Effectiveness of Different Approaches to Kanji Education with Second Language Learners

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Approaches to teaching Chinese characters as used in Japanese (kanji) to adult second/foreign language learners can be broadly divided into the Whole-kanji method and the Component Analysis method. The Whole-kanji method involves memorizing kanji as units. The Component Analysis method involves breaking the kanji down into components, attaching meaning to those components and memorizing a story which ties the components together. This study examines the effectiveness of the two approaches with subject populations in JSL and JFL settings. Five sessions of each method consisting of instruction in 30 kanji were given to two subject groups. A Short Term Memory (STM) test followed each of the first three sessions, a Long Term Memory (LTM) test was given at the fourth session, and a Post LTM test was given one month later. The Component Analysis method promoted significantly higher retention in both settings. These findings are discussed in terms of depth of processing, learning styles and location of instruction.

日本語学習者に対する漢字教授法は、全体的漢字教授法と構成要素分析教授法とに大別することができる。全体的漢字教授法とは、漢字を独りで繰り返し書き写し、学習用に制約された文章の中でそれらを読むことで、漢字全体を一つの単位として記憶させるものである。構成要素分析教授法は個々の漢字を構成要素にまで完全に分解し、それぞれの構成要素に固有の意味を付与し、その後でそれらの構成要素を関連付けるようなストーリーを記憶し、元の漢字の本来の意味を思い出させるというものである。本稿では、日本国内と国外という異なった状況における、これら二つの教授法の効果を比較検討した。日本国内外の被験者グループに対し、それぞれの教授法を週1回3週間実施した。被験者は毎回10個の漢字を学習し、その後短期記憶テストを受けた。4週目には長期記憶テストを実施し、さらに一ヶ月後の5回目のテスト時には追加的な長期記憶テストを実施した。この結果、構成要素分析法の教授法としての優位性が証明された。本稿では、漢字処理の深度、学習方法、日本国内外での差異を中心に議論を展開する。

JALT Journal, Vol. 20, No. 2, November, 1998

"The relative ease or difficulty of the beginner reader's task will be influenced to a large extent by the features of the symbols he has to deal with, as well as by the nature of their relation to the spoken language" (Feitelson, 1972, p. 18). We suggest that this is equally true for second language learners. All major systems of writing are based on spoken languages, though they differ radically in the ways in which they correlate to primary spoken languages and the linguistic level at which the mapping of script unit to linguistic unit occurs. In alphabetic orthographies, the basic script unit corresponds to the phoneme; in logographic orthographies it corresponds to the lexical unit or to the morpheme (Klima, 1972). Logographies involve considerably more orthographic units than the alphabet (Lado, 1957; Wang, 1981).

The focus of the research literature on kanji has been on the cognitive processing of the fluent native speaker. Alphabetic and logographic writing systems apparently activate different coding and memory mechanisms such that logographic characters produce significantly more visual information in memory, whereas alphabetic words result in a more integrated code involving visual, phonological, and semantic information (Chen & Juola, 1982; Chen & Tsoi, 1990). However, the question of the importance of phonetic representation in processing logographic scripts is far from settled (Horodeck, 1987). Tzeng, Hung & Wang (1977), Steinberg & Yamada (1978), and Perfetti & Zhang (1995) indicate that a degree of phonetic recoding occurs with processing Chinese characters. Other researchers have found that "the direct processing from visual (graphemic) codes to meaning (semantic codes) is possible" (Saito, 1981, p. 273). The *orthographic depth hypothesis* (ODH) (Frost, 1994; Frost, Katz & Bentin, 1987) proposes that with a deep orthography such as kanji, a direct route is activated primarily and word phonology is retrieved through lexical access. Evidence exists to support this hypothesis (Perfetti & Zhang, 1991). Recent studies on Chinese and English indicate that while there is an automatic phonological coding involved in all languages, orthographic variation in the degree of involvement of phonological coding is observed across languages (Perfetti, Zhang & Berent, 1992).

While some research has addressed the acquisition of kanji in the native Japanese child (Mann, 1986) and in the second language learner (Flaherty, 1995; Chikamatsu, 1996), many important questions concerning kanji pedagogy remain unanswered. In Japanese second language (L2) education, the importance of kanji knowledge has been stressed by a number of researchers (Met, 1988; Kawai, 1991). Various methods have been suggested (Gray, 1960; Downing, 1973), but none have been assessed in terms of their effectiveness. The purpose of this paper is to

examine the effectiveness of different methods of teaching kanji to L2 learners both in Japan and outside of Japan. However, the question as to whether romanization should be introduced prior to kanji has led to much argument (Harries, 1989; Steinberg & Yamada, 1978; Everson, 1988) and will not be considered in the present paper.

Methods of Kanji Instruction

There are many ways of teaching learners how to read kanji but they may be broadly divided into two general methods. One will be referred to in this paper as the Whole-kanji method and the other as the Component Analysis method. The question as to which is better echoes the historic thirty-year debate between the whole-word supporters and phonics school in teaching English reading (see Smith, 1988).

