

Computer assisted learning of Chinese shape classifiers*

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Abstract

Classifiers are important characteristics of Chinese. All the noun phrases with numerals or demonstratives must co-occur with classifiers, for example, *liang zhang zhuozi* ‘two CL table’ or *zhe zhi bi* ‘this CL pen.’ Classifiers vary depending on the nouns. This poses a big challenge for learners of Chinese as second language. The goal of this study is to develop a multimedia classifier learning program based on shape.

Thirty CSL learners participated in our study: fifteen in the experimental group and fifteen in the control group. The experimental group used the multimedia program and the control group received the same information as paper assignments introducing the nine shape classifiers including saliently one-dimensional *tiao*, *gen*, *zhi*, saliently two-dimensional *zhang*, *pian*, *mian*, and saliently three-dimensional *ge*, *ke*, and *li*. The semantic bases of classifiers were introduced inductively followed by drills and simulated situation.

A pretest and a post test were given before and after the ten-week treatment. There is no significant difference between the two groups in the pre-test. The paired-sample t-test within neither experimental and control group

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indicated significant progress. After analyzing by learners' L1, we found interestingly learners with classifier L1 relapsed while learners with nonclassifier L1 improved after using the material.

Key words: Chinese, classifier, Chinese as a second language, second language acquisition, Computer assisted language learning, (CALL)

1. Introduction

Classifiers are important characteristics of Chinese. All the noun phrases with numerals or demonstratives must co-occur with classifiers, for example, *liang zhang zhuozi* 'two CL table' or *zhe zhi bi* 'this CL pen.' There are about 500 classifiers or measure words used in daily life in Modern Mandarin (Huang, Chen, & Lai, 1997). Classifiers vary depending on the nouns. Every noun has a conventional classifier. Some nouns can collocate with more than one classifier. For example, *horse* can take the specific classifier *pi* or the general classifier *zhi* for animals. There is no shift in the meaning. This poses a big challenge for learners of Chinese as second language.

1.1. Definition of classifiers

There are all kinds of entities in the world. They are represented as nouns in human language. Semantically, nouns can be grouped into count nouns and mass nouns. Count nouns denote individual countable entities, such as DOG; mass nouns denote an undifferentiated mass, such as WATER (Lyons 1977: 462). Without specific context, if we say "two waters," the listener does not know whether we mean "two glasses of water" or "two bottles of water." It is therefore reasonable that languages have counters, such as *glass* or *bottle*, for mass nouns. Such counters do not cause difficulties for second language learners, because they can find the counterparts in their native languages. However, whereas languages such as English tend to use counters only with mass nouns, classifier languages such as Chinese, Japanese, and Thai use counters for count nouns as well. Such kinds of counters are called "classifiers." For example,

Mandarin Chinese requires the classifier *tiao* in *liang tiao gou* ‘two classifier dog’ ‘two dogs.’ These classifiers are new categories for native speakers of non-classifier languages, and they seem to be semantically redundant, because *two dogs* is clear enough.

1.2. Classifiers and categorization

Seven categories have been proposed for classification: material, shape, consistency, size, location, arrangement and quanta. This classification is based on the use of classifiers in more than fifty languages (Allan, 1977). The material category has three subcategories: animacy, inanimacy, abstract and verbal nouns. Shape is divided into saliently one-dimensional, saliently two-dimensional, and saliently three-dimensional. Consistency consists of three subtypes: flexible, hard or rigid and non-discrete. Size means big or small. Location refers to the place where the object exists. Arrangement refers to the relation among members that a collective noun denotes. Quanta refers to the function of quantification. Material, shape, consistency, size along with attributes of parts (Tversky and Hemenway, 1984) are identified as relevant cognitive categories in Chinese classifiers (Tai, 1994). For example, the classifier *tiao* in Mandarin Chinese groups long objects into one category (Tai and Wang, 1990), while the classifier *zhang* groups flat objects into another category (Tai and Chao, 1994). This has been shown to be psychologically real by Tien, Tzeng and Hung (2002). They conducted a multiple regression analysis on data independently collected from a noun-feature rating task and a noun classifier collocation judgment task. The results show that participants used noun feature as a valid cue in acceptability judgments of classifiers. For example, participants rated *shenzi* ‘rope’ to be long and accepted *shenzi* ‘rope’ to go with the long classifier *tiao*. In the classifier elicitation, they found that production of classifiers shifted from the original category to another with the manipulation of the salience of noun features. These results suggest that the semantic bases for noun classifier collocations do have psychological reality for Mandarin speakers. Native speakers of Mandarin agreed that entities denoted by nouns collocating with *tiao* were long and those with *zhang* were flat. This object shape percep-

