Studies on L2 Acquisition of the Chinese Script Published in America

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Abstract: This study is an analysis of studies published in America relevant to the theme of the 汉字认知 conference, primarily the fifty-eight articles published in the *Journal of the Chinese Language Teachers Association* (JCLTA) since 1966. The discussion is organized into six broad topics, and is aimed at highlighting those articles which are particularly innovative or have good potential for furthering the goal of greater effectiveness in mastering Chinese reading and writing by students whose native languages use phonetic scripts. Special attention is directed to recent or current research, including research on the use of modern technology in pedagogy. While not all scholarship in this field is published in the JCLTA by any means, a survey of this journal should give us a good overview of the relevant studies made by the Chinese language teaching field in America over the last four decades.

美国中文教学界近四十年来对汉字认知的研究成果

凌志韫,《中文教师学会学报》总编辑

提要：自从 1962 年美国的中文教师学会成立以来，该组织在推广、凝聚、和领导美国中文教学界方面一直起着关键性的作用，而这个学会创办于 1966 年的《中文教师学会学报》又成为了美国这个学术界主要的一个研究成果的载体。

作为《中文教师学会学报》的现任编辑负责人，本人借今天这个机会向大家报道一下这个学报在过去将近四十年间对汉字认知这个主题刊登过一些什么文章。该学报每年出三期，至今已出了 119 期，而与汉字认知有关的文章一共有 58 篇。这份报告将对这 58 篇文章分类纳入以下六个主题、并作分析总结：

一、 汉字到底有多么难学？
二、 文字改革对对外汉语教学有什么影响？
三、 阅读与写作在中文教学整体中的地位。
四、 认字和阅读教学的方法。
五、 对以语音拼字为“母文”者来说，阅读中文必须通过什么心理过程？
　　与中文为母语者如何不同？
六、 电脑时代给汉字认知带来的前景。

报告的重点在于如何使以语音拼字为母文的学生更有效地习得汉字，包括如何开拓电脑与其它科技实用于中文阅读教学的潜力。

最后本报告将对今后的汉字认知研究提出一些建议。由于本报告受限于《中文教师学会学报》所刊登的文献，必然疏漏了很多宝贵的研究成果。尽管如此，本人希望这份报告在我们今后研究工作中具有一份参考价值。

Introduction

In the highly eloquent "mission statement" for this conference, the urgency of developing an effective way for massive numbers of Western CFL learners to master Chinese reading was brought home by the scenario that the world's knowledge pool is rapidly shifting toward China, thus creating a growing "interactional imbalance between mankind's largest two cultural areas." While China is one among the world's current major producers of new knowledge, she is unrivaled as a recipient of knowledge from other cultures.

The challenge that the CFL field now faces is to somehow find ways to overcome the hermeticity of the Chinese writing system so that knowledge embodied in the Chinese script would be accessible to those not fortunate enough to inherit it by birth or by early education. This is not a new challenge – for it has been with us for at least the past half century of CFL teaching in Western universities – but it has taken on a special urgency in recent years.

China faced a parallel challenge when she re-emerged onto the world stage around 1980, after a generation of being sealed off from the Western world. At that time, only a minute percentage of China's educated population was capable of reading English, the most prevalent language in world trade and science. However, now a generation later, all graduates from Chinese universities must be able to read their field-specific materials in English, even though most of them still lack functional aural-oral skills. English is already part of the standard curriculum in junior high and high schools, and is increasingly being introduced in primary schools and even elite preschools. The bilingualization of the Chinese population is so rapid that college students on the average have better mastery of English than their professors, and more and more high school students have better mastery of English than their teachers. It does not take much imagination to see that in another twenty years, the educated sector of China's population will equal Singapore's in being fully functional in the English language.

