liquor
'three bottles of liquor'
- (2) *san* *ge* *ren*
three CL person
'three persons'

The function of classifiers is to indicate the semantic category of nouns, to provide information about physical properties (e.g., shape, animacy, etc.), functional properties (e.g., hand tool, vehicle, etc.) or the social status of the referent of the head noun (Adams and Conklin 1973, Allan 1977). Therefore, nouns are categorized into different semantic classes as indicated by classifiers.

The use of classifiers in Chinese has been widely examined in the literature. In the last few years, more and more researchers have started to pay considerable attention to children's acquisition of Chinese classifiers (e.g., Chien et al. 2003, Erbaugh 1986, Fang 1985, Hu 1993). The results are often satisfactory. It has been found that children seem to demonstrate a sound knowledge of the basic syntactic nature of classifiers (e.g., order and phrase structure) at a very young age.

The present research was prompted by a desire to learn more about Chinese children's use of count and mass classifiers in order to echo Cheng and Sybesma's (1998) claim that the count-mass distinction indeed plays a crucial role in Chinese grammar. The present study aims to address the following research questions:

- 1) Do Chinese preschoolers respond differently to the count-mass distinction?
- 2) Do Chinese children of different age groups respond significantly differently to count and mass classifiers?
- 3) Is there a hierarchy of difficulty in Chinese children's acquisition of count and mass classifiers?

2. Linguistic Properties of Chinese Classifiers

In Chinese, simple numerals cannot quantify a noun by itself (Chao 1968, Li and Thompson 1981, Myers 2000, Tai and Wang 1990). Instead, classifiers are used along with numerals to define the quantity of a given object or objects and indicate the unit of measurement of some object just as their English counterparts in phrases like “five *bottles* of milk” or “a *piece* of paper.”

Counting and measuring are two different ways to get the quantity information of entities. Measuring, or quantification, applies to mass-like entities. Counting, however, requires individuation of the noun referents and therefore applies to countable units. According to Cheng and Sybesma (1998), Chinese classifiers are of two categories, count classifiers and mass classifiers. The former is typically used with individual entities whereas the latter is used with mass-like entities. In other words, in a classifier language like Chinese, counting/measuring thus involves the obligatory occurrence of count and mass classifiers respectively. In this section we attempt to give a classification of Chinese count and mass classifiers and their respective subcategories. Each of the categories will be defined and explored with collocating nouns specified.

2.1.1 Types of Count Classifiers

The presence of count classifiers marks not only the result of individuation but also classification (Allan 1997, Chao 1968). They are forms which denote a particular quality in the noun classified and carry information about the inherent traits of the noun referents being counted. In other words, a speaker is often constrained in the choice of a count classifier to be used with a given referent. Given these, the classes encoded by the count classifiers tend to be semantically based (Myers 2000, Tai and Wang 1990, Tai 1992, Tai 1994). In what follows we will

probe into count classifiers based on the major animate/inanimate distinction and their respective subtypes with collocating nouns specified.

Type 1: ANIMACY

Count classifiers comprise two categories: animacy and inanimacy. That animacy should be treated as a class apart is not surprising since the animate/inanimate distinction is always relevant in describing numeral classifier systems (Adams and Conklin 1973, Alan 1977, Tai 1992, Tai 1994). Within the animate subsection of the Chinese classifier system, the distinction between human and non-human is well maintained.

Type 1-1: human

Human classifiers can be further divided into two subtypes: general human classifier and honored human classifier (Myers 2000). The latter exhibits a higher social status of the human referents as in (1) while the former denotes common humans who are not in the categories ‘people to be polite to’ as in (2).

- (1) *yi ge ren*
one CL person
‘a (general) person’
- (2) *yi wei laoshi*
one CL teacher
‘a (honored) teacher’

Type 1-2: animal

Animal classifiers consist of two types of classifiers. One is the classifier *zhi* as in (3) and the other is the classifier *tou* as in (4). Both classifiers *zhi* and *tou* are used to specify animals being enumerated. *Zhi* is used with any animals, functioning as a general animal classifier; *tou*, on the other hand, is based on the part-whole relationship between the animal enumerated and its head.

- (3) *yi zhi gou*
one CL dog
‘a dog’

- (4) *yi tou niu*
 one CL cow
 'a cow'

Type 2: INANIMACY

Shape/dimensionality classifiers are examples of the Chinese count classifiers used to enumerate inanimate concrete objects¹ which exhibit the feature of classifying nouns. The shape/dimensionality classifiers consist of three basic shapes of long, flat and round are encoded (Tai and Wang 1990, Tai 1992, Tai 1994) and they are dominated by shape-denoting forms such as *tiao*, *zhang*, and *ke*. Such shape classifiers fall into three subtypes: one dimension, two-dimension, and three-dimension (Allan 1977, Tai and Wang 1990, Tai 1992).

Type 2-1: saliently 1-dimentional (long)

There are three classifiers for saliently one-dimensional objects in Mandarin, namely, *tiao*, *gen*, and *zhi*. *Tiao* indicates long and more flexible entities like *xiangpijin* 'rubber band' whereas *gen*², and *zhi* indicate long and more rigid entities (Loke 1991, Tai and Wang 1990), as in (5).

- (5) a. *yi tiao xiangpijin*
 one CL rubber band
 'a rubber band'
- b. *yi gen diaoyugan*
 one CL fishing rod
 'a fishing rod'
- c. *yi zhi qianbi*
 one CL pencil
 'a pencil'

¹ In this paper, we only focus on the physically semantic properties of Chinese classifiers rather than their natural extension and metaphorical extension.

² According to Tai and Wang (1990), *gen* and *zhi* are used with long and rigid objects (e.g., *yi gen gunzi* 'a rod'; *yi zhi qiang* 'a gun').

Type 2-2: saliently 2-dimensional (flat)

There are three classifiers which can be used for saliently two-dimensional objects in Mandarin, namely, *zhang*, *pian*, and *mian*. *Zhang* denotes flat and thin entities such as *zhi* in (6a). *Pian* indicates flat, thin, and small objects such as *yezi* in (6c). *Mian* refers to objects with flat surfaces such as *qiang* in (6b) (Loke 1991, Tai and Wang 1990).

- (6) a. *yi zhang zhi*
one CL paper
'a piece of paper'
- b. *yi mian qiang*
one CL wall
'a wall'
- c. *yi pian yezi*
one CL leaf
'a leaf'

Type 2-3: saliently 3-dimensional (round)

There are three classifiers for saliently three-dimensional roundish objects of different sizes in Mandarin, namely, *ge*, *ke* and *li*. *Li* is for roundish objects which are so small that they are hard to count when they are together. *Ke* denotes round entities which are big enough for the eyes to perceive, but small enough to pick up without effort (Kuo 1998). *Ge* is used for round objects so big³ that they cannot be picked up easily with one hand.

- (7) a. *yi ge qiqiu*
one CL balloon
'a balloon'
- b. *yi ke juzi*
one CL tangerine
'a tangerine'

³ There is an overlap among the three saliently 3-D classifiers due to the fact that 'size' is gradable (Saeed 2003). Such boundaries vary from person to person.

- c. *yi li sha*
 one CL sand
 'a grain of sand'

2.1.2 Types of Mass Classifiers

Mass classifiers indicate "a quantitative measurement of the denotatum of the noun classified" and they typically do not denote any "inherent characteristic" or "salient perceived characteristics" of the noun referents with which they are associated (Allan 1977). To put it another way, mass classifiers simply denote a measure of these things. Such classifiers are imposed units involving partitions, groupings, etc., as opposed to the natural units expressed by count classifiers. Mass classifiers can be divided into four categories: standard measures, container measures, partitive measures, and group measures (Myers 2000).

Type 1: Standard Measures

They are conventionalized units used to indicate only the quantity of the nouns such as standard for length, weight, area, or volume, and have little to do with the conceptual properties of the following objects such as *jin* as in (8a), *bang* as in (8b), *chi* as in (8c), and *mu* as in (8d) (Chao 1968, Li and Thompson 1981, Myers 2000).

- (8) a. *yi jin mianfen*
 one CL flour
 'a catty of flour'
- b. *yi bang rou*
 one CL meat
 'a pound of meat'
- c. *san chi bu*
 three CL cloth
 'three (Chinese) feet of cloth'
- d. *san mu tian*
 three CL farmland
 'three (Chinese) acres of farmland'

Type 2: Container Measures

They are nouns used as measures and thus form an open class. That is, nouns that have the meaning of a container can be used as a container measure (Chao 1968, Li and Thompson 1981, Myers 2000).