tion was also agreed by nonnative speakers (Kuo, 2005); therefore, could be useful for second language learners.

1.3. Acquisition of classifiers in a second language

Most studies in second language acquisition have focused on Indo-European languages. There are therefore few studies on classifiers in second language acquisition research. Classifiers were used as an indicator of a general second language acquisition issue. For example, Chen (1996) investigated the effect of different types of corrective feedback on the acquisition of Chinese classifiers by 38 American college students. The results support the view that considers corrective feedback to be facilitative.

In an investigation of non-native speakers' use of nominal classifiers in Mandarin Chinese, Polio (1994) found that using a classifier in an obligatory context did not pose a problem for second language learners. There was little omission of classifiers. Most speakers overused them where they do not belong. Loke (1996) attempted to establish the norms of Mandarin shape classifiers for Chinese language teaching and learning. Liang (2008) showed that shapes played an influential role in the acquisition of classifiers. First, a strong and positive correlation was shown between learners' proficiency and the shape classifier comprehension. Second, two dimensional classifiers were best learned followed by one-dimensional and then three-dimensional classifiers.

Shape has also been found to be a useful strategy for CSL learners (Kuo, 2000) and played an influential role in the acquisition of classifiers (Liang, 2008). Thus, the goal of this study is to develop a multimedia classifier learning program based on shape. By interacting with the multimedia, learners can get the meanings through pictures and hear the speech by native speakers. The program is also web-based so that learners all over the world can have access to it.

2. Methodology

The present study investigated if multimedia learning material can better facilitate the learning of Chinese classifiers. In this section, the participants, materials, procedures, and data analysis will be introduced.

2.1. Participants

Thirty CSL learners, 10 males and 20 females at a university in Taiwan, where Mandarin is the official language, participated in the research. Twenty-four of them in two separate classes enrolled in degree programs taking Chinese as a required course for international students and the other six were students who volunteered to take Chinese in the extension program. Those in the degree program took three-hour Chinese class and two-hour tutoring a week. Those in the extension program had 12-hour Chinese class a week. These students ranged from 21 to 58 years old with an average age of 27.86. Moreover, most of them came from Southern Asia, some from Northern Asia, and only three of them were from France. Generally, the participants learned Chinese for six months before the treatment. But some of them learned Chinese before they came to Taiwan, so the length of Chinese learning is from six months to 18 months. Moreover, some of the participants' native languages are classifier languages. The information of the participants' native languages is given in Table 1.

Table 1 The participants' native languages

	Classifier language 量詞語言	not used 未使用	Used 使用	Total 總計
French 法語	No	1	2	3
Filipino 菲律賓語	No	0	1	1
Thai 泰語	Yes	6	7	13
Indonesian 印尼語	Yes	0	6	6
Mongolia 蒙古語	Yes	0	1	1
Vietnamese 越南語	Yes	0	1	1
Korean 韓語	Yes	3	1	4
Japanese 日語	Yes	1	0	1
Total 合計		11	19	30

The participants were divided into two groups, 15 in the experimental group and 15 in the control group. An independent t-test on the pre-test shows that there is no difference between the two groups ($t(28) = .94, p > .05$) as given in Table 2. Therefore, the two groups are homogeneous in terms of their knowledge of Chinese classifiers.

Table 2 Independent t-test between experimental group and control group on the pretest

Groups 組別	N 人數	M 平均	SD 標準差	t	df	p
Experimental 實驗組	15	56.33	17.67	.94	28	.35
Control 控制組	15	49.67	20.91			

2.2. Materials

The materials used in the present study including learning materials, tests, and questionnaires are described in the following.