China's success in meeting this challenge is all the more impressive in light of the fact that the Chinese method of foreign language education – including the teaching of Chinese to foreigners – has been commonly disdained by Westerners. But as the English saying goes, "the test of the pudding is in the eating." It is about time we in the West turn our attention to the Chinese success story to see what lessons we can learn from it. One might argue that, because of the fundamental differences between the acquisition of a phonetic and a graphemic script, we in the West cannot possibly expect the same level of success as the Chinese. At a certain level, we must concede that apples cannot be compared with oranges, but apples and oranges both belong to the fruit category after all, and there must be certain similarities between them. The Chinese example is both encouraging and discouraging. Encouraging because it shows what a nation, with consorted effort, can achieve by way of literacy in a foreign language in just one generation. Discouraging because we in the West now see how far we have fallen behind. Let me suggest that we focus on the encouraging part, roll up our sleeves, and get going.

In America, there is a saying "working hard is not enough, you must also work smart." Applied to the mandate of this conference, the "working hard" part can be interpreted as giving high priority in allocating human and fiscal resources to CFL acquisition on the national level, and devoting more time and effort on the individual level. The "working smart" part means applying

effective methods so as to make good on the "working hard" part. So it is up to us the CFL professionals to develop those effective methods through research to help those legions of would-be hard-working students and teachers of the Chinese language. In the meanwhile, students and teachers can still achieve their goals through hard work – as has been demonstrated by the Chinese example - so they should not waste time waiting for more effective methods.

The field of CFL has existed in isolated pockets in the U.S. since the nineteenth century, but it did not become an organized academic field until the middle of the twentieth century. The founding of the Chinese Language Teachers Association in 1962 gave professionals in this academic field an identity, and the *Journal of the Chinese Language Teachers Association* – launched in 1966 – has been the primary repository of research and scholarship of the CFL field in America ever since.[1] The present paper will provide an overview of the research relevant to the theme of this conference done in America over the last four decades by surveying all articles on or related to the acquisition of the Chinese script published in the JCLTA since its inception.

This survey has its limitations, for not all American scholarship in this field is published exclusively in the JCLTA, and even more importantly, it omits all the scholarship published elsewhere in the world. Nevertheless, it is the author's hope that this paper will help future researchers avoid reinventing the wheel, and provide them with relevant references and directions in their research.

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Topics Relevant to 汉字认知 Treated in the JCLTA

I. How difficult really is it to master Chinese orthography? 汉字真的那么难学吗？

The task of mastering the Chinese writing system is correctly recognized by experienced CFL teachers and students to be enormous, but has also been wildly exaggerated in popular lore. For example, on the basis of the fact that the Kangxi Dictionary (compiled under Emperor Kangxi's edict of 1710) contains 47,000 characters, it has been said that the Chinese writing system contains nearly 50,000 discrete graphs. To set the score straight, Bruce Douglass (1969) performed a study on seventeen graduate students from Taiwan at the University of Hawaii in the late 1960's and found that on the average they "knew" 4365 characters. The study also points out that the definition of "knowing a character" is not so simple, so the figure of 4365 needs to be interpreted in that light. This paper concludes that 2000-3000 characters should be sufficient for literacy.

More recently, it has been reported that the number of characters that current college graduates in China know is in the 3000-3500 range. Given the various factors involved in measuring the number of characters "known" by a subject, the difference in the number of characters known by graduate students from Taiwan in the late 1960's and by the current generation of college graduates in China should not necessarily be taken as a difference in their level of literacy. The

[1] The JCLTA publishes articles in CFL pedagogy, Chinese linguistics, and Chinese literature. While there are other journals that also publish articles in Chinese linguistics and Chinese literature, the JCLTA has been the only journal in America with a focus on Chinese language teaching.

most relevant point here for the CFL field is that recent Chinese studies confirm the view that the 2000-3000 is adequate literacy and 3000-3500 is the range for fully functional educated natives.