- (9) a. *yi bei cha*
one CL tea
'a cup of tea'
b. *san lan li*
three CL pears
'three baskets of pears'

Type 3: Partitive Measures

Partitive measures designate partitions or parts of objects rather than groups of them (Chao 1968, Myers 2000). In other words, any substance which takes 'part of object' classifier is having this part as its salient perceptual property as in (10).

- (10) *yi kuai dangao*
one CL cake
'a piece of cake'

Type 4: Group Measures

They differ from partitive measures in that they designate a group or collection of individuals (Chao 1968, Li and Thompson 1981, Myers 2000) as in (11).

- (11) *yi qun yang*
one CL sheep
'a flock of sheep'

To sum up, count classifiers in the present study mainly are classified into two categories: animacy and inanimacy. On the other hand, mass classifiers are divided into four types of measures: standard, container, partitive, and group, as shown in Table 1.

Table 1: Classification of Chinese Count Classifiers

Category	Type	Feature	Sub-Type	Sub-Feature	Example
Animacy	T1-1	human	T1-1-1	[− honored]	<i>ge</i>
			T1-1-2	[+ honored]	<i>wei</i>
	T1-2	non-human	T1-2-1	[− prominent head]	<i>zhi</i>
			T1-2-2	[+ prominent head]	<i>tou</i>
Inanimacy	T2-1	long saliently 1D	T2-1-1	[+ flexible]	<i>tiao</i> [+1D, +flexible]
			T2-1-2	[− flexible]	<i>gen</i> [− cylindrical] <i>zhi</i> [+cylindrical]
	T2-2	flat saliently 2D	T2-2-1	[+ flexible]	<i>zhang</i> [+2D, +flexible]
			T2-2-2	[− flexible]	<i>pian</i> [+2D, − flexible]
	T2-3	round saliently 3D	T2-3-1	[+ big]	<i>ge</i> [+3D, +big]
			T2-3-2	[− big]	<i>ke</i> [+3D, − big]

Table 2: Classification of Chinese Mass classifiers

Type	Example
standard measures	<i>yi bang rou</i> ‘a pound of meat’
	<i>yi jin rou</i> ‘a catty of meat’
container measures	<i>yi bei cha</i> ‘a cup of tea’
	<i>yi wan fan</i> ‘a bowl of rice’
partitive measures	<i>yi kuai dangao</i> ‘a piece of cake’
	<i>yi pian⁴ tusi</i> ‘a slice of toast’
group measures	<i>yi qun yang</i> ‘a flock of sheep’
	<i>yi shuang kuaizi</i> ‘a pair of chopsticks’

3. Previous Empirical Studies on the Acquisition of Classifiers

How Chinese children acquire the intricate classifier system has been the interest of linguists studying child language acquisition. Research conducted by Chien et al. (2003), Erbaugh (1986), Fang (1985), and Hu (1993) has constituted a big step toward understanding classifier acquisition by Chinese children. These

⁴ Two classifiers *pian* and *kuai* can function as partitive classifiers as well as count classifiers (Tai 1992). When used as partitive measures, the two classifiers denote the ‘part’ of the noun referents instead of the whole. By contrast, when used as count classifiers, *pian* and *kuai* denote a particular quality in the noun classified. That is, *pian* refers to objects which are flat and thin whereas *kuai* refers to objects which are rigid and not round.

studies are of two kinds in terms of their methodology: longitudinal (Erbaugh 1986) and experimental (Chien et al. 2003, Fang 1985, Hu 1993).

3.1 Fang (1985)

In his quantitative study of Chinese preschoolers' acquisition of classifiers, Fang's (1985) subjects, tested for their ability to use count classifiers in two tasks, were 36 Mandarin, 36 Cantonese and 30 bilingual children, divided into three age groups: four, five and six. In the first task, in order to investigate which classifiers the subjects at a certain age had acquired, twelve pictures of familiar objects were used to elicit numerical constructions. Twelve classifiers denoting animacy, arrangement, function, and shape were expected with one stimulus for each classifier. In the second task, Fang tested children's comprehension (bilingual child subjects excluded) of four shape classifiers, viz *zhang*, *li*, *tiao*, *kuai*, among twelve novel objects with pseudo names. After hearing a stimulus containing a specific shape classifier, the subjects were asked to select one appropriate object out of the four for that shape classifier. The same set of the four objects was repeatedly used for each of the four shape classifiers.

As predicted, the results of the first task showed that the children's command of classifiers increased with age. Even though the four-year-olds uses classifiers poorly, their ability improved quickly as they grew older. Interestingly, the children at the age of four predominantly used the general classifier *ge*, and by the age of six they still used *ge* more often than other count classifiers. Influenced by English, the bilingual children exhibited lower proficiency than the monolingual ones despite the fact that all children, either bilingual or monolingual, tended to use the general classifier *ge* for almost any noun in production.

The results of the second task showed that very few of the 4-year-olds demonstrated knowledge of any of the four shape classifiers tested. About half of the 5-year-olds knew two of the four classifiers, and almost all 6-year-olds knew all four classifiers. To put it differently, the children's classifier ability was found to be directly related to their cognitive development of abstract thinking and the power of generalization.

Based on his findings, three following acquisition processes were proposed: acquiring the general classifier *ge*, then classifiers with narrow application (e.g., *ben* for counting books), and finally classifiers with wide application (e.g., *zhang* denoting features such as “flat, rectangular, two dimensional and horizontal”). For classifiers with narrow application, the children would treat the classifier and noun construction as an inseparable linguistic unit and learn them by simple memorization. For classifiers with wide application, the acquisition process would involve three steps: i) the mechanical memorization of the classifier-noun construction as an inseparable linguistic unit, ii) the abstraction and generalization of the salient features of the classifier, and iii) the application of the acquired rule to describe new objects and overgeneralization of the use of both general and specific classifiers.

3.2 Erbaugh (1986)

Erbaugh (1986) conducted a longitudinal study of Chinese children's acquisition in noun classifiers and stated that the historical semantic development of Chinese classifiers from 1,400 B.C. to the present parallels both child acquisition and modern adult use. Her subjects were four Chinese two-year-olds in Taipei, Taiwan. The data was collected through transcribed types of the four subjects at play with their families at home one hour every two weeks for each child for one year. Under Erbaugh's observation, the subjects demonstrated a sound knowledge of the basic syntactic nature of classifiers at a very young age. It was found that her two participants “were almost as reliable as the adults in using classifiers whenever one was required.”

Erbaugh further divided the subjects' classifier acquisition into three stages: (i) early use: the lexical stage, (ii) later use: the prototypical stage, and (iii) broadening use: generalization. It was proposed that children's early use of classifiers should be lexical in nature rather than feature-based. It was found that the subjects almost never used specific classifiers before the age of 2.6 at the lexical stage. The children's classifiers included potentially larger and more heterogeneous sets at the prototypical stage, but each new classifier typically appeared with its prototypical nominal referent first. The prototypical stage was the stage

where the children chose prototypes which were the most representative family members. Once the children learned the prototypical referent, they chose a significant feature to generalize from. Later conventionalized use rested on this foundation and shape (especially vertical extension and small size) were the most frequently generalized features.

Finally, the diachronic and developmental classifier emergence order was claimed as follows:

- i) Valued items before ordinary ones. Early marking of animals, flowers, books, and weapons is prominent;
- ii) Concrete objects before abstractions and honorifics. A general classifier for concrete objects is also quite early;
- iii) Measures before special noun classifiers;
- iv) Unique reference before prototypical;
- v) Length abstracted before flatness;
- vi) Use of classifiers with both number and noun before anaphoric use without noun.

3.3 Hu (1993)

Hu (1993) investigated the acquisition of the general classifier *ge* and twelve count classifiers denoting animacy, function, shape and arrangement. She further explored the relative acquisition order of different classifiers and the development of semantic co-occurrence constraints on classifier-noun sequences. Also under investigation were the relation between children's comprehension and production of classifiers and the relation between their cognitive development and comprehension/ production of classifiers.