2.2.1. Learning materials

Two kinds of learning materials were developed, multimedia for the experimental group and written text for the control group. In both learning materials, there are ten lessons introducing nine shape classifiers including saliently one-dimensional *tiao*, *gen*, *zhi*, saliently two-dimensional *zhang*, *pian*, *mian*, and saliently three-dimensional *ge*, *ke*, and *li*. *Tiao*, *gen*, and *zhi* are all classifiers for saliently one-dimensional objects in Mandarin. To account for their distribution, Tai and Wang (1990) propose that each of them has its own salient perceptual property, which serves as the typicality condition for categorization: one-dimensional extension in length for *tiao*, three-dimensionality of rigid long objects for *gen*, and cylindricity of the saliently one-dimensional rigid objects for *zhi*. This can be shown by the following examples:

Table 3 *Tiao* and some collocating nouns

Classifier 量詞	Nouns 名詞	Gloss 翻譯
Tiao 條	Kuzi 褲子	trousers
	Shengzi 繩子	rope
	Yu 魚	fish
	She 蛇	snake
	Xiaohwanggua 小黃瓜	cucumber
	He 河	river
	Lu 路	road
	Falu 法律	law

Table 4 *Gen* and some collocating nouns

classifier 量詞	Nouns 名詞	Gloss 翻譯
Gen 根	Toufa 頭髮	hair
	Xiangjiao 香蕉	banana
	Lazhu 蠟燭	candle
	Shengzi 繩子	rope
	Shouzhi 手指	finger

Table 5 *Zhi* and some collocating nouns

classifier 量詞	Nouns 名詞	Gloss 翻譯
Zhi 枝	Shuzhi 樹枝	branch
	Hua 花	flower (with the stem)
	Cao 草	grass
	Bi 筆	writing tool
	Bingbang 冰棒	ice on a stick

Mandarin uses the classifier *zhang* to categorize ‘paper,’ ‘table,’ ‘chair,’ and ‘bed.’ ‘Paper’ is the central member in this category due to its flatness and two-dimensionality. The category of *zhang* extends to cover ‘table,’ ‘chair,’ and ‘bed,’ since they all have a two-dimensional surface, which is functionally salient. Although they are in fact three-dimensional objects, the saliently two-dimensional surface is the part that offers the main function. Thus, we put things on the surface of a table, and when we sit on a chair or sleep on a bed, we contact the two-dimensional surface. For an object which has both one-dimensionality and two-dimensionality, which feature is perceived depends on their importance to the object. For a ruler, *zhi* is used. In this case, one-dimensionality has the priority to be perceived, because a ruler is for measuring length. One-dimensionality is therefore more salient than two-dimensionality for a ruler. On the other hand, *zhang* is used for a strip of paper. Regardless of the degree of one-dimensionality of a strip of paper, its two-dimensional surface is where we write. Moreover, since ‘paper’ is the central member in *zhang* category, it is more tightly tied with *zhang*.

In Mandarin, *li*, *ke*, and *ge* refer to three dimensional round objects of different sizes, as for example, *yi li mi* ‘a grain of rice,’ *yi ke baoxincai* ‘a head of cabbage,’ and *yi ge qiu* ‘a ball.’ *Ge* is also a general classifier, which is often used to replace other classifiers. However, it is limited to objects without salient one-dimensionality or two-dimensionality. For example, if we replace the classifier *tiao* with *ge* in the expression *yi tiao mianbao* ‘a loaf of bread,’ the bread is not saliently one-dimensional any more. It is neither a loaf of bread, with feature of salient one-dimensionality, nor a slice of bread, with the feature of salient two-dimensionality. The listeners will think the referent is round, such as a doughnut.

The collocating nouns were chosen from the Mandarin 8000 words provided by the Steering Committee for the Test of Proficiency-Huayu (SC-TOP). Based on the frequency difference, these 8000 words are further divided into three levels: basic, intermediate, and advanced.