Students' perception of a learning task is always an important factor in their motivation and learning effectiveness. In two articles published in the JCLTA, the authors emphasize the importance of cultivating the perception that the Chinese script is systematic and realistically masterable, so that the students at the threshold would not be unduly intimidated by this task. In the six techniques for teaching the Chinese writing system discussed by Mickel (1980), the first and foremost is getting students to overcome their anxiety over learning characters, so that they can settle down and learn to read and write characters. This sentiment is echoed in M. Zhang 2001, in which the first principle in introducing Chinese characters is to introduce basic concepts to get students comfortable with the idea before introducing actual characters.

Interestingly, while most beginning CFL students perceive the Chinese writing system to be the most formidable aspect of the language, this is no longer true for students beyond the beginning level. In "An investigation of students' perspectives on Chinese language learning" by Chiang (2002), the author reports that only 16% of the a group of students completing their "second year" of study in a summer program in China rated characters and writing to be difficult, and only 4% rated reading to be difficult (vs. 20% for memorization, tones, and speaking). The author hypothesizes that the hurdles in character reading/writing were largely overcome in the first year of study. It would be very encouraging to the field if future research confirms this hypothesis, because this would mean that a major investment of effort in the first year will yield dividends quickly, and that beginning students can look forward to enjoying the fruits of their labor in the near future.

In another survey, this one on character-memorization strategies used by American college students from beginning to advanced levels, the author (Yin 2003) reports that not all students consider writing characters to be more difficult than remembering the pronunciation and meaning of characters (i.e. character recognition). This is contrary to the commonly held view that writing is even more difficult than reading.

II. On reforming the Chinese orthographic system (文字改革)

Reform of the Chinese orthographic system since the beginning of the Communist era has been mainly an internal Chinese issue over which the rest of the world has no say, but because the issue potentially has major consequences for the CFL field, it has been a matter of concern to the field, especially since the re-opening of China in the late 1970's.

The first obvious issue of concern is character-simplification, which has been addressed in the following articles in the JCLTA: Ng 1976, Chang 1976, Chen 1977, Zhang 94 & 95; Chan & He 1988. The last of the listed articles, entitled "A study of the one thousand most frequently used Chinese characters and their simplification," includes suggestions on how to systematically teach simplified characters to students who know complex characters. Currently, both traditional and simplified characters continue to be used in CFL pedagogy in America, often somewhat awkwardly, but nevertheless in a state of peaceful co-existence.

A much more fundamental kind of script reform over which debate has waxed and waned in China over the past fifty years, and one that would have a stunning impact on the CFL field if it ever comes to pass, is the movement toward phoneticization. In China's modernization effort in the last two decades of the twentieth century, the proponents of such a movement gained some support from the argument that the Chinese script system is an impediment in the digital age, but by now that argument seems have been trumped by advancement in computer technology. The status of this debate in China in the mid-1990's is eloquently described in "Chinese lexicography at the crossroads" by DeFrancis (1996). In this article, DeFrancis portrays the struggle to be between the traditionalists who want to stick with characters and the reformists who stand for some form of a two-track system (the two-tracks being pinyin and 汉字), something that DeFrancis calls "digraphia." Then DeFrancis reveals his own allegiance with these words:

> China is rapidly approaching a mjor intellectual crossroads. One road is the dead-end country lane of the past ; the other is the new global information highway. The road that Chinese intellectuals and official circles take will determine the future of Chinese lexicography, and indeed of the Chinese language and the Chinese system of writing, and even of China's whole modernization effort.[2]

On this issue, Mair (1996) goes one step further in predicting that China will soon – perhaps in 5-10 years – adopt digraphia, and thereafter "sinographs" will gradually be eclipsed. In this same article, Mair supports John Rohsenow's view that a huge amount of Chinese school children's energy and talent would be freed up for other intellectual pursuits if they were not required to read and write everything in characters (Rohsenow 1996).[3] Many of us who have struggled to learn and teach the Chinese script might, in our wishful thinking, imagine how much easier it would be for foreigners to master Chinese orthography if China adopts digraphia. But we need not look too far to see from the Japanese example that even a phonetic-graphemic hybrid script can be equally formidable, and JFL is rated on a par with CFL in its level of difficulty.