The subjects were twenty-four Mandarin-speaking children from three to six years in age with an equal number of males and females, further divided into four age groups. Three production tests and four comprehension tests were designed in the study. First, each subject was given **three production tests** where numerical noun phrases (the *numeral* + *CL* + *noun* sequences) were elicited with visual stimuli and some assisting questions. After the production tests, each child

was given four comprehension tests⁵.

Hu's results were as follows. To begin with, the children acquired the general classifier first, and acquired it through the syntactic distribution. They generalized the general classifier widely with all noun phrases containing numerals. They could even drop or add an element in the *numeral + CL + N* construction. Second, it was found in the production data that the children at age three used one or two count classifiers. The subjects at three mostly used the general classifier, and very few count classifiers, the frequency and the number of different count classifiers they used correlated positively with their age. As for the emergence order of count classifiers, it is suggested that the animacy classifier *zhi* might be one of the earliest acquired count classifiers. Third, the semantics of the classifier becomes essential to children's acquisition of count classifiers and the co-occurrence constraints on classifier-noun sequences. Fourth, it was found that the children's perception of physical shapes and categorization abilities were in advance of their ability to comprehend or produce the relevant classifiers. The order of perception of different shapes did not parallel the emergence of shape classifiers. Nor did the children's categorization ability parallel the emergence order of classifiers denoting the same categories.

3.4 Chien et al. (2003)

Chien et al. (2003) examined 80 Chinese-speaking children between the ages of 3 and 8, and 16 adults, who served as the comparison group. All the participants came from Taipei, Taiwan, and were sampled from day-care centers, nursery schools, kindergartens, and elementary schools. Additionally, the children were assigned to one of five different age groups (G1 to G5) with one-year interval.

⁵ In the first comprehension test, the subjects were presented with the same objects of different shapes and were asked to pick up an object based on the classifier they heard from the verbal stimulus. In the second comprehension test, adjectives were used for the oral stimuli. In the third comprehension test each subject was presented two sets of five pictures separately and was instructed to complete the experimenter's spoken incomplete numerical noun phrase by choosing an object from the set of five pictures. In the last comprehension test, an additional classification test was employed, and the subjects were instructed to group together all pictures according to the given cues.

Two identical comprehension tasks in methodology and design were employed. Totally, fourteen count classifiers and four mass classifiers (all container measure words) were selected. The subjects were asked to play a guessing game with the experimenter and the stuffed animal Mickey Mouse. For each turn in the guessing game, the experimenter would show Mickey Mouse three different things, and then Mickey Mouse would pick up one thing he wanted. The child was asked to guess what Mickey Mouse wanted and pointed it to the experimenter.

The results provided evidence for children's knowledge of the count-mass distinction at their early stages of language acquisition, and cohered with the linguistic analysis that the count-mass distinction is represented in Chinese grammar at the level of the classifier, as suggested by Cheng and Sybesma (1998). Such count-mass distinction was available to their subjects at early stages of Chinese language acquisition. Their subjects predominately used an entity corresponding to a count/mass noun when provided a count/mass selective context and "rarely mistakenly used count classifiers to quantify substances or use mass classifiers to enumerate individuated objects." (Chien et al. 2003, p.113) In addition, the subjects were able to draw subtle differences between and among fourteen count classifiers and their respective corresponding referents. They knew that the relationship between a count classifier and an entity denoted by a noun is relatively fixed. Moreover, these children's abilities in dealing with count classifiers and mass classifiers were roughly comparable⁶. Finally, it was found that the general classifier *ge* posed the biggest problem in the comprehension task. Their young children almost used the general classifier *ge* for every noun. The "ge-preference" was seen even in the production of the adult subjects.

To sum up, four empirical studies on language acquisition of Chinese classifiers were reviewed in this section. Fang (1985) investigated Mandarin, Cantonese and bilingual children and attempted to find out if children from different linguistic environments and developmental stages exhibit significantly different

⁶ Combining the results of Experiments 1 and 2, children performed slightly better for mass classifiers (81.10%) than count classifiers (78.84%); however, the difference was not statistically significant: $F(1,75) = 2.46, p > .05$.

proficiency in the use of classifiers. Though the results confirmed that children's proficiency in classifiers was strongly influenced by their educational level, linguistic environment and cognitive development, only one task was employed in the study. Erbaugh (1986) conducted a longitudinal study of Chinese children's acquisition of noun classifiers and showed that children demonstrated a sound knowledge of the basic syntactic nature of classifiers at a very young age. However, her sample size was small. Hu (1993) examined children's acquisition of the general classifier *ge* and eleven count classifiers denoting animacy, function, shape and arrangement. She also explored the emergence order of classifiers denoting properties of different semantic domains and the relation between children's cognitive development and their classifier acquisition. Nonetheless, there were an unequal number of trials for different classifiers in the four comprehension tests. Chien et al. (2003) examined children's comprehension of count and mass classifiers and claimed that these young children honored the grammatical count-mass distinction. However, their study mainly focused on children's comprehension of container measure words, not other types of mass classifiers. These previous studies failed to provide a clear and comprehensive overview of children's comprehension and production of classifiers. Some only focused on children's correct use of classifiers in production or in comprehension, rather than both comprehension and production. Furthermore, the empirical studies reviewed above were mainly concerned with count classifiers rather mass classifiers. Hence, a closer look at Chinese children's acquisition of count and mass classifiers is still necessary.

4. Experimental Methods

4.1 Subjects

For the purpose of scrutinizing whether Chinese children, at early stages of language acquisition, comprehend and produce the grammatical count-mass distinction, the target subjects were Chinese children acquiring Mandarin Chinese as their first language and demonstrated a level of Chinese language comparable to children at the same age. Forty-five subjects between the ages of three and five were selected from the Guanghai kindergarten in Tainan, Taiwan. In order to

spark the children's individuality and develop a love of learning and searching, the teachers at the kindergarten designed various activities related to **language arts, mathematics, social studies and science**. This curriculum also **provided** the children with the opportunities for drawing, painting, music, pottery, woodworking and many other activities. The forty-five children between the ages of three and five were recruited to participate in the present study. They were further divided to three age groups (G1: 3yr-olds; G2: 4-yr-olds; G3: 5-yr-olds) with one-year interval and each age group consisted of fifteen subjects⁷.

4.2 Methods and Materials

The present study adopted a quantitative experimental approach to evaluate Chinese preschoolers' linguistic competence. In language acquisition research, in order to investigate L1 learners' comprehension and production of the target language there are different quantitative methods in use, including different eliciting tasks such as imitation tasks, completing sentences, act-out tasks, problem-solving tasks, picture-cued tasks, truth-value judgment tasks, etc. (McDaniel et al. 1996). According to Miller (1981), these eliciting tasks can increase the efficiency and specificity of assessing language behaviors that occur infrequently in natural language. Furthermore, among the above-mentioned various eliciting methods, picture-cued tasks are most widely used (Pinker et al. 1987, Izumi and Lakshmanan 1998). On the one hand, pictures can increase the understanding of the context, enhancing the validity and reliability of the experiment. On the other hand, with the help of pictures, the task becomes vivid and stimulating, and thus subjects feel more relaxed and are more willing to participate in the experiment.

Two tasks were designed in this study to elicit the children's linguistic knowledge within a short period of time — a picture identification (henceforth PI) task for comprehension and a picture description (henceforth PD) task for free production. With the two tasks designed, we can **also** see if comprehension is

⁷ Five Chinese adults were asked to participate in the pre-test of the present experiment, and all of them responded the same to the two tasks we designed. That's why no Chinese native controls were included in the formal study. **As one of the reviewers pointed out, we may include a group of college students to be native Chinese controls to see if their performance is similar to what has been reported in the literature.**

indeed easier than production. According to the classification of Chinese count and mass classifiers discussed in Section 2, test materials were designed for each task. Ten count classifiers and eight mass classifiers were selected to examine from a pool of Chinese count and mass classifiers. Corresponding to the count classifiers and mass classifiers, thirty-six individual objects (or substances) were included. Table 3 provides details of the count and mass classifiers in the PI and PD tasks, their meanings, and the corresponding nouns designating the individual entities or substances that were used.