The Whole-kanji method of teaching kanji to alphabet-habituated L2 students is essentially the same method Japanese teachers traditionally employ in the elementary classroom. The children memorize kanji as whole units by repeatedly writing them in isolation and by reading them in controlled reading passages. Writing the characters in space (kusho), according to Sasaki (1987), has two functions: "first, providing motor- or action-based representation and second, aiding a conscious mental process by an external action" (p. 146). Pictures used as visual memory aids, analysis of the radical (an element within a more complex character with a similar conceptual meaning), and etymological explanations may be used in the early stages of kanji learning to motivate Japanese children, but most teachers eventually abandon these approaches as more and more kanji are presented (Sakamoto & Makita, 1973; Kiss, 1991). The most widely used textbooks in post-secondary programs in the United States, according to a survey by Jorden and Lambert (1991), are *Learn Japanese* (Young & Nakajima, 1985) and *Reading Japanese* (Jorden & Chaplin, 1977). Both of these texts are representative of the Whole-kanji method.

On the other hand, the Component Analysis method of teaching kanji involves analyzing each kanji to be learned by breaking it down entirely into components (i.e., not simply pointing out the radical), attaching meaning to each of these components, and then having learners remember a story which ties the components together and calls to mind the essential meaning of the kanji (De Roo, 1982). While the stories of some Component Analysis materials are based partly on etymological explanations or historical research on ancient Chinese life, Heisig (1986) takes a more whimsical approach. He suggests that the

L2 learner should "make a sort of alphabet out of [the components], assign to each its own image, fuse them together to form other images and so build up [a] complex tableau in imagination" (p. 7). Heisig gives his own "story" for each of the first 508 kanji he presents and asks learners to create their own stories for the others, stories that will "shock the mind's eye . . . so as to brand it with an image intimately associated with the (meaning)" (p. 9).

Although the role of component shapes, context and frequency on L2 acquisition has been examined (Matsunaga, 1994; Harada, 1985; Everson, 1992; Hatasa, 1993), kanji acquisition research so far has not analyzed the relative success in terms of L2 reading progress. It has been suggested that, "in learning to write Chinese, the alphabet habituated person simply has to start afresh" (Lado, 1957, p. 108). However, it is possible that the Whole-kanji approach is inappropriate for adult L2 learners, who bring a mechanism for recognition of their own native written language to the task of kanji learning which can provide a useful bridge for developing a recognition mechanism for kanji. Adult L2 learners also have much higher powers of abstraction than children, as well as a facility with generalized principles (Lado, 1957; Heisig, 1986). McGinnis (1995) suggests that the greatest challenge teachers of kanji face is to overcome their own notion that kanji are extremely difficult so that they will not pass this psychological handicap on to their students.

The present work is an attempt to approach this challenge in terms of assessing the effectiveness of *two* different methods of teaching kanji to adult L2 learners in *two* different settings: in Ireland, a Japanese as a Foreign Language (JFL) setting where the subject is exposed to kanji only in the classroom setting, and in Japan, a Japanese as a Second Language (JSL) setting where the subject is surrounded by constant kanji stimulation. The difference between studying a language in the country where it is spoken or in one own's country cannot be underestimated (Jones, 1989).

The Study

The purpose of this study is to focus on the visual perception of word forms and their meanings, and the ability to translate the printed symbols into verbal forms.[1] Reading is a complex task involving many processes and is influenced by a number of factors. Thus both the recognition and production performance of the word forms will be considered (See Ke, 1996; Mori, 1995).

Hypotheses

The following hypotheses will be examined.

1. The adult L2 learners of kanji in both Japan (JSL) and Ireland[2] (JFL) will benefit more from instruction using the Component Analysis method than instruction using the Whole-kanji method in both the short term and the long term.
2. The adult L2 learners will benefit more in accuracy of writing kanji from the Whole-kanji method than the Component Analysis method. This hypothesis is based on the belief that repetitive kinesthetic action enhances kanji learning, but no investigation of whether this is actually true will be carried out in this preliminary study.
3. The adult L2 learners' ability to access the meaning of the kanji will be enhanced more by the Component Analysis method than by the Whole-kanji method. This is suggested to be due to the heightened power of abstraction and semantic creativity involved in use of the Component Analysis method, although, again, this will not be investigated in the present study.
4. The JSL learners in Japan will outperform their Irish counterparts in both reading and writing measures of accuracy due to their constant exposure to kanji stimuli.

Method

Subjects

Fifty-three potential subjects, all native English speakers, were recruited at two separate locations, one group in Japan (n = 19) and the other in Ireland (n = 34). Details regarding these subjects are given below. Three criteria were decided upon in order to choose the subjects: the presence of matched kanji knowledge, generally equivalent proficiency in spoken Japanese and the lack of significant difference on two types of IQ measure. The subjects were self-selected insofar as they replied to an advertisement made at a public lecture in Japan concerning the experiment.