There are ten lessons. Each lesson introduced one classifier and the last lesson is the review of the nine classifiers. The content of the two learning materials was similar. The major difference is the presentation of the materials. The learning material for the experimental group is presented in the form of Flash with pictures and animations while the learning material for the control group is presented in the form of paper-based textbook with words only.

In Flash, we first introduce the characteristics of the classifiers with prototypical collocating nouns, which bear most salient features of the members. The example sentences (e.g., *Zhe shi yi tiao mianmao* ‘this is a loaf of bread’) were presented with pictured objects and learners needed to choose the correct characteristics by observing the similarities among those nouns. For example, in lesson 1 *tiao*, we presented *lu* ‘road’, *qunzi* ‘skirt’, *qiaokeli* ‘chocolate’, *mianbao* ‘bread’, and *mian* ‘noodle’ with pictures to learners. Then, learners needed to choose long and flexible as characteristics of *tiao* by observing the pictures. In part two, learners apply the characteristics of the specific classifier to pick the collocating nouns by shooting and catching in games. If they chose the wrong picture of the collocating noun, the classifier of that collocating noun and the characteristics of this classifier were provided. In the third section, learners prac-

ticed classifier under simulated real-life situations. Based on Situational Language Learning, the program provides a generative situation to encourage the use of classifiers. For example, we first showed them a short animation to present the context such as shopping or putting the products in order. After that, they need to follow our instruction to buy specific items with specific classifier to get discount or to put the products in correct order. Each lesson may contain at least three contexts for learners to practice. The program is available at http://web.ncyu.edu.tw/~jennykuo/CSL/L_Opening.swf/.

In the paper-based textbook, we used the dialogs in one of the contexts in the third section in Flash as the text for each lesson in the first section. In the second section, we introduce the characteristics of the classifier in the similar way as in Flash. The only difference is that collocating nouns were presented without pictures. In the third section, we also designed multiple choice questions for learners to practice collocations between nouns and classifiers. Answers were provided for learners to check by themselves.

2.2.2. Pretest and Posttest

A pretest and a posttest were designed to examine the improvement of the students by using different learning materials. The content of the tests, a pilot study, item analysis, and reliability are introduced in the following.

Both pretest and posttest were written tests containing two tasks. The first task is that given a classifier participants need to choose a correct noun that matches the classifier and the second task is that given a noun participants need to choose a correct classifier that could collocate with the noun. The nouns in our tests were chosen from the Mandarin 8000 words provided by the Steering Committee for the Test of Proficiency-Huayu (SC-TOP). Based on the frequency difference, these 8000 words were further divided into three levels: basic, intermediate, and advanced. In each task, there are 25 questions and six to seven questions in each level.

2.2.3. Reliability.

The tests were piloted with twenty-one learners of Chinese as a second language with the mean age 22.75 years old, including 14 males and 7 females. The

participants were asked to finish both pre- and post-test on the same day and also to complete a background questionnaire. After the pilot tests were completed, a paired t-test was conducted to see if there is significant difference between pre- and post-test. As shown in Table 6, the scores of pretest and posttest do not significantly differ from each other in our pilot study ($t = .73, p > .05$). So, the difficulty of pre- and post-test is the same.

Table 6 Results of paired t-test on pretest and posttest

	M 平均	N 人數	SD 標準差	t	df	p
Pretest 前測	29.33	21	9.97	.73	20	.48
Posttest 後測	28.29	21	11.68			

Besides the paired t-test, item difficulty (P) and item discrimination (D) indexes were also conducted to show the difficulty and discrimination of each task in each test. For the item difficulty index (P), the higher the value is, the lower the difficulty will be. For the item discrimination index (D), the higher the value is, the better the item can discriminate high and low achievers. Moreover, the higher the discriminate index value, the higher the Pearson's r value will be. The results are presented in the following tables. In Table 7 shows the results of pre-test on task one, the mean difficulty is .27 and the mean discrimination is .23.