Table 3: Count Classifiers, Mass Classifiers, and Their Corresponding Nouns Used in Each Task⁸

Classifier	Semantic Feature	Expected Classifiers	Corresponding Nouns	
			PI Task	PD Task
Count	human	<i>ge</i>	<i>xiaoyinger</i> 'baby'	<i>xiaonanhai</i> 'boy'
		<i>wei</i>	<i>laoshi</i> 'teacher'	<i>yisheng</i> 'doctor'
	Non-human	<i>zhi</i>	<i>xiaobaitu</i> 'rabbit'	<i>xiaoniao</i> 'bird'
		<i>tou</i>	<i>runiu</i> 'cow'	<i>shanyang</i> 'goat'
	long saliently 1D	<i>tiao</i>	<i>shengzi</i> 'rope'	<i>xianglian</i> 'necklace'
		<i>zhi</i>	<i>qianbi</i> 'pencil'	<i>bi</i> 'pen'
	flat saliently 2D	<i>zhang</i>	<i>tiezhi</i> 'sticker'	<i>kapián</i> 'card'
		<i>mian</i>	<i>jingzi</i> 'mirror'	<i>qizi</i> 'flag'
	round saliently 3D	<i>ge</i>	<i>qiqiu</i> 'balloon'	<i>xigua</i> 'watermelon'
		<i>ke</i>	<i>caomei</i> 'strawberry'	<i>yachi</i> 'teeth'
Mass	standard measures	<i>gongjin</i>	<i>tang</i> 'sugar'	<i>mi</i> 'rice'
		<i>gongfen</i>	<i>xian</i> 'thread'	<i>chi</i> 'ruler'
	container measures	<i>wan</i>	<i>mifan</i> 'steamed rice'	<i>mian</i> 'noodles'
		<i>ping</i>	<i>niunai</i> 'milk'	<i>shui</i> 'water'
	partitive measures	<i>kuai</i>	<i>feizao</i> 'soap'	<i>dangao</i> 'cake'
		<i>pian</i>	<i>tusi</i> 'toast'	<i>yezi</i> 'leaf'
	group measures	<i>qun</i>	<i>mianyang</i> 'sheep'	<i>houzi</i> 'monkeys'
		<i>shuang</i>	<i>xiezi</i> 'shoes'	<i>kuaizi</i> 'chopsticks'

⁸ These classifiers were chosen in that they are the ones most commonly used in our daily life. As one of the reviewers pointed out, standard measures might be too challenging for our children. However, in order to keep the same number of items for each classifier type, we still included this measure type. And according to the kindergarten teachers, *gongjin* and *genfen* were relatively easiest ones of this type.

In the PI task, the subjects were asked to play a guessing game with the experimenter and a stuffed animal Snoopy. The experimenter held up Snoopy and told each child the rules of the game. That is, for each turn in the guessing game, the experimenter showed Snoopy three different objects, and then Snoopy picked out one of them and told the child what he wanted. The child was asked to guess what Snoopy wanted and pointed it to the experimenter. In other words, the subjects had to identify the target objects based on the classifier they heard from the verbal stimulus. If the child had the grammatical count-mass distinction, then he would be able to choose an entity corresponding to a count noun in the count-selective context (e.g., *Shinubi shuo ta yao yi zhi sheme?*) and an entity corresponding to a mass noun in the mass-selective context (e.g., *Shinubi shuo ta yao yi ping sheme?*). In total, there were eighteen test trials in this guessing game. Table 4 shows the test items used in this task.

Table 4: Test Items Used in the PI Task

Q1	C7 <i>tiezhi</i> ‘sticker’	C1 <i>xiaoyinger</i> ‘baby’ *	M1 <i>tang</i> ‘sugar’
Q2	C10 <i>caomei</i> ‘strawberry’	C3 <i>xiaobaitu</i> ‘rabbit’	M4 <i>niunai</i> ‘milk’ *
Q3	C4 <i>runiu</i> ‘cow’ *	M6 <i>tusi</i> ‘toast’	C1 <i>xiaoyinger</i> ‘baby’
Q4	C9 <i>qiqiu</i> ‘balloon’	M2 <i>xian</i> ‘thread’ *	M8 <i>xiezi</i> ‘shoes’
Q5	C8 <i>jingzi</i> ‘mirror’	M4 <i>niunai</i> ‘milk’	C10 <i>caomei</i> ‘strawberry’ *
Q6	M5 <i>feizao</i> ‘soap’ *	M7 <i>mianyang</i> ‘sheep’	C6 <i>qianbi</i> ‘pencil’
Q7	C2 <i>laoshi</i> ‘teacher’	M3 <i>mifan</i> ‘steamed rice’	C3 <i>xiaobaitu</i> ‘rabbit’ *
Q8	C6 <i>qianbi</i> ‘pencil’	C5 <i>shengzi</i> ‘rope’ *	M4 <i>niunai</i> ‘milk’
Q9	M8 <i>xiezi</i> ‘shoes’ *	M2 <i>xian</i> ‘thread’	C3 <i>xiaobaitu</i> ‘rabbit’
Q10	M6 <i>tusi</i> ‘toast’	C10 <i>caomei</i> ‘strawberry’	M3 <i>mifan</i> ‘steamed rice’ *
Q11	C2 <i>laoshi</i> ‘teacher’ *	C1 <i>xiaoyinger</i> ‘baby’	M7 <i>mianyang</i> ‘sheep’
Q12	M1 <i>tang</i> ‘sugar’	M7 <i>mianyang</i> ‘sheep’ *	C5 <i>shengzi</i> ‘rope’
Q13	M3 <i>mifan</i> ‘steamed rice’	C8 <i>jingzi</i> ‘mirror’	C7 <i>tiezhi</i> ‘sticker’ *
Q14	M8 <i>xiezi</i> ‘shoes’	M6 <i>tusi</i> ‘toast’ *	C4 <i>runiu</i> ‘cow’
Q15	M1 <i>tang</i> ‘sugar’ *	C9 <i>qiqiu</i> ‘balloon’	C2 <i>laoshi</i> ‘teacher’
Q16	M5 <i>feizao</i> ‘soap’	C7 <i>tiezhi</i> ‘sticker’	C6 <i>qianbi</i> ‘pencil’ *
Q17	C4 <i>runiu</i> ‘cow’	C9 <i>qiqiu</i> ‘balloon’ *	M2 <i>xian</i> ‘thread’
Q18	C8 <i>jingzi</i> ‘mirror’ *	M5 <i>feizao</i> ‘soap’	C5 <i>shengzi</i> ‘rope’

Note: The asterisks stand for the target answers. C1= *ge* for general humans; C2= *wei*; C3= *zhi* for small animals; C4= *tou*; C5= *tiao*; C6= *zhi* for something long, thin, cylindrical, and rigid; C7= *zhang*; C8= *mian*; C9= *ge* for round objects ; C10= *li*; M1=

gong jin; M2= *gong fen*; M3= *wan*; M4= *ping*; M5= *kuai*; M6= *pian*; M7= *qun*; M8= *shuang*.

In the PD task, the subjects were presented with a picture and asked to describe the picture. There were a total of 18 elicitation pictures with each drawing containing one target object.

4.3 Procedures

The experiment was conducted individually in Mandarin Chinese in the classroom of the kindergarten. The two tasks were recorded with back-up notes. The PD task was given to the subjects first to prevent them from getting hints from the PI task. Before the actual trials, a two-minute training session was given to ensure that the participant knew the names of the objects or substances.

In the present study, correct responses were determined according to the CL-noun associations listed in Table 2. For instance, the classifier *zhang* tested in the PI task should be associated with *tiezhi* 'sticker'. Thus, only the *zhang-tiezhi* linkage was considered correct. The subjects were given 1 point for each correct response, 0 point for an incorrect answer. Answers different from the expected answer like '*yi ke niunai*' were not given any point.

As for the PD task, the frequency of the correct use of the classifier was counted. Every one of the eighteen classifiers was expected to be elicited once in the production of a child. The total frequency produced by each group was divided by the total expected frequency of each group. Thus, the frequency and percentage of the results were calculated. The data of each task were entered into SPSS (Statistical Package for Social Science) files and processed by the computer.

5. Results and Discussion

5.1 The Count-Mass Distinction

This section mainly addresses the first research question—to find out whether Chinese children, at early stages of language acquisition, respond differently to the count-mass distinction. Table 5 presents our subjects' correct responses to overall count and mass classifiers:

Table 5: Subjects' Correct Responses to All Count/Mass Classifiers

Type	Mean	SD
Count Classifiers	0.48	0.16
Mass Classifiers	0.40	0.20

As can be seen in Table 5, the mean score of count classifiers was 0.48 and that of mass classifiers was 0.40. Evidently, our subjects showed better abilities in dealing with count classifiers. The Paired Samples *t*-test also confirmed that the subjects performed better on count classifiers than on mass classifiers at a significant level ($p=.000$). That is to say, our subjects, at early stages of language acquisition, had significantly different abilities in their use of count and mass classifiers.