In order to control for current kanji knowledge and Japanese proficiency, a kanji pretest was administered. The pretest consisted of two parts; the first part was based on kanji which also act as radicals and the second on more advanced kanji. The first part consisted of a list of 16 words in English (e.g., mouth, ear, woman) for which the kanji are basic characters and also act as radicals (see Appendix 1). The second part consisted of a list of 48 concepts given in English (e.g., employment, bridge) (see Appendix 2). The Japanese Ministry of Education requires elementary

school children to have mastered certain kanji by specific grades in school. Eight kanji were selected at random from each of the first six grades to make the list of 48. The subjects were asked to write the kanji and pronunciation (in kana or romanized script) for each English word. Only subjects who knew at least 8-10 basic kanji from the first list and 13-15 kanji from the second list in the pretest qualified as subjects. Subjects who knew more than 30 kanji were also eliminated. The potential subjects were considered to know the kanji only if the kanji could be written correctly and one of its pronunciations noted. The criteria here for "knowing the kanji" were the ability to pronounce and write the character. While it could be argued that simple recognition of the kanji might tap into the passive knowledge of the L2 learners (particularly those who might have learned the character, had not used it in a while and could neither access the pronunciation of it nor reproduce it in writing), "reading" here is deemed to involve the visual perception of the word, the elaboration of both meaning and pronunciation to symbol, and the ability to reproduce the symbol on comprehending the message once decoded.

The subjects were also required to have sufficient spoken Japanese proficiency to comprehend and respond to basic conversation. This was assessed by the experimenters, who speak Japanese fluently, and also through self-assessment by the subjects. While the subjects' self-reported proficiency in spoken Japanese was approximately matched between the JSL and JFL groups, those subjects recruited in Japan may have known more vocabulary than those in Ireland, by virtue of having lived in Japan for an average of three years.

Two types of IQ tests were administered, a visual test (Visual Estimation: ET3) and a verbal test (Verbal Comprehension: VT1) (Saville & Holdsworth, 1979). These tests had reliability estimates of .83 and .80 respectively. Paired and unpaired *t*-tests were used to examine the significance of differences in the test scores of subjects assigned in the two instructional situations.

Application of these criteria drastically reduced the original potential subject sample of 53. Twenty-nine subjects were chosen to participate in the experiment (15 in Japan and 14 in Ireland). Fourteen subjects (7 in Japan and 7 in Ireland) were randomly assigned to the Component Analysis method instruction group and 15 (8 in Japan and 7 in Ireland) to the Whole-kanji method instruction group. As measured by an independent t-test, there were no significant differences between the subjects assigned to the two methods on either IQ measure (subjects living in Japan: verbal IQ: $t = .91$, $df = 13$, $p > .01$; visual IQ: $t = 1.06$, $df = 13$, $p < .01$. Subjects living in Ireland: verbal IQ: $t = .49$, $df = 12$, $p > .01$; visual IQ: $t = .55$, $df = 12$, $p > .01$).[3]

Subjects in Japan: Fifteen adults (six males and nine females) aged 20-45 (Median age = 28) participated in the study. All were resident in Japan at the time of testing and had lived in Japan for some time (three years on average). Some subjects had taken brief courses in Japanese but none were taking classes at the time of the study. For the most part they were all self-taught in Japanese, and their motivation to learn the language was for practical reasons. They were all alphabet-habituated native English speakers. All had normal or corrected-to-normal vision in both eyes. Each subject was paid transportation costs to the experiment site (approximately $10 per session).

For practical reasons, the subject population in Japan was recruited prior to the Irish group. It was difficult to find people in Japan who were willing to commit themselves to the time required for the entire experiment. The kanji knowledge of these subjects was then matched with the Irish group; it was found that the skill level of students studying Japanese intensively for six months was equivalent to those who had resided in Japan without long-term formal education. Although it was impossible to control for the subjects' individual kanji input between sessions, in an attempt to control for the kanji taught in the sessions, all materials used in the experiment were taken from the subjects after each session and given to them only after the post-LTM test had been completed.

Subjects in Ireland: Fourteen undergraduate students of Japanese (three males and 11 females), aged 18-19, from Dublin City University, Ireland participated in the study. All had studied Japanese intensively as a foreign language for six months. None of the subjects had ever been to Japan or any other kanji-using country. Their motivation to study Japanese was to gain a degree in the language and pursue a career in the field. All were alphabet-habituated native English speakers. All had normal or corrected-to-normal vision in both eyes. Each subject was paid $15 for participation.

Materials

Two sets of teaching materials corresponding to the two teaching methods being investigated were employed. For the Whole-kanji method, Jorden and Chaplin's *Reading Japanese* (1977) was used. For the Component Analysis method, Heisig's *Remembering the Kanji* I (1986) and De Roo's *2001 Kanji* (1982) were employed.

Design and Procedure

The experiment consisted of five sessions for each method. The first four sessions, each lasting two hours, were held at intervals of one week and a follow-up post-test was given one month later. All sessions for each

method were administered in a group setting. All explanations and instructions were given verbally in English. The experimenters acted as the instructors: one experimenter was in Ireland and taught both methods; the other experimenter was in Japan and taught both methods.

The kanji for the sessions were carefully chosen from the pre-test list (see Appendix 3 for the list). Kanji that were known (as indicated by the pre-test) were rejected. Thirty kanji were chosen randomly from the list of unknown kanji. It is important to note that no subject knew the Japanese word or the written form of these 30 kanji prior to the experiment. The set of 30 kanji was randomly assigned to three groups of 10 each.