III. The place for reading and writing in CFL pedagogy

One of the most widely used textbooks for basic Chinese in America today bears the title 《中文听说读写》 (Yao & Liu 1997), which reflects the idea that the four skills – listening, speaking, reading, writing – are to be developed in tandem. This has not always been the case in American CFL pedagogy, and different language programs have assigned different priorities and order in teaching the four skills. While listening and speaking are generally recognized as fun-

[2] DeFrancis 1996, p. 7.

[3] In "The 'Z.T.' experiment in the P.R.C." ("Z.T." is 注提, short for 注音识字、提前读写), Rohsenow analyzes a Chinese government experiment whereby children were taught to read and write using pinyin *in addition to* Chinese characters for the *first two years* of primary education (in contrast to the standard procedure of using pinyin for just the *first two months* as a phonetic notational device for the pronunciation of characters). The results over more than ten years indicate that most students who used pinyin for two years *learn to read and write characters* faster and at a higher level than most students taught by more traditional methods. Rohsenow also cites experiments done in the U.K. and U.S.A. whereby children were initially allowed to spell words exactly as they sound (i.e. ignoring the irregularities in English spelling), with the result that these children learned to read and write faster, with no appreciable harm to their later spelling ability. While Rohsenow does not draw from these experimental results any implications for the teaching of Chinese L2 reading and writing, these results do provide some clues for future research into the function of pinyin in L2 reading and writing.

damental components of the basic CFL curriculum, reading, and even more so writing, have not enjoyed the same status, so some CFL teachers have deemed it necessary to come to their defense. In his article "Literacy and reading in a Chinese language program," Walker (1984) states:

> In the long run, reading is probably the most important skill a learner can gain from formal instruction in Chinese…Reading is absolutely crucial to the life-long maintenance of language skills and the increase of knowledge. How to inculcate this skill must top the agenda of every Chinese language instructor who strives to effect a permanent change in the students who come his or her way.[4]

In the rest of the article, the author makes a distinction between literacy (mastery of an orthography) and reading, which involves interpreting the orthography in its cultural milieu.

While there is a widely-held conviction among CFL teachers that the four language skills are linked, this conviction is not supported by a great deal of empirical research on just how the four language skills are related to each other, and to what extent they are mutually reinforcing. However, the JCLTA has published two articles that explore the relationship between the four skills.

In "Vocabulary acquisition and learning Chinese as a foreign language" (Lin 2000), the author posits a vocabulary acquisition "continuum," with passive vocabulary knowledge (able to connect meaning to sound) at one end and active vocabulary knowledge (able to connect sound to both meaning and character production) at the other end, and finds that the bigger the distance between the two ends, the weaker the general language proficiency. This study concludes that the higher level of vocabulary acquisition (active vocabulary that includes character production) is the foundation of all-round proficiency, with the pedagogical implication that all four skills should be integrated.

Interestingly, a mirror image of the above study – published one issue later - arrived at quite a different conclusion. In Yang 2000, the author finds that L1 and L2 learners recognize Chinese characters through different processes, and that L2 learners rely heavily on oral proficiency. She concludes that different teaching strategies should be applied to Chinese learners with different L1 backgrounds, and that for students from phonetic-script language backgrounds, development of spoken proficiency should have priority.

The one skill that has been most difficult to integrate into the CFL curriculum is writing in the sense of composing prose or essays using characters. Given the enormous amount of time and effort required for developing Chinese writing skills, the following questions naturally arise: Is it necessary to learn writing for its own sake? If not, then is the ability to write linked to ability in more important areas such as reading? On the first question, while no one has professed in any article published in the JCLTA that writing is not worth the necessary investment in time and effort needed, only one author (Shen 2000) has made the point that writing should not be viewed only as a supporting or secondary skill in obtaining literacy in CFL classes, but rather as a communication skill that deserves a place in the CFL curriculum in and of itself. However, even

[4] Walker 84, pp. 67-68.

there, the point is tangential to the theme of the article and is not elaborated upon with supporting rationale.