Table 7 Item analysis on Task One of pretest

Item	<i>P</i>	<i>D</i>	<i>r</i>
1	0.55	0.49	0.57*
2	0.23	0.46	0.62**
3	0.23	0.46	0.33
4	0.25	0.22	0.55*
5	0.05	0.09	0.06
6	0.44	0.58	0.69**
7	0.23	0.46	0.40
8	0.13	-0.08	-0.23
9	0.39	0.49	0.72**
10	0.40	0.47	0.65**
11	0.28	-0.01	-0.08
12	0.21	0.13	0.36
13	0.14	0.27	0.28
14	0.30	0.31	0.44
15	0.40	-0.07	0.08
16	0.32	0.64	0.39
17	0.40	-0.07	0.08
18	0.18	0.36	0.24
19	0.14	0.27	0.24
20	0.16	0.04	0.28
21	0.44	0.03	0.24
22	0.28	-0.01	0.03
23	0.05	0.09	0.06
24	0.47	-0.21	-0.19
25	0.18	0.36	0.52*

Note. * $p < .05$; ** $p < .01$

Table 8 shows the results of pretest on Task Two. The mean difficulty is .32 and the mean discrimination is .15.

Table 8 Item analysis on Task Two of pretest

Item	<i>P</i>	<i>D</i>	<i>r</i>
26	0.25	-0.22	-0.08
27	0.33	0.48	0.55*
28	0.35	0.16	0.10
29	0.26	0.34	.50*
30	0.57	0.58	0.63**
31	0.47	0.21	0.33
32	0.16	-0.04	0.22
33	0.21	0.43	0.53*
34	0.45	0.53	0.50*
35	0.42	0.30	0.36
36	0.21	0.43	0.34
37	0.25	-0.22	-0.18
38	0.33	-0.08	-0.10
39	0.42	-0.26	-0.05
40	0.44	-0.03	0.00
41	0.49	-0.12	-0.02
42	0.33	0.48	0.55*
43	0.07	0.14	0.15
44	0.16	-0.04	0.03
45	0.23	0.10	0.17
46	0.33	0.48	0.39
47	0.14	-0.27	-0.34
48	0.23	0.10	0.17
49	0.49	0.44	0.52*
50	0.33	-0.08	0.10

Note. * $p < .05$; ** $p < .01$

Table 9 shows the results of posttest on Task One. The mean difficulty is .28 and the mean discrimination is .21.

Table 9 Item analysis on Task One of posttest

Item	<i>P</i>	<i>D</i>	<i>r</i>
1	0.34	0.46	0.56*
2	0.27	0.32	0.47
3	0.27	0.32	0.55*
4	0.33	0.21	0.41
5	0.27	0.32	0.59*
6	0.24	-0.19	-0.05
7	0.21	0.43	0.19
8	0.35	-0.41	-0.01
9	0.18	-0.08	-0.07
10	0.40	0.35	0.41
11	0.27	0.32	0.51*
12	0.20	0.18	-0.07
13	0.36	0.71	0.75**
14	0.25	0.06	0.39
15	0.33	0.21	0.41
16	0.41	0.60	0.63**
17	0.25	0.06	0.35
18	0.25	0.06	0.31
19	0.20	0.18	-0.03
20	0.25	0.06	0.35
21	0.41	0.60	0.59*
22	0.33	0.21	0.45
23	0.27	0.32	0.39
24	0.13	0.03	-0.01
25	0.13	0.03	-0.01

Note. * $p < .05$; ** $p < .01$

Table 10 shows the results of posttest on Task Two, the mean difficulty is .34 and the mean discrimination is .26.

Table 10 Item analysis on Task Two of posttest

Item	<i>P</i>	<i>D</i>	<i>r</i>
26	0.57	0.53	0.61*
27	0.22	0.23	0.13
28	0.27	0.13	0.21
29	0.60	0.80	0.75**
30	0.43	0.47	0.61*
31	0.40	0.20	0.36
32	0.38	0.57	0.59*
33	0.44	0.45	0.56*
34	0.13	0.07	0.03
35	0.05	-0.10	-0.12
36	0.43	0.47	0.57*
37	0.23	-0.13	-0.07
38	0.22	0.23	0.09
39	0.48	0.37	0.53*
40	0.30	0.40	0.49
41	0.18	-0.03	-0.09
42	0.43	0.47	0.57*
43	0.52	0.63	0.68**
44	0.40	0.20	0.10
45	0.32	0.03	0.25
46	0.18	-0.03	0.13
47	0.18	-0.03	0.13
48	0.45	0.10	0.08
49	0.30	0.40	0.21
50	0.40	0.20	0.07