In each of the first three sessions, one group of 10 kanji was taught for a total of 100 minutes (10 minutes dedicated to each kanji), and a short-term memory test (STM), lasting approximately 20 minutes, was given immediately afterwards. All tests were unannounced. In the STM test (production only), the subjects were given a list of English words corresponding to the kanji they had just learned in that particular session and were asked to write the kanji and one pronunciation for each word. Since three STM tests were conducted, each subject therefore had three pronunciation scores and three writing scores. The three pronunciation and three writing scores were averaged to give each subject one score as STM score for pronunciation and writing respectively

In the fourth session the subjects were asked to complete a surprise long-term memory (LTM) test over the 30 kanji that had been taught in the three previous sessions and were asked to write a short report of their impressions of the methodology employed. The LTM test consisted of two parts, production and recognition. The first part had a list of English words and the subject was asked to write the corresponding kanji. When the first part was completed, the experimenter took the list from the subject and administered the second part, which was a list of the 30 kanji; the subject then had to write the meaning and pronunciation of each kanji.

The fifth session took place one month after administration of the LTM test and consisted of a post-LTM test lasting one and a half hours. The post-LTM test was identical to the long-term memory test, and again was unannounced.

Instruction of the Two Methods

The procedures for instructing each method were as follows:

Whole-kanji Method: The subjects were given a copy of each kanji with the stroke order outlined, a writing grid, and a number of sentences written in natural Japanese in which the kanji being taught appeared several times. These sentences were taken from the Jorden text (Jorden

& Chaplin, 1977). The subjects were asked to look at the kanji while the instructor wrote it on the board. The shape of the kanji was noted and the stroke order was counted aloud. Various pronunciations were written on the board and the subjects were asked to repeat them aloud. They read some sentences in which the kanji appeared, and then wrote the kanji eight times on the writing grid provided. A dictation exercise followed during which the subjects were not allowed to look at any of the teaching materials.

After all kanji for the session had been introduced, the subjects were given appropriate contextual reading material in which the 10 kanji appeared, again from the Jorden textbook. They were asked to read the material silently, and then aloud.

Component Analysis Method: The subjects were given a worksheet (from Noguchi, 1995) with two writing spaces for each kanji. One space was a box in which the kanji would be written in its entire form and the other was a space in which its components would be broken down. Also on the worksheet were spaces for noting pronunciations, compounds (*jukugo*), names of the compounds and a story which tied the components together to provide an aid for remembering the shape and meaning of the kanji. The worksheet was filled in entirely by the subject alone.

The experimenter then wrote the kanji on the board, noting the stroke order. The subjects were asked to write the kanji on their worksheet once, calling aloud the order number of the strokes of the kanji as they wrote it. The various pronunciations and one compound containing the kanji were written on the board and then noted on the worksheet by the subjects. A component grid divided up into boxes was drawn on the board and the components of that particular kanji were noted. The story logic (as outlined by Heisig, 1986 and De Roo, 1982) which linked the components together was explained and noted on the worksheets by the subjects. They were then asked to put their worksheets aside. They also drew the kanji on each other's backs, repeating the story as they drew each component. They were allowed to review any of the 10 kanji from the session at any point during the session as time permitted.

Statistical Analysis of the Data

Analysis of variance procedures (a two-way ANOVA) were used to determine between-group differences in the STM, LTM and post-LTM test scores of the two treatment groups according to whether they were in the JFL or JSL instructional situation. A two x two cell design was used, followed by Tukey tests (given as *t* values) to further determine where differences lay. As mentioned, an indepen-

dent *t*-test was used to find whether there were significant differences between IQ test scores for subjects in each instructional group. The alpha level was set at $p < .05$.

Results

The hypotheses given in the introduction will now be considered in turn.

Hypothesis 1: The adult learners of kanji in both Japan (JSL) and Ireland (JFL) will benefit more from instruction using the Component Analysis method than instruction using the Whole-kanji method in both the short term and the long term.

The effectiveness of each method was assessed in terms of the ability of the subjects to remember one pronunciation of the kanji, its meaning, and its written form. Effectiveness was also assessed in terms of the STM, LTM and post-LTM test scores. The performance results of the two methods in terms of the STM, LTM and Post-LTM test scores of the two subject groups in the two instructional situations are outlined in Table 1.

Table 1: Average Scores for STM (pronunciation and written form), LTM (pronunciation, meaning and written form) and Post LTM (pronunciation, meaning and written form) tests* of the two subject groups. (The mean results are shown with the standard deviations in italics underneath.)