On the other hand, the second question posed in the previous paragraph has received considerable attention from researchers. While different CFL programs give reading different priority ranking and ordering vis-à-vis development of aural-oral skills, it is generally accepted that sooner or later reading is an important skill for L2 learners to acquire. On that premise, there arises the question of whether it is necessary to learn writing in order to learn reading. Judging from the relevant articles published in the JCLTA to date, it is fair to say that the jury is still out on this question.

In "Is it necessary to require writing in learning characters?," Chin (1973) reports that a "simple, casual, grassroots" piece of research he conducted on how character writing and recognition are related revealed that students required to write characters learn to produce (i.e. write) AND recognize characters better, and interestingly, students who voluntarily practiced writing even though they were not required to do so outperformed the required-to-write group in character recognition. Light (1975) shares Chin's view that writing should be a required part of the Chinese curriculum. Although Light did not conduct empirical research on this subject, he has the conviction that "controlled composition" aids reading, because it simply stands to reason that engaging in some *problem-solving activity* reinforces students' passive ability to read.

The strongest support for the positive impact of writing on reading ability comes from the empirical study "The Interconnections of reading text based writing and reading comprehension" (Shen 2000).[5] One of the conclusions of this article is that, from the perspectives of information processing theory (which holds that the connection between reading and writing lies primarily in the similarity of the cognitive processing and the strategies applied to fulfill those two processes), sociolinguistic theory, and psycholinguistic theory, there is strong support for the reading/writing connection in general. The pedagogical implications derived from this conclusion are that writing can help students not only to develop writing skills, but also to improve reading comprehension, and the best way to teach reading and writing is to teach them together in an integrated manner.

The view that writing is necessary for the development of reading skills has not gone unchallenged in the CFL field. In another empirical study (Ke 1998), the research data suggest that poor character recognition correlates with poor character production, and good character production correlates with good character recognition, but "in general, those good at character recognition *can be poor character producers*."[6]

Even before empirical data became available in the 1990's, there was skepticism toward the necessity of writing. In "Writing in Chinese" (Barnes 1970), the author cautions that a relationship between "passive" recognition (of characters) and "active" production (i.e. character writing) cannot be assumed. He also questions the value of requiring students to write in 楷体, and pro-

[5]In this title, "reading text based writing" means "reading-text-based writing," which is a kind of writing exercise based on texts read by the learner before doing the writing.

[6]Ke 1998, p. 95. The result of this empirical study was first reported in Ke 1996, and Ke 1998 refers to this earlier published article.

poses that students be taught to write in cursive script to save time. This view seems to stem from a suspicion that the massive amount of time and effort put into mastering Chinese writing may not be necessary or worth the cost. The idea that students can save time by writing in 草书 rather than 楷体 is questionable, but it does reflect the sentiment that if students are to learn to write – for its own sake or for enhancing reading skill - we need to find ways to make the process of writing less onerous.

Among the proponents of teaching writing for its own sake or for the sake of enhancing reading ability, there seems to be agreement that we need to steer students to the most efficient and productive writing exercises possible. In this vein, Light (1975) advocated "controlled composition and reading," Shen (2000) advocated "reading-text-based writing," and Mou (2003) proposed a type of journal-based writing with many devices to minimize time expenditure and maximize benefits to the other three language skills. What all of them have in common is that the substance of the writing is provided by the format of the exercise, and students are not burdened with the creative part of the writing process.