It has been suggested by various linguists (e.g., Chao 1968, Chierchia 1998) that Chinese nouns do not encode a count-mass distinction and that all nouns in Chinese are like mass nouns. While Chinese nouns are not marked for the count-mass distinction, this does not mean that the count-mass distinction is not relevant to Chinese nominal syntax. According to Cheng and Sybesma (1998), the count-mass distinction is not encoded in nouns, but rather at the level of the classifier. In other words, the enumeration and quantification of Chinese nouns do require the presence of count and mass classifiers. Young Chinese children, at their stages of language acquisition, are expected to respond differently to the count-mass distinction. The present study, similar to Chien et al. (2003), provided experimental evidence showing that young Chinese children have knowledge of the semantic difference between count classifiers and mass classifiers, and therefore supported the linguistic analysis proposed by Cheng and Sybesma.

Interestingly enough, in Chien et al.'s study, though their children performed slightly better on mass classifiers than on count classifiers, yet the difference was not statistically significant ($F(1, 75)=2.46, p>.05$). Nonetheless, our subjects performed better on count classifiers than on mass classifiers at a significant level ($p=.000$). This difference might lie in the fact that the four mass classifiers adopted in Chien et al.'s experiments were all container measure words, which were easier for children to differentiate. In addition to container measures, we

examined standard measures, partitive measures, and group measures, which posed greater difficulty for the children.

In addition to the subjects' significant count-mass distinction, there is one phenomenon particularly worth mentioning. In Chien et al.'s study, it was found that their children rarely made a "cross-category" classifier-noun association. Scarcely did their subjects use count classifiers to quantify substances or use mass classifiers to enumerate individuated entities (Chien et al. 2003). The present study yielded similar results that the classifier-noun association made by our subjects were mainly "within-category". They were able to use count classifiers to count individuated objects and use mass classifiers to indicate the quantitative measurement of substances. They associated meanings with specific classifiers and applied the specific classifiers generally with only the nouns whose referents belong to the same semantic category as identified by the classifiers. In other words, they were constrained in the choice of a count classifier to be used with a given referent. Seldom did they use a specific classifier non-restrictively with all nouns. This finding might be a reflection of their sensitivity to the nature of the nouns — the grammatical count-mass distinction.

Given that our subjects had better control over count classifiers than mass classifiers and their classifier-noun associations were mainly "within-category," when their misuses of "cross-category" classifier-noun associations were analyzed, we would naturally expect that the subjects would use count classifiers to replace mass classifiers with a view to enumerating substances. However, the results were contrary to our expectations. It was found that even though our subjects were capable of differentiating the respective functions of count and mass classifiers, they, when making errors in "cross-category" classifier-noun associations, tended to use mass classifiers to quantify individuated objects more frequently than they used count classifiers to enumerate substances. For instance, **yi ping caomei (ke)* 'a bottle of strawberries,' **yi gongjin/gongfen de qiqiu (ge)* 'one kilogram/centimeter of balloon,' **yi gongjin de laoshi (wei)* 'one kilogram of teacher,' **yi wan caomei (ke)* 'one bowl of strawberries,' **yi wan tusi (pian)* 'one bowl of bread.' The classifiers in parentheses refer to the correct usages of count classifiers. The subjects' misuses of mass classifiers and their correspond-

ing numbers of misuses are shown in Table 6:

Table 6: Subjects' Misuses of Mass Classifiers (in means)

Type	Misuses	Misuses
M1 standard measures	* <i>yi gongjin de qiqiu (ge)</i>	0.44
	* <i>yi gongjin de laoshi (wei)</i>	0.20
	* <i>yi gongfen de qiqiu (ge)</i>	0.47
	TOTAL	0.56
M2 container measures	* <i>yi wan caomei (ke)</i>	0.22
	* <i>yi wan tusi (pian)</i>	0.04
	* <i>yi ping caomei (ke)</i>	0.22
	* <i>yi ping xiaobaitu (zhi)</i>	0.18
	TOTAL	0.33
M3 partitive measures	* <i>yi kuai shanyang (tou)</i>	0.07
	* <i>yi kuai qianbi (zhi)</i>	0.20
	* <i>yi pian runiu (tou)</i>	0.09
	TOTAL	0.18
M4 group measures	* <i>yi qun shengzi (tiao)</i>	0.16
	* <i>yi shuang xian (tiao)</i>	0.07
	* <i>yi shuang xiaobaitu (zhi)</i>	0.09
	TOTAL	0.16

The subjects' misuses of mass classifiers cohered with the argument of Tai (1992, 1994). The relationship between a count classifier and an entity denoted by a noun is much more fixed than the relationship between a mass classifier and an entity denoted by a noun. In many cases, different mass classifiers can be used to specify different quantities of the same entity, and the same mass classifier can be used to express the same quantity of many different entities, but count classifiers are not as flexible.

Furthermore, as shown in Table 6, when our subjects made "cross-category" errors, their preferred substitution of standard measures for count classifiers was easily detected. The nature of standard measures might contribute to their performance. Standard measures such as *gongjin* and *gongfen* are conventionalized units used to indicate only the weight and length of the following nouns. That is, they mainly serve to denote the unit of measurement of the associated nouns, revealing no intrinsic relation with the properties of these nouns. Therefore, stan-

dard measures can be applied to any entities that possess weight, length, area, etc.

To summarize, our subjects, at their early stages of language acquisition, responded significantly differently to the count-mass distinction. They performed better on count classifiers than on mass classifiers and, for the most part, they used count classifiers to enumerate individuated entities and used mass classifiers to quantify substances.

5.2 Age Effects

This section primarily concerns the investigation of age differences. The results of the subjects' correct response to each count classifier in the three age groups are shown in Table 7:

Table 7: Mean Scores of Correct Count Classifiers Used by the Subjects

Type		Group 1 (3-yr-olds; n=15)		Group 2 (4-yr-olds; n=15)		Group 3 (5-yr-olds; n=15)	
		Mean	SD	Mean	SD	Mean	SD
C1-1-1	C1 <i>ge</i>	0.57	0.18	0.60	0.21	0.63	0.23
C1-1-2	C2 <i>wei</i>	0.17	0.24	0.37	0.23	0.37	0.23
C1-1 human		0.37	0.29	0.48	0.25	0.50	0.26
C1-2-1	C3 <i>zhi</i>	0.30	0.32	0.63	0.35	0.77	0.26
C1-2-2	C4 <i>tou</i>	0.20	0.25	0.37	0.23	0.33	0.31
C1-2 animal		0.25	0.29	0.50	0.32	0.55	0.36
C1 ANIMACY		0.31	0.29	0.49	0.28	0.53	0.31
C2-1-1	C5 <i>tiao</i>	0.40	0.21	0.43	0.26	0.57	0.18
C2-1-2	C6 <i>zhi</i>	0.30	0.32	0.63	0.30	0.67	0.24
C2-1 long saliently 1D		0.35	0.27	0.53	0.29	0.62	0.22
C2-2-1	C7 <i>zhang</i>	0.40	0.21	0.53	0.23	0.67	0.24
C2-2-2	C8 <i>mian</i>	0.20	0.25	0.40	0.21	0.33	0.24
C2-2 flat saliently 2D		0.30	0.25	0.47	0.22	0.50	0.29
C2-3-1	C9 <i>ge</i>	0.67	0.24	0.73	0.26	0.67	0.24
C2-3-2	C10 <i>ke</i>	0.33	0.24	0.60	0.34	0.57	0.26
C2-3 round saliently 3D		0.50	0.29	0.67	0.30	0.62	0.25
C2 INANIMACY		0.38	0.28	0.56	0.28	0.58	0.26
Total		0.35	0.29	0.53	0.29	0.56	0.28

In Table 7, a developmental progress was found in terms of the subjects' performance on the count classifiers. We can see that the older subjects, as far as

their overall performance is concerned, could better use count classifiers than the younger ones. The average score of correct responses for Group 3 (0.56) was higher than that for Group 2 (0.53) and Group 2 higher than Group 1 (0.35). One-way ANOVA indicated that there was a significant difference among the three age groups ($F(2, 42) = 10.675, p = 0.000$). The Scheffe post hoc further indicated that a significant difference was found between Group 1 and Group 2 ($p = 0.003$), and Group 1 and Group 3 ($p = 0.001$). However, the performance between Groups 2 and 3 did not reach a significant difference ($p = 0.857$).