	STM Pron.	Writ.	LTM Pron.	Mean.	Writ.	POST Pron.	LTM Mean.	Writ.
Component Analysis								
Japan ss	9.60	9.33	20.50	25.33	14.16	18.33	23.83	14.16
($n = 7$)	*.81*	*1.21*	*5.64*	*6.12*	*10.10*	*8.11*	*18.33*	*9.62*
Irish ss	8.85	9.00	12.00	19.71	8.42	12.85	15.85	7.42
($n = 7$)	*1.06*	*.81*	*7.34*	*6.55*	*8.24*	*6.93*	*7.15*	*6.97*
Whole-kanji method								
Japan ss	9.00	7.11	12.33	14.44	2.88	11.11	12.88	2.55
($n = 8$)	*1.11*	*2.36*	*5.59*	*3.67*	*2.08*	*5.81*	*4.75*	*1.81*
Irish ss	6.00	3.57	6.28	7.42	2.42	9.57	12.42	6.00
($n = 7$)	*1.82*	*1.81*	*4.57*	*4.72*	*2.37*	*4.19*	*6.16*	*3.05*

* The maximum correct scores for the STM tests were 10, for the LTM tests 30, and for the Post-LTM 30.

Two-way ANOVA analysis indicated that there was a significant difference between the two methods in favor of the Component Analysis method in the STM test scores in terms of both pronunciation ($F(1, 28) = 13.70$, $p < .05$) and writing ($F(1, 28) = 34.19$, $p < .05$ in both groups of subjects. This advantage was further revealed in the LTM test scores of the characters (meaning: $F(1, 28) = 34.69$, $p < .01$; pronunciation: $F(1, 28) = 9.95$, $p < .05$; writing: $F(1, 28) = 13.41$, $p < .05$).

However, for the post-LTM test (i.e., the test which followed one month after the LTM test and 5 to 7 weeks after the kanji had actually been taught), the difference between the effectiveness of the two methods appeared to depend on whether the subjects were exposed to kanji only in the classroom (as with the JFL subjects in Ireland) or whether they had constant kanji input from the environment (as with the JSL subjects in Japan). For subjects tested in Ireland, while the trend was still in favor of the Component Analysis method, there was no statistically significant difference, as determined by Tukey tests, between the success of the two methods in terms of recalling the pronunciation of the kanji ($t = -1.07$, $df = 12$, $p > .05$), the meaning ($t = -.96$, $df = 12$, $p < .05$) or the written form ($t = .49$, $df = 12$, $p > .05$). However, in Japan, the trend in favor of those who used the Component Analysis method continued in both the recall of the written form ($t = 2.92$, $df = 13$, $p < .05$) and the meaning ($t = 3.06$, $df = 13$, $p < .05$) of the kanji. In terms of remembering the pronunciation of the kanji, there was no significant difference between the two methods ($t = 1.88$, $df = 13$, $p > .05$).

Hypothesis 2: The L2 learners will benefit more in accuracy of writing kanji from the Whole-kanji method than the Component Analysis method.

Two-way ANOVA analysis indicated that the subjects who were instructed by the Component Analysis method scored significantly higher than those instructed by the Whole-kanji method in terms of accuracy in writing the kanji in the STM tests ($F(1, 28) = 34.19$, $p < .01$) and the LTM test ($F(1, 28) = 13.41$, $p < .01$). However, follow-up Tukey tests comparing the post-LTM test scores of the instruction groups for each setting suggests that this trend continued only for the subjects in Japan ($t = 3.06$, $df = 13$, $p < .01$). For the subjects in Ireland, there was no difference between the two methods ($t = -.96$, $df = 12$, $p > .01$).

The Two-way ANOVA procedures revealed an interesting method-by-country interaction in the written part of the post-LTM test scores ($F(1, 28) = 5.49$, $p < .05$). A Tukey test indicated that subjects instructed by the Component Analysis method in Japan outscored their counter-

parts in Ireland ($t = 2.07$, $df = 27$, $p < .05$). In addition, the Component Analysis group outscored Whole-kanji subjects in both Japan ($t = 3.76$, $df = 27$, $p < .01$ and Ireland ($t = 2.51$, $df = 27$, $p < .05$).

Hypothesis 3: The L2 learners' ability to access the meaning of the kanji will be enhanced more by the Component Analysis method than by the Whole-kanji method.

Two-way ANOVA procedures also indicated that those subjects who were trained by the Component Analysis method in both Ireland and Japan outperformed their Whole-kanji counterparts in terms of accessing the meaning of the kanji in the LTM test ($F(1, 28) = 34.69$, $p < .01$). However, the Component Analysis method scores on the post-LTM test were significantly higher only for the JSL group, as revealed by a Tukey test (Japan: $t = 3.06$, $df = 13$, $p < .01$; Ireland: $t = -.96$, $df = 12$, $p > .01$).

Hypothesis 4: The JSL learners in Japan will outperform their Irish counterparts in both reading and writing measures of accuracy due to their constant exposure to kanji stimuli.

Two-way ANOVA procedures indicated that the subjects in Japan scored significantly higher than their Irish counterparts in the STM tests (pronunciation: $F(1, 28) = 16.02$, $p < .01$; writing: $F(1, 28) = 8.75$, $p < .01$). There was an interaction effect between the method employed and the location (JFL versus JSL), with the JSL group in Japan showing significantly higher scores (pronunciation: $F(1, 28) = 5.29$, $p < .05$; writing: $F(1, 28) = 6.00$, $p < .05$). Subjects in Japan also scored higher than subjects in Ireland on the LTM test (meaning: $F(1, 28) = 10.31$, $p < .01$; pronunciation: $F(1, 28) = 10.93$, $p < .01$; writing: $F(1, 28) = 1.72$, $p > .01$) and the post-LTM test (meaning: $F(1, 28) = 9.01$, $p < .01$; pronunciation: $F(1, 28) = 10.23$, $p < .01$; writing: $F(1, 28) = 2.01$, $p > .01$).