Note. * $p < .05$; ** $p < .01$

Overall, both pretest and posttest on either Task One or Task Two are quite difficult. Thus, the discrimination values are not high. It might be the influence of the nouns. Since we included the nouns from different levels, if the participants did not know the meaning of the nouns, they would guess the answer without any basis. Since our participants were all beginning Chinese learners, we only kept 10 questions in each task containing only the basic level nouns in the actual pretest and posttest.

Regarding the reliability, the Cronbach's α of pretest is .52 and the Cronbach's α of posttest is .73.

2.2.4. Questionnaires

Questionnaires were given to the students in their pretest and posttest. The questionnaire in the pretest is the background questionnaire, including their general background and language background. The general background includes age and gender and language background includes native language and Chinese learning experience such as length and environment of learning. The questionnaire in the posttest is about the participants' use of our material. We asked how much time they spent on our material and what they think about our material.

2.3. Procedures

Participants took the pretest at the beginning of the semester and completed the background questionnaire as well. Then, the participants were divided into two groups, control group and experiment group, based on their pretest scores, so that the two groups have the same proficiency level. For those from the control group, their reading material is a paper-based textbook while the reading material for the experimental group is flash on the internet. They were supposed to study a lesson a week. After ten weeks, when they should have finished studying our material, the posttest was then conducted. In the posttest, participants needed to complete another questionnaire about their use of the material.

2.4. Data analysis

First, an independent t-test on the pretests between groups was conducted to make sure the two groups are homogenous before the treatment. Then, a paired t-test was conducted to compare whether there is significant difference between pretest and posttest within subjects. The time they spend on the material would be considered. Those who did not study the material at all would be excluded from the analysis. Finally, an independent t-test between the control group and experimental group on posttest was conducted.

3. Results and discussion

3.1. Pretest and posttest within groups

Since the goal of the present study is to find out if multimedia better facilitates CSL learners in learning Chinese classifiers than traditional textbooks,

paired t-tests were conducted within both the experimental group and the control group on their scores of pretest and posttest. The results were shown in Table 11.

Table 11 Paired t-test results of the experimental group in pretest and posttest.

	M	N	SD	t	df	p
Pretest	45.63	8	13.48	.34	7	.75
Posttest	43.75	8	9.16			

As shown in Table 11, the experimental group did not improve in the posttest after using flash (Pretest: $M = 45.63$, Posttest: $M = 43.75$). The result indicates that the learning material did not have significant effect on participants' performance ($t(7) = .34, p > .05$).

In Table 12, we can see that participants seemed to perform better after using the textbook (Pretest: $M = 41.82$, Posttest: $M = 45.45$). However, using textbook did not have significant effect on participants' performance ($t(11) = -1.02, p > .05$).

Table 12 Paired t-test results of the control group in pretest and posttest.

	M 平均	N 人數	SD 標準差	t	df	p
Pretest 前測	41.82	11	17.65	-1.02	10	.33
Posttest 後測	45.45	11	15.88			

Furthermore, an independent t-test was then conducted to compare the results on posttest between the two groups as shown in Table 13.

Table 13 Independent t-test results on posttest between the experimental group and the control group

Material 教材	N 人數	M 平均	SD 標準差	t	df	p
Flash 多媒體	8	43.75	9.16	-.27	17	.79
Textbook 紙本	11	45.45	15.88			

Although the control group seems to perform better than experimental group (Experimental group: $M = 43.75$, Control group: $M = 45.45$), the difference was not statistically significant ($t(17) = -.27, p > .05$) as shown in Table 8. It is possible that the minor difference was caused by the test format. The multiple-choice paper and pencil based test is quite similar to the exercises in the textbook

we gave to the control group. The experimental group, who used to see nouns with pictures, may not recognize words alone if they had not internalized the vocabulary. Thus, the format of the testing materials may benefit the control group. No difference between the two groups indicates that the experimental group performed as well as the control group. That means learners can learn independently by using the multimedia program.