Moreover, count-classifiers comprise two categories: animacy and inanimacy. With regard to animate/inanimate distinction, the age effects were easy to detect. There was an upward trend in mean scores as the subjects' age increased. One-way ANOVA showed that in both animacy and inanimacy classifiers there were significant differences among the three age groups (animacy: $p = 0.002$; inanimacy: $p = 0.000$). The Scheffe post hoc also showed that, in animacy and inanimacy classifiers alike, significant differences were found between Group 1 and Group 2 (animacy: $p = 0.020$; inanimacy: $p = 0.005$), and Group 1 and Group 3 (animacy: $p = 0.005$; inanimacy: $p = 0.001$). The difference in performance between Groups 2 and 3 again was not statistically significant (animacy: $p = 0.868$; inanimacy: $p = 0.905$).

As we take a closer look at each semantic feature, there was a gradual improvement on count classifiers. Within the animate subsection of the classifiers, there were human and animal classifiers. With regard to human classifiers *ge* and *wei*, the average scores of correct responses of Groups 3 and 2 were higher than that of Group 1. Nonetheless, one-way ANOVA showed that the three age groups did not perform significantly differently on the human classifiers ($F(2, 42) = 2.850, p = 0.069$). The major problem lies in the classifier *ge*, where no significance was found between the three age groups ($p = 0.675$). As for animal classifiers, the situation was a bit different. Despite the fact that a general developmental progress was found in terms of animal classifiers, Group 3 performed less well than Group 2 in response to the classifier *tou*. Even so, one-way ANOVA showed that the three age groups did perform significantly differently on animal classifiers ($F(2, 42) = 6.781, p = 0.003$). To be more specific, the Scheffe post hoc fur-

ther showed that there was a significant difference between the three-year-olds and the four-year-olds, and the three-year-olds and the five-year-olds. However, the difference between the four-year-olds and the five-year-olds was not significant ($p=0.849$).

As for shape classifiers, as mentioned earlier, group effects were found as well. In terms of overall shape classifiers (INANIMACY classifiers), the tendency was obvious that the older subjects outperformed the younger subjects. To begin with, in response to the 1D classifiers *tiao* and *zhi*, a developmental progress was found. One-way ANOVA showed that there was a significant difference among the three groups ($F(2, 42) = 6.931, p = 0.003$). As for the 2D classifiers *zhang* and *mian*, there was a general developmental progress and one-way ANOVA confirmed this ($F(2, 42) = 4.796, p = 0.013$). Nevertheless, when encountering the classifier *mian*, only ten subjects of Group 3 scored the full points in the case of the classifier *mian* in the PI task, where twelve subjects of Group 2 succeeded in identifying the correct picture. Although some subjects of Group 3 seemed to perform less well than most subjects of Group 2, we might want to attribute such a result to individual differences. One-way ANOVA showed that in response to the 2D classifiers there was a significant difference between the three-year-olds and the five-year-olds ($p=0.022$), but not between the other age groups.

Despite the overall developmental progression in shape classifiers, such tendency, did not seem true in response to the 3D classifiers. Compared to the five-year-olds, the four-year-olds performed much better on both the 3D classifiers *ge* and *ke*. Though one-way ANOVA indicated that, in terms of the 3D classifiers, there was a significant difference among the three age groups ($p=0.020$), a significant difference was found in the classifier *ke* ($p=0.027$) rather than the classifier *ge* ($p=0.701$). The Scheffe post hoc further showed that between the four-year-olds and the five-year-olds there was no significant difference in their performance (*ge*: $p=0.765$, *ke*: $p=0.949$). However, a significant difference was found in the classifier *ke* between the three-year-olds and the four-year-olds

($p=0.046$)⁹.

Table 8 presents the mean scores of mass classifiers of our subjects:

Table 8: Mean Scores of Correct Mass Classifiers Used by the Subjects

Type		Group 1 (3-yr-olds; n=15)		Group 2 (4-yr-olds; n=15)		Group 3 (5-yr-olds; n=15)	
		Mean	SD	Mean	SD	Mean	SD
M1-1	M1 <i>gongjin</i>	0.10	0.21	0.23	0.26	0.27	0.32
M1-2	M2 <i>gongfen</i>	0.07	0.18	0.17	0.24	0.27	0.26
M1 standard measures		0.08	0.19	0.20	0.25	0.27	0.29
M2-1	M3 <i>wan</i>	0.30	0.32	0.57	0.42	0.77	0.26
M2-2	M4 <i>ping</i>	0.30	0.37	0.67	0.36	0.77	0.37
M2 container measures		0.30	0.34	0.62	0.39	0.77	0.31
M3-1	M5 <i>kuai</i>	0.20	0.25	0.40	0.21	0.57	0.26
M3-2	M6 <i>pian</i>	0.30	0.32	0.60	0.34	0.60	0.28
M3 partitive measures		0.25	0.29	0.50	0.29	0.58	0.27
M4-1	M7 <i>qun</i>	0.17	0.24	0.27	0.26	0.47	0.13
M4-2	M8 <i>shuang</i>	0.30	0.25	0.57	0.26	0.63	0.30
M4 group measures		0.23	0.25	0.42	0.30	0.55	0.24
Total		0.22	0.28	0.43	0.34	0.54	0.33

As shown in Table 8, a developmental difference was also obtained in the subjects' use of mass classifiers—the older the children were, the better their performances were. As far as all mass classifiers are concerned, one-way ANOVA confirmed that a significant difference was found among the three age groups ($F(2, 42) = 17.526, p = 0.000$). Similar to the performance of overall count classifiers, the Scheffe post hoc test further indicated that a significant difference existed between Groups 1 and 2 ($p = 0.002$), and Groups 1 and 3 ($p = 0.000$), but not Groups 2 and 3 ($p = 0.166$).

As we take a closer look at each semantically-based subgroup, a gradual developmental progress was also found in mass classifiers. One-way ANOVA showed that there was a significant difference among the three groups in standard measures ($p = 0.039$), container measures ($p = 0.000$), partitive measures ($p = 0.000$) and group measures ($p = 0.000$). Again, the Scheffe post hoc further indi-

⁹ No statistical significance was found in the classifier *ge* between Group 1 and Group 2 ($p = 0.765$), Group 2 and Group 3 ($p = 0.765$), and Group 1 and Group 3 ($p = 1.000$).

cated that a significant difference existed between Groups 1 and 2, and between Groups 1 and 3, but not between Groups 2 and 3.

It is intriguing to note that in container measures, partitive measures and group measures, the developmental progress seemed conspicuous while in standard measures, the progress seemed relatively slower, which might indicate that standard measures were far more difficult for our subjects to comprehend and produce.

To summarize, one-way ANOVA indicated that the three age groups responded significantly to overall count classifiers ($p = 0.000$) and mass classifiers ($p = 0.000$). Within the semantically-based subgroups, with the expectation of human classifiers, the tendency that the older outperformed the younger subjects was obvious and confirmed by SPSS. The Scheffe post hoc further indicated the statistical significances were found mainly between the three-year-olds and the four-year-olds, and between the three-year-olds and the five-year-olds, rather than between the four-year-olds and the five-year-olds.

The abovementioned data were further analyzed by the **Two Way Mixed Design ANOVA** and confirmed that our subjects of different age groups did respond significantly differently to the count-mass distinction ($p = .000$). To put it another way, developmental differences were significant in response to the count and mass classifiers.

For decades, there has been substantial interest in the question of how age affects language acquisition. Take children's semantic development for example, according to Piaget (1932), children have accomplished a lot by the age of one. They are able to repeat interesting invents and show preliminary indications of classification or meaning. Shortly after age one, children begin to utter words. To use words meaningfully, they begin to associate a sound with a meaning. By the age of 1;6, they have already acquired the object concept. It is also around this age that children begin to form a mental representation. Children in their second year have gradually become familiar with their surroundings, and they had formed some mental representations which were the meanings of the words they first acquired. At age three, children command some notions of time and aspectual distinctions and are beginning to develop a repertoire of modal meaning

(Goodluck 1991).