On completion of the experiment, the subjects were given a chance to express their opinions of the method employed. Their impressions were enlightening. Among those who were taught using the Whole-kanji method, many noted that the "use of texts was quite effective" and reading new kanji in context made the practice "rewarding;" however, "writing kanji after kanji was very boring". Those who were taught using the Component Analysis method found it "very worthwhile," "interesting" and "easy to remember the shape and meaning by breaking the kanji down and learning an interesting or bizarre story." However, it was "difficult to remember the readings (*yomi*) because we mainly concentrated on the actual writing of the kanji rather than the pronunciation." Indeed, this comment supports the statistical findings.

Discussion

Support for an Eclectic Approach

A variety of studies concerning memory have been discussed in terms of a level of processing model (Craik & Lockhart, 1972; Craik & Tulving, 1975; Craik, 1990). According to this model, information can be encoded in multiple forms within memory; this could be in terms of semantic, phonemic or visual features, in terms of verbal associates, or as an image. The analysis procedure in memory moves from the sensory level to matching or pattern recognition and finally to semantic enrichment. This model implies greater cognitive involvement at each successive level and it has been demonstrated that stimuli processed to a deep semantic level are better remembered than those processed to a supposedly more shallow level (Frase and Kammann, 1974; Klein & Saltz, 1976; Bellezza, Cheesman & Reddy, 1977). The subjects in Japan in the Component Analysis group commented that they made associations from kanji they had seen in their local environment. In terms of both physical location and time input, the local environment (Jones, 1989) is identified as an important factor in L2 education. The findings reported here support an eclectic interaction of teaching practices which draws benefits from each method: Component analysis, with its emphasis on writing the kanji as components (e.g., on the backs of classmates) and the Whole-kanji method with its emphasis on the contextualized reading of the kanji. We suggest that such an eclectic approach would contribute to deeper processing and therefore a better memory of the kanji.

Learning Styles and Kanji Instruction

Many studies of success in L2 learning have focused on language learning styles (see Ehrman & Oxford, 1995). Language learning styles encompass the general approaches which students are predominantly disposed to use in order to learn a new language (Ehrman, 1990; Oxford, 1990; Oxford, Ehrman, & Lavine, 1991).

It has been suggested that different learners will respond well to various sub-components of an eclectic methodology. For example, highly sequential learners will probably be more comfortable with a relatively large amount of teacher-led drill. More random learners may want to use relatively non-mechanical approaches. Analytic and global associational procedures (the Component Analysis method) work well together with exposure in context and practice (the Whole-kanji method) to integrate kanji into LTM networks of meaning and experience. Perhaps the advantage of the JSL learners in Japan, who receive constant meaning-focused input outside the classroom, could be simulated for the less

fortunate classroom-bound JFL learners by more extensive use of the World Wide Web, with its numerous Japanese sites.

Reading

The value of reading to overall second language acquisition in both the home country of the L2 learner and the home country of the target language has been widely acknowledged in the applied linguistics literature (Genessee, 1979). Conducting cross-cultural research involves many organizational and practical difficulties such as matching subject groups on age, profession, social status, motivation, exposure to the L2 and a complex puzzle of other variables. Unfortunately, in the present exploratory study, it was impossible to control a number of variables. Future research in the field should attempt to refine these shortcomings with stringent control on the matching of larger groups of subjects.

Conclusion

In this exploratory study of kanji instruction methods with adult learners, Component Analysis was found to be superior to the Whole-kanji method traditionally employed with Japanese children. The Component Analysis method appeared to be particularly useful in helping the subject access the meaning of the character. Adult learners approaching a second writing system already have an advantage over the child initially approaching the writing system for the first time; they understand that writing is a symbol for a sound and they have higher powers of abstraction than children. Further investigation into the Component Analysis method in terms of the nature of the particular kanji and the application of different learning styles would further enrich our understanding of the "depth of processing" kanji and give new directions for JFL instruction methodology.

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Notes

1. This focus, strongly influenced by Harris (1969), is in the Thorndike mould (1917).
2. Subjects were recruited in Ireland for practical reasons.
3. This level of statistical significance gives a 99% measure of confidence ($p < .01$) that the conclusion is not simply due to chance.

References

Bellezza, F. S., Cheesman, F. L., & Reddy, B. G. (1977). Organization and semantic elaboration in free recall. *Journal of Experimental Psychology: Human Learning and Memory, 3*, 539-550.

Chen, H.-C. & Tsoi, K. (1990). Symbol-word interference in Chinese and English. *Acta Psychologica, 75* (2), 123-138.

Chen, H.-C. & Juola, J. F. 1982. Dimensions of lexical coding in Chinese and English. *Memory and Cognition, 10* (3), 216-224.