3.2. Analysis by items

We then analyze learners' performance by items. Some items have high agreement, right or wrong, in the pretest. The items that have over 50% correction rate are *tiao* for *tui* 'leg' (70%), *zhi* for *bi* 'pen' (89%), *ge* for *laotaitai* 'old woman' (67%), *zhang* for *ditu* 'map' (63%) and *zuozi* 'table' (89%). The saliently-two-dimensional *zhang* seemed to the first classifier they acquired with more productive nouns. The correction rate seemed to be determined by frequency rather than salience since a map is physically flatter than a table. The common errors are *tiao* for *nuren* 'woman' (96%) and *zhi* for *ru* 'road' (52%). They fall in the correct shape category—saliently-one-dimensional, but different material or consistency. A woman is actually long in terms of shape, but we just do not categorize human beings this way. A road is actually solid, but we use the flexible *tiao* to emphasize the extension.

Some improvements but also some overgeneralizations were observed in the posttests. The largest improvement was observed in *tiao* for *qunzi* 'skirt' (26%-->41%). The items with over 50% correction rate are *zhang* for *zhuozi* 'table' (63%) *zhi* 'paper' (52%), *tiao* for *qiaokelie* 'chocolate' (63%), *li* for *tang* 'sugar' (56%) and *ge* for *nansheng* 'man' (63%). Common errors were *tiao* for *bi* 'pen' (93%) and *pian* for *fapiao* 'receipt' (70%). The errors fell within the correct shape category but wrong consistency or size. *Tiao* is for flexible long objects and we were not clear why our participants thought a pen was flexible. Maybe some marginal members such as *road*, which is solid, have misled their generalization. *Pian* is used for small flat things, which is part of something. A receipt is small and flat but not part of anything though. The learners have actually grasped the shape principle designed in our program. What they need is

other cognitive principles to fine tune their generalizations to really acquire the use of classifiers.

3.3. Analysis by learners' L1

We further investigate learners' performance by their native languages. In both experimental and control groups, learners with classifier L1 relapsed while learners with nonclassifier L1 improved after using the material as shown in Table 14. Learners whose native languages are classifiers language did not outperform those whose native languages were nonclassifier languages. Instead, once they found a similar counterpart in their native language, they overgeneralized.

Table 14 Means of pretest and posttest by classifier and nonclassifier L1

L1 母語	Pretest mean 前測平均	Posttest mean 後測平均
Classifier language 量詞語言	54.81	49.79
Nonclassifier language 非量詞語言	41.25	55

Learners' errors show similar patterns by their native language. Participants with nonclassifier L1 had little agreement in the pretest while had higher agreement in the posttests though not necessary correct. They acquired the shape principle for classifiers, but picked the wrong salient features. For example, 100% of French speakers used saliently-two-dimensional *mian* for *san* 'umbrella' while native Chinese speakers focused on the handle and picked the saliently-one-dimensional *zhi* or *ba*. In addition, all of them used the saliently one-dimensional *gen* for *qiang* 'wall.' They might have emphasized the height instead of the flatness of the wall. They also all used another saliently-one-dimensional *zhi* for *dan* 'egg.' The other nonclassifier L1 among our participants is Filipino with only one participant, so is too few to make any generalizations.

Shape classifiers are quite common in classifier languages. So, participants with classifier L1 can easily find counterparts in their native languages; however, they often do not have exactly the same categorization patterns as in

Chinese. For example, Japanese *hon* categorizes long objects regardless of consistency including a road, a pen and an umbrella. Korean uses *zalu* for ‘pen’ while *gadak* for ‘hair’. Vietnamese uses *gong* for ‘road,’ *kai* for ‘pen,’ ‘skirt,’ ‘umbrella,’ ‘egg,’ etc, but *tsei* for ‘hair.’ Vietnamese uses *ruans* for ‘road,’ *butir* for ‘egg,’ *buah* for ‘umbrella,’ *batang* for ‘pen’ and *helai* for ‘hair.’ Thai uses *sen* for ‘road’ and ‘hair,’ *fong* for ‘egg’ and *dam* for ‘pen’.