In the present study, age is also a determining factor for affecting our subjects' use of count and mass classifiers. The fact that our subjects' ability to detect the grammatical count and mass distinction increased with their age is understandable in that as our subjects grew older, they exhibited a higher level of linguistic competence and performance. Chinese language acquisition researchers (Chien et al. 2003, Fang 1985, Hu 1993, Ying et al. 1983) also reported that children's acquisition of classifiers is strongly associated with their age.

It was also observed in the production data that those children aged three used only two to three classifiers. As Erbaugh (1986) found that children almost never used specific classifiers before the age of 2;6, specific classifiers seemed to emerge at around the age of three. In the present study, although the three-year-olds used the general classifier most of the time, the number of classifiers produced increased steadily with their age. By age four, they used four to five classifiers. By age five, they produced five to six classifiers. To put it another way, the frequency and the number of different classifiers our subjects used correlated positively with their age.

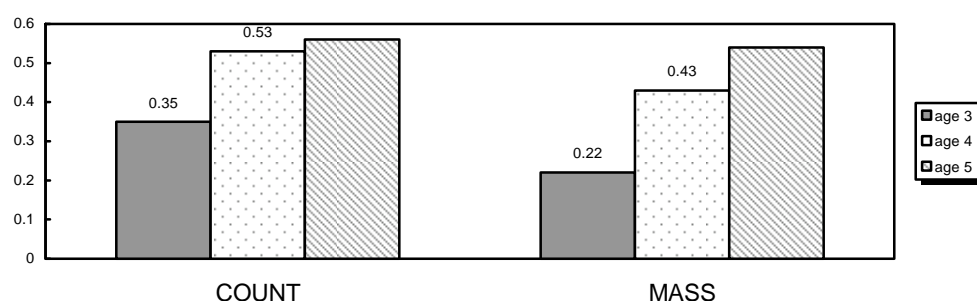


Figure 1: Distribution of the Subjects' Correct Response to the Two Types of Classifiers in PI and PD Tasks

Similarly, as can be seen in Figure 1, in terms of the count-mass distinction, as the subject's age increased, so did his performance on classifiers. To put it differently, it was found that, both in response to count and mass classifiers, the age between three and four was a critical stage in our children's classifier devel-

opment. It is during this momentous period that our subjects began to rapidly learn to grasp the meaning of count and mass classifiers and use them in their daily life.

From age three to age four, it is said that children start to learn how to read and write and their verbal skills increase rapidly. During this period most children can count from one to three, focus on a specific task, and recall things that happened in the recent past. This is also the age at which most children know what sex they are, and they are able to name most of their body parts. All this may contribute to children's critical development in their acquisition of classifiers between age three and age four (Lee and Dasgupta 1995). Children, by the age of four, have already acquired a good many classifiers so that after age four, the developmental progress is comparatively less obvious. This may cohere to Erbaugh's findings (1986). According to Erbaugh, the children were found to demonstrate a sound knowledge of the basic syntactic nature of classifiers at a very young age. Her two participants, aged two and three, were almost as reliable as the adults in using classifiers whenever one was required. The results of the present study supported Chien et al. (2003). As mentioned above, with regard to both count and mass classifiers, their 4-year-olds performed as well as the 5-year-olds, and they performed significantly better than the 3-year-olds. To put it differently, the age between three and four is a critical stage in Chinese children's classifier acquisition.

Interestingly, in addition to the developmental progress, there are two phenomena worth mentioning. Firstly, if we compare the respective performances of the three age groups, we can see that our subjects' performance on count classifiers was not the same as their performance on mass classifiers, indicating that in the acquisition process of classifiers, children aged three to five may make much more progress with regard to mass classifiers than count classifiers. Secondly, despite the fact that our subjects generally showed better abilities in dealing with count classifiers, their performance difference between count classifiers and mass classifiers became less marked as their age increased. To be more specific, for the three-year-olds, the result of count and mass classifiers was 0.35 to 0.22. The result of the four-year-olds was 0.53 to 0.43 and the result of the five-year-olds

was 0.56 to 0.54. All this suggests that our children's ability to judge count-mass distinction should correlate positively with their age. By the age of five, they had roughly comparable performance on count and mass classifiers.

As a whole, our findings support the previous linguistic studies of Chinese classifier acquisition. The age effects found in our subjects' comprehension and production serve as an empirical support for the previous linguistic analyses that age is a determining factor for the success of Chinese classifiers (Chien et al. 2003, Fang 1985, Hu 1993, Loke 1991, Ying et al. 1983).

5.3 The Hierarchy of Difficulty of Count and Mass Classifiers

This section aims to address the third research question about the hierarchy of difficulty in the subjects' acquisition of count and mass classifiers. The correct responses of all the subjects to each classifier are shown in Table 9:

Table 9: Subjects' Mean Scores of Correct Count and Mass Classifiers

Count Classifier				Mass Classifier			
Type		mean	SD	Type		mean	SD
C1-1-1	C1 <i>ge</i>	0.60	0.20	M1	M1 <i>gongjin</i>	0.20	0.27
C1-1-2	C2 <i>wei</i>	0.30	0.25	M1	M2 <i>gongfen</i>	0.17	0.24
C1-2-1	C3 <i>zhi</i>	0.57	0.36	M2	M3 <i>wan</i>	0.54	0.38
C1-2-2	C4 <i>tou</i>	0.30	0.27	M2	M4 <i>ping</i>	0.58	0.41
C2-1-1	C5 <i>tiao</i>	0.47	0.22	M3	M5 <i>kuai</i>	0.39	0.28
C2-1-2	C6 <i>zhi</i>	0.53	0.33	M3	M6 <i>pian</i>	0.50	0.34
C2-2-1	C7 <i>zhang</i>	0.53	0.25	M4	M7 <i>qun</i>	0.30	0.25
C2-2-2	C8 <i>mian</i>	0.31	0.25	M4	M8 <i>shuang</i>	0.50	0.30
C2-3-1	C9 <i>ge</i>	0.69	0.25				
C2-3-2	C10 <i>ke</i>	0.50	0.30				

As far as each individual classifier is concerned, the rankings were (in descending order of total mean scores): 3D *ge* (0.69), human *ge* (0.60), *ping* (0.58), animal *zhi* (0.57), *wan* (0.54), 1D *zhi* (0.53), *zhang* (0.53), *ke* (0.50), *pian* (0.50), *shuang* (0.50), *tiao* (0.47), *kuai* (0.39), *mian* (0.31), *wei* (0.30), *tou* (0.30), *qun* (0.30), *gongjin* (0.20), and *gongfen* (0.17).

Figure 2 shows the results of each individual classifier and their corresponding hierarchy of difficulty:

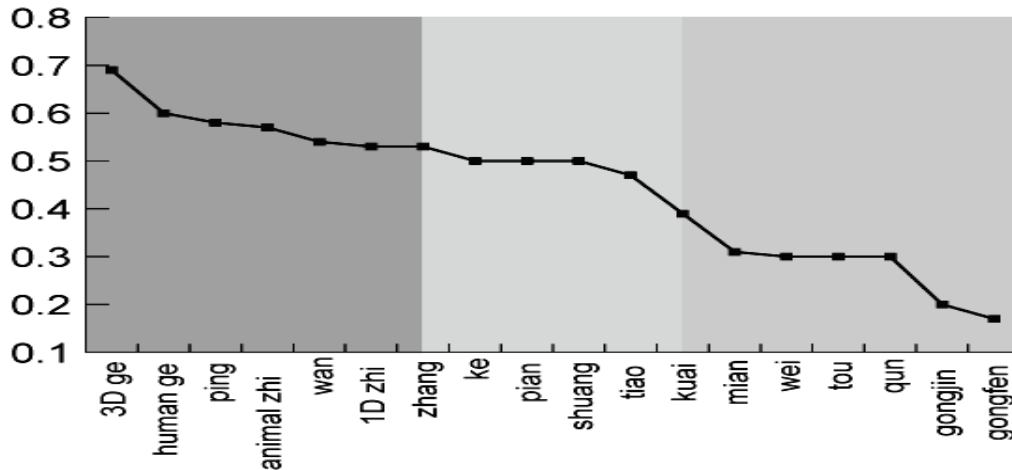


Figure 2: Distribution of the Subjects' Correct Responses to Each Classifier

As can be seen in Figure 2, the classifiers used by the subjects indicated a general emergence order among the children aged between three and five. Among the classifiers tested, *ge* indeed was the earliest acquired classifier. Children used *ge* initially and preponderantly as a “general classifier” for all objects, which contributed to its highest frequency in their speech. Similarly, although some previous studies have shown different results concerning the order of classifier acquisition, they all reached the conclusion that children first acquired the classifier *ge* (Chien et al. 2003, Erbaugh 1986, Fang 1985, Hu 1993, Loke 1991, Ying et al. 1983). The present findings can be another piece of evidence for the *ge*-prominent phenomenon in Chinese children's classifier acquisition.