Chikamatsu, N. (1996). The effects of L1 orthographies on L2 word recognition: A study of American and Chinese learners of Japanese. *Studies in Second Language Acquisition, 18* (4), 403-432.

Craik, F. I. M. (1990). Levels of processing. In M. E. Eysenck (Ed.), *The Blackwell dictionary of cognitive psychology* (pp. 203-213). London: Blackwell.

Craik, F. I. M. & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior, 11*, 671-684.

Craik, F. I. M. & Tulving, E. (1975). Depth of processing and the retention of words in episodic memory. *Journal of Experimental Psychology: General, 104*, 268-294.

De Roo, J. R. (1982). *2001 kanji*. Tokyo: Bonjinsha.

Downing, J. (1973). *Comparative reading*. New York: Macmillan.

Ehrman, M. E. (1990). Owls and doves: Cognition, personality, and learning success. In J. E. Alatis (Ed.), *Linguistics, language teaching, and language acquisition: The interdependence of theory, practice, and research*. (pp. 413-437). Washington DC: Georgetown University Press.

Ehrman, M. E. & Oxford, R. L. (1995). Cognition plus: Correlates of language learning success, *Modern Language Journal, 79*, 67-89.

Everson, M. E. (1988). Speed and comprehension in reading Chinese: Romanization vs. characters revisited. *Journal of the Chinese Language Teachers' Association, 23* (2), 1-15.

Everson, M. E. (1992). The effect of frequency and density on character recognition speed and accuracy by elementary and advanced L2 readers of Chinese. *Journal of the Chinese Language Teachers' Association, 27* (1), 29-44.

Feitleson, D. (1972). Learning to read. In *UNESCO handbook for reading* (pp. 406-425). Paris: UNESCO.

Flaherty, M. (1995). The role of visual abstract memory in the learning of kanji reading. In Hsuan-Chih Chen (Ed.), *Cognitive processing of Chinese and related Asian languages*, (pp. 389-400). Hong Kong: Chinese University Press.

Frase, L. T. & Kammann, R. (1974). Effects of search criteria upon unanticipated free recall of categorically related words. *Memory and Cognition, 2,* 181-184.

Frost, R. (1994). Prelexical and postlexical strategies in reading: Evidence from a deep and a shallow orthography. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 29,* 116-129.

Frost, R., Katz, L., & Bentin, S. (1987). Strategies for visual word recognition and orthographical depth: A multilingual comparison. *Journal of Experimental Psychology: Human Perception and Performance, 13,* 104-115.

Genessee, F. (1979). Acquisition of reading skills in immersion programs. *Foreign Language Annals, 12* (1), 71-80.

Gray, W. S. (1960). Reading. In C. W. Harris (Ed.), *Encyclopedia of Educational Research* (3rd edition) (pp. 206-220). New York: Macmillan.

Harada, Y. (1985). On reduced juxtaposition in Japanese. *Language Research, 27* (1) 41-67.

Harries, P. (1989). Matter and method in Japanesè language teaching. *Japan Forum, 1,* 113-118.

Harris, T. L. (1969). Reading. In R. L. Ebel (Ed.), *Encyclopedia of educational research* (4th Edition) (pp. 456-467). New York: MacMillan.

Hatasa, Y. A. (1993). *Transfer of the knowledge of Chinese characters to Japanese.* Unpublished doctoral dissertation, University of Illinois, Urbana.

Heisig, J. W. (1986). *Remembering the kanji.* (3rd edition). Tokyo: Japan Publication Trading Company.

Horodeck, R. A. (1987). *The role of sound in reading and writing kanji.* Unpublished doctoral dissertation, University of Michigan, Ann Arbor.

Jones, S. (1989). *Intensive versus extensive foreign language learning.* Paper presented at the Third National Modern Languages Convention, "Languages in the 1990s," Dublin City University, Ireland, January, 1989.

Jorden, E. H. & Chaplin, H. I. (1977). *Reading Japanese.* Tokyo: Charles E. Tuttle.

Jorden, E. H. & Lambert, R. (1991). *Japanese language instruction in the U.S.: resource, practice and investment strategy.* Washington, DC: The National Foreign Language Center.

Kawai, Y. (1991). Teaching Japanese at a public high school as an ACT teacher of the Jorden Method. In Japan Foundation (Ed.) *Japanese-Language Education around the Globe, 1* (pp. 237-247). Tokyo: Japan Foundation.

Ke, C. (1996). An empirical study on the relationship between Chinese character recognition and production. *Modern Language Journal, 80,* 340-349.

Kiss, I. (1991). Experience with teaching the Japanese language to elementary school children in Hungary. In Japan Foundation (Ed.) *Japanese-Language Education around the Globe, 1* (pp. 59-71). Tokyo: Japan Foundation.

Klein, K. & Saltz, E. (1976). Specifying the mechanisms in a levels-of-processing approach to memory. *Journal of Experimental Psychology: Human Learning and Memory, 2,* 671-679.