We had 12 Thai participants and six Indonesian participants, but not enough representatives for other L1s. The Thai participants had high correction rate in the pretest in *ge* for *nuren* ‘woman’ (92%), *zhang* for *ditu* ‘map’ (83%) and *zhuozi* ‘table’(92%), *zhi* for *bi* ‘pen’(92%), and *tiao* for *tui* ‘leg’ (83%). They were all correct usages. In the posttest, the new items that with high correction rate include *ge* for *hanbao* ‘hamburger’ (83%) and *tiao* for *qiaokeli* ‘chocolate’(67%). Common errors include *pian* for *panzi* ‘plate’ (67%). It is true that a plate is flat, but Chinese picks the roundness as the feature for categorization. The Indonesian participants also had high correction rate in the pretest in *ge* for *nuren* ‘woman’ (100%), *zhang* for and *zhuozi* ‘table’(100%), *zhi* for *bi* ‘pen’(83%), and *tiao* for *tui* ‘leg’ (63%). But, they also had some incorrect agreement such as *zhang* for *chazi* ‘fork’ (67%), and *mian* for *ji* ‘chicken’ (67%). After the treatment, new correct items were added including *ge* for *hanbao* ‘hamburger’ (83%) and *nansheng* ‘man’ (67%), *tiao* for *qiaokeli* ‘chocolate’(67%) and *zhang* for *fapiao* ‘receipt’ (83%). There were also some overgeneralizations including *pian* for *lanqiu* ‘basketball’ (67%), *zhi* for *jiaozi* ‘dumpling’ and *gen* for *shoutao* ‘glove.’

4. Conclusion

The present study developed multimedia and paper-based learning materials based on shape principle to enhance the learning of Chinese classifiers as a second language. No significant differences were observed between the two kinds of materials. Multimedia and paper-based materials may have equal effects on second language learning. Although neither group showed significant progress after using the materials, their errors fell in the correct shape category. They seemed to have grasped the shape principle intended in the materials, but need

materials on other cognitive principles to fine tune their classifier use.

On the other hand, we found interesting influence of learners' native language. Learners whose native language is a nonclassifier language improved after the treatment while learners whose native language is a classifier language relapsed after the treatment. Once learners found a similar counterpart in their native language, they overgeneralized. The task of learners of nonclassifier L1 is to learn a new syntactic category, while learners of classifier languages need to figure out the differences between the classifiers in their L1s and Mandarin. The later is more difficult and takes longer. Due to the limitation of the course period, the treatment last only ten weeks. A longer treatment may reveal the progress of these learners. Incorporating contrastive analysis of L1 and L2 classifiers in future research may also facilitate the process.

The phenomenon that learners of a nonclassifier L1 improved while learners of a classifier L1 relapsed is in accord with the fact that L2 learners whose native language has a Roman script have more problems with spelling (for example, Spanish, French) than those whose native language used a non-Roman script (for example, Chinese, Japanese) (Oller and Ziahosseiny, 1970). Differences between L1 and L2 do not cause difficulties. Rather, features that are similar but not exactly the same cause most difficulties for second language learners. It takes longer to restructure learners' existing knowledge than to learn a new concept. Since we do not have enough participants for each L1, future research with more participants for each L1 is necessary to enhance our understanding on the role of L1 on second language acquisition.

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Computer assisted learning of Chinese shape classifiers

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電腦輔助華語形狀量詞學習

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摘要

量詞是華語重要的特色之一，所有的名詞與數量詞及指示詞出現時必須伴隨量詞。量詞的選擇依名詞的不同而改變，每個名詞有其約定成俗的量詞，有的名詞有一個以上的量詞可接，這對學習以華語為第二語的學習者為一大挑戰。

本研究根據形狀認知基礎開發量詞數位學習互動教學軟體，包括條、根、枝、張、面、片、個、顆、粒。經 30 名學習華語的學生進行十週的教學實驗，結果發現母語沒有量詞的學生進步，而母語有量詞的反而退步。

關鍵詞：華語，量詞，華語作為第二語，外語學習，多媒體