In addition to the human classifier *ge*, the animal classifier *zhi* was among the early acquired classifiers, showing that our children's use of the classifiers was constrained by ANIMACY (MacWhinney and Fletcher 1995). This observation is comparable with Erbaugh's (1986), Fang's (1985), and Hu's (1993) findings. In an experimental study of 36 four to six-year-old Chinese children, Fang (1985) found that the animal classifier *zhi* was the most correctly used classifier. The animacy classifier *zhi* was also found among the most frequently used

classifiers by two of Erbaugh's (1986) four children. In Hu's (1993) study, *zhi* (the animacy classifier) was the earliest acquired classifier as well. Hu further pointed out that *shuang* (the arrangement classifier), and *zhang* (the shape classifier denoting two dimensions and thinness) were also the most frequently used among her twenty-four Mandarin-speaking children from ages three to six years. The present findings also support Hu's results in that *zhang* (0.53) and *shuang* (0.50) were found among the early acquired classifiers.

Furthermore, for our subjects, container measures *ping* and *wan* were relatively easy both in the comprehension and production tasks. This is because containers are easy to find in children's environment, and hence they are familiar with the classifiers *ping* and *wan*. However, partitive measures, such as *pian* and *kuai*, were challenging for our children, indicating that the children aged three to five have not fully acquired the meaning and use of partitive measures, which designate partitions or parts of objects rather than groups of them. Our subjects' unfamiliarization of *kuai* and *pian* supports the findings of Loke (1991), who found that *kuai* and *pian* were the least salient classifiers and therefore among the late acquired classifiers.

Among the late acquired classifiers, standard measures *gongjin* and *gongfen* received the lowest mean scores. In other words, our children encountered the most difficulty with standard units of measurement. Such findings meet our expectations in that most preschoolers are not familiar with the concept of standard measuring system, which is often taught in the curriculum of elementary school after children acquire the basic notion of mathematics.

It is worth mentioning that though some classifiers belong to the same semantically-based subgroup, one was relatively easy for our children while the other was just the opposite. Classifiers such as human *ge* versus *wei*, *zhang* versus *mian*, *zhi* versus *tou*, and *shuang* versus *qun* were these cases.

To begin with, both *ge* and *wei* can be used to denote the human referents. *Wei*, which exhibits a higher social status of the human referents, posed considerable difficulty for our subjects aged from three and five. In the comprehension task, ten of the subjects chose the noun referent *xiaoyinger* 'baby' rather than *laoshi* 'teacher' to co-occur with the classifier *wei*. *Wei* reflects the social and

cultural prominence of the human referents but *ge* simply denotes common humans who are not in the category “people to be polite to.” Hence, while *wei* has the semantic feature [+honorable], *ge* does not. At this stage of development, our children had difficulty differentiating “people to be polite to” from “the general public.” For them, detecting whether a person is honorable and respected and thus required the use of the honorific classifier *wei* is closely associated with their cognitive development. With the increase of their age, they gradually understand and discern the social and cultural subtlety. This not only corresponds to Hu's (1993) study, where the honorific classifier *wei* was one of the late acquired classifiers, but also matches the findings of a number of studies (Chang 1983, Fang 1985) that found Chinese children's proficiency in classifiers to be closely related to their educational levels and cognitive development.

Similarly, while *zhang* proved to be simple for our children, *mian* remained an obstacle. Several subjects could not tell the differences between the two-dimensional classifiers *zhang* and *mian*. They chose the noun referent *jingzi* ‘mirror’ rather than *tiezhi* ‘sticker’ to co-occur with the classifier *zhang*. Both *zhang* and *mian* share the physical attribute of flatness. Since *jingzi* ‘mirror’ is a flat object, our children's misuse of *zhang* is understandable. Nonetheless, *zhang* denotes flat, thin and flexible entities such as in *yi zhang congyoubing* ‘a deep-fried scallion pancake,’ but *mian* refers to hard or nonflexible objects with flat surfaces such as *qiang* ‘wall.’ In other words, the following semantic features can be assigned to *zhang*: [+2D, +thin, +flexible]; and to *mian*: [+2D, ±thin, —flexible]. *Zhang* is then much more salient than *mian* in the feature ‘flexibility.’ In addition to the difference in flexibility, *mian* is only salient on the front side or the face (Tai and Chao 1994). It mainly classifies objects which have a front side or face. As a consequence, a mirror is often the most prototypical object. For our children, such subtle differences were not detected until they acquired the adults' usage, hence resulting in the difficulty of *mian*.

Both *zhi* and *tou* are classifiers associated with non-human animates. The former is used with any animals whereas the latter is based on a part-whole relationship between the animal enumerated and its head. That is, one prominent attribute of the referent is used to refer to the whole referent. Such part-whole no-

tion, again, posed great difficulty for our subjects.

Shuang and *qun* are group measures, designating a group or collection of individuals. For our children, *shuang* is comparatively easy in that it is a classifier to refer to the object that is made from two similar parts joined together. Noun collates of *shuang* such as *xiezi* ‘shoes’ and *kuaizi* ‘chopsticks’ are readily available and easy to detect in their immediate environment, hence resulting in their familiarization. *Qun*, on the other hand, designates several people, animals or things that are all together in the same place. The classifier *qun* provides a collective reference for separate entities. This collective notion involving large quantities caused our children difficulties. Despite the fact they might comprehend the meaning of *qun* (27 subjects comprehended its meaning in the PI task), none of the 45 subjects were able to use it in the production task. Most of them used the phrase *hen duo* ‘a large quantity’ rather than the classifier *qun* to describe the picture where lots of monkeys were presented.

6. Conclusion

The present study carefully designed the experiment and has shed some light on the issues it aims to investigate. Still, it has its limitations.

First of all, the study selected only ten count classifiers and eight mass classifiers. Although these classifiers are commonly used by adults, it is possible that our children had acquired classifiers other than the tested ones. Moreover, in the present study, in the subcategory of INANIMACY, we only dealt with the shape/dimensionality classifiers, but not the function/type classifiers, which characterize classes such as bounded volumes, tools, plants, and buildings. In future studies, more classifiers, especially function/type classifiers, may be included to show a whole picture of the acquisition of the Chinese classifier system.

Second, the present study was experimental in terms of its methodology. Future researchers can conduct longitudinal research to delve into children’s use of count and mass classifiers and track their developmental trends over a long period of time.

Finally, even though our results have been demonstrated that the forty-five subjects successfully detected the grammatical count-mass distinction, how chil-

dren acquire this mapping, particularly in a language like Chinese still remains unknown. Future research is still necessary.

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臺灣學齡前兒童華語量詞習得之再探討

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摘要

本研究旨在探討臺灣學齡前兒童對華語類別量詞（count classifiers）和計量量詞（mass classifiers）的習得（Cheng and Sybesma 1998, Tai 1994）。本研究共設計兩個實驗：圖片辨識測驗及圖片描述測驗。研究對象為 45 位以華語為母語的學齡前幼童，根據其年齡分成三組（第一組為三歲、第二組為四歲、及第三組五歲）。

主要的研究發現如下：首先，學齡前兒童能夠分辨類別量詞和計量量詞之間的差異，此差異達到統計上的顯著，且不同於前人（Chien et al. 2003），我們發現學齡前兒童在類別量詞的表現顯著優於計量量詞。其次，「年齡」的確對類別量詞和計量量詞的習得有所影響並達到統計上的顯著差異（Chien et al. 2003, Hu 1993, Loke 1991, Ying et al. 1983），研究發現三歲到四歲是兒童習得量詞的關鍵期。量詞「個」是兒童最早習得的量詞，「標準量詞」對兒童來說難度最高，因此為最慢習得的量詞（Erbaugh 1986, Loke 1991）。

關鍵詞：量詞，華語，母語習得，學齡前兒童