Klima, E. S. (1972). How alphabets might reflect language. In J. F. Kavanagh and I. Mattingly (Eds.), *Language by eye and by ear* (pp. 57-80). Cambridge,

MA: Harvard University Press.
Lado, R. (1957). *Linguistics across cultures.* Ann Arbor: University of Michigan Press.
Mann, V.A. (1986). Temporary memory for linguistic and nonlinguistic material in relation to the acquisition of Japanese Kana and Kanji. In H. S. R. Kao and R. Hoosain (Eds.), *Linguistics, psychology, and the Chinese language* (pp. 175-167). Centre of Asian Studies, University of Hong Kong.
Matsunaga, S. (1994). *The linguistic and psycholinguistic nature of kanji: Do kanji represent and trigger only meanings?* Unpublished doctoral dissertation, University of Hawaii, Honolulu, HI.
McGinnis, S. (1995). *Student attitudes and approaches in the learning of written Chinese.* Paper presented at the Annual Conference of the American Association for Applied Linguistics, Long Beach, CA. March.
Met, M. (1988). Tomorrow's emphasis in foreign language proficiency. In *Content of the Curriculum: 1988 ASCD Yearbook* (pp. 47-58). Alexandria, VA: Association for Supervision and Curriculum Development.
Mori, M. (1995). *Reading bilingually: Crosslinguistic study of reading comprehension in English and Japanese by intermediate and advanced level Japanese speakers of English as a Second Language (ESL) and English speakers of Japanese as a Foreign Language (JFL).* Unpublished doctoral dissertation, University of Minnesota, Minneapolis, MN.
Noguchi, M. S. (1995). Component analysis for learners from non-kanji using countries. *The Language Teacher, 19* (10), 11-14.
Oxford, R. L (1990). *Language learning strategies: What every teacher should know.* New York: Newbury House/Harper & Row.
Oxford, R. L., Ehrman, M. E. & Lavine, R. Z. (1991). Style wars: Teacher-student conflicts in the language classroom. In S.S. Magnan (Ed.), *Challenges in the 1990s for college foreign language programs* (pp. 1-25). Boston: Heinle.
Perfetti, C. A., & Zhang, S. (1991). Phonological processes in reading Chinese characters. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 17,* 633-643.
Perfetti, C. A., & Zhang, S. (1995). Very early phonological activation in Chinese reading. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 21,* 24-33.
Perfetti, C. A., Zhang, S. & Berent, I. (1992). Reading in English and Chinese: Evidence for a "universal" phonological principle. In R. Frost and L. Katz (Eds.) *Orthography, phonology, morphology, and meaning* (pp. 227-248). Amsterdam: Elsevier.
Saito, H. (1981). Use of graphemic and phonemic encoding in reading kanji and kana. *The Japanese Journal of Psychology, 52* (5), 266-273.
Sakamoto, T. & Makita, K. (1973). Japan. In J. Downing (Ed.), *Comparative Reading* (pp. 440-465). New York: Macmillan.
Sasaki, M. (1987). Why do Japanese write characters in space? *International Journal of Behavioral Development, 10* (2), 135-149.
Saville, P. & Holdsworth, R. (1979). *Technical Test Battery.* Esher, Surrey, England: Saville and Holdsworth Press,

Smith, F. (1988). *Understanding reading*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Steinberg, D. D. & Yamada, J. (1978). Are whole word kanji easier to learn than syllable kana? *Reading Research Quarterly, 1*, 88-99.

Thorndike, E. L. (1917). Reading as reasoning: A study of mistakes in paragraph reading. *Journal of Educational Psychology, 8*, 323-332.

Tzeng, O. J. L., Hung, D. L., & Wang, W .S-Y. (1977). Speech recoding in reading Chinese characters. *Journal of Experimental Psychology: Human Learning and Memory, 3*, 621-630.

Wang, W. S.-Y. (1981). The Chinese language. *Scientific American, 228*, 50-60.

Young, J. & Nakajima, K. (1985). *Learn Japanese-new college text*. Honolulu: University of Hawaii Press.

(Received January 23, 1998; revised April 28, 1998)

Appendix 1

Please write the kanji (no readings) for the concepts below:

Example
fire 火

mouth	ear
moon	shell
woman	soil
tree	rain
heaven	thread
day	cow
bamboo	strength
eye	mountain

Appendix 2

Please write the kanji and as many readings as you know for each of the following 48 concepts:

Example
vehicle 車 しゃ、くるま

sky	borrow	snow	government
dog	type	reason	blame, liability
blue	quiet	sing	laugh
red	rule	daytime, noon	separate (verb)
name	harm, damage	side	warm
sound	rejoice, happy	bridge	wages
left (vs. right)	employment	steps, story	be in difficulty
right (vs. left)	draw near	grade, rank	serve, employed
distant	special	harbor	settle
make	duty	finish	young
count, number	lend	hot (weather)	garden
younger sister	suitable	war	history

Appendix 3

空	借	遠	特	横	暖
犬	型	作	務	橋	貸
青	静	数	貸	階	困
赤	治	妹	適	級	勤
名	害	雪	政	砦	済
音	喜	理	貢	終	若
左	職	歌	笑	暑	庭
右	寄	昼	割	戦	歴