There remains one question on the relationship between reading and writing that has not been addressed in any study, and that is whether practice in writing characters *by hand* can enhance reading and other language skills? A corollary question is: If practice in writing enhances reading ability, can the same effect be accomplished with less time and effort by producing characters *on the computer* (inputting romanization and weeding out "wrong" homophones)? Answers to these two questions could have momentous implications for CFL pedagogy. An article relevant to these two questions will be discussed in Part VI, which deals with computer applications.

This section would not be complete without mentioning calligraphy. Brush calligraphy is offered as an elective activity in many programs; it is a frequent topic at conferences; and there is a Calligraphy Education Group in the U.S.; but to date only one article has been published on this subject in the JCLTA (Chin 1987), and it is by the strongest promoter of this art in the CFL field in America.

IV. How to teach Chinese characters

Common sense tells us that the first issue for every teacher who teaches L2 Chinese reading is how to teach Chinese characters. Numerous articles on this subject have been published in the JCLTA, although in many of them, recognition and writing of characters are not explicitly distinguished, and the reader is left to apply the article to character recognition and/or writing as he sees fit.

The one common element found in all the articles on how to teach Chinese characters (Ching 1975, Mickel 1980, Liu 1983, M. Zhang 2001, and Yin 2002) is the recognition that an organizational system is necessary, although they differ on the details of that system. There is also a consensus that the recurrent components and radicals should be taught. In addition, Yin (2002) points out that stroke order and the names of the strokes are indispensable elements in the teaching of characters. An empirical study entitled "The effect of character density on learning Chinese as a foreign language" (Xiao 2002) supports the importance of learning character components with the finding that student performance in recognition, production, and dictation is gen-

erally better with low-density characters, and therefore *teachers should help students master complex characters by breaking them down into analyzable units*.

Information on radicals is readily available, but not so for phonetic components. On the latter subject, two articles have been published in the JCLTA. The first is "A phonetic-inductive approach to Chinese character recognition" (Astor 1970), in which the author presents eight lessons that he has created to teach seven phonetic elements and their embodiments in Chinese characters (lesson 8 is review). The author also claims that the phonetic elements often give semantic clues as well, although he does not compare phonetic components against radicals as semantic indicators. The second article is "The most recent list of 3000 most commonly-used characters and their phonetics" (Alber 1989), in which the author concludes that learning the phonetic elements is very useful for all students.

On the subject of character components, an article on a non-traditional approach to decomposing Chinese characters deserves some mention, not because it has relevance to human learning of Chinese characters, but because of its potential implication for computer-manipulation of characters. This article - "The linguistics of Chinese writing" (Ashworth 1970) - identifies about 350 recurring components and a finite number of "subframes" (left half, right half, upper righter, center, etc.) which form the "grammar of the language of Chinese characters." In this system, each character can be defined as a composition of subframes put into a particular arrangement. While its claim that this system can be used to systematize the learning of characters and thereby overcome students' fear of character complexity was dubious, its potential application in computer recognition and production of characters *was* real in the nascent computer age, but no longer seems to be so today.

The Chinese term 教学 embodies the concept that an educational enterprise has two sides to it. Along with attention to how characters should be taught, considerable amount of research has been directed toward students' views on character learning. In "Effects of strategies on the learning of Chinese characters among foreign language students" (Ke 1998),[7] the data culled from 150 students completing their first year of Chinese indicate that the two strategies that students found most effective are using character components and graphic structure, and practicing characters *in the context of vocabulary items* (i.e. not in isolation). The latter echoes the point made by Wang (1972) that parsing is a major hurdle for CFL students. Interestingly, relating characters to sounds was not found to be particularly useful in this study, which is contrary to the results of a study done by Everson (Modern Language Journal 1998) and another study done by Yang (2000, mentioned in section III above). This article also reports on some very different results from a study of a group of students in the middle of a 9-week beginning Chinese course (McGinnis 1995), in which students favored writing characters repeatedly and creating mnemonics (making up stories). Ke surmises from this that students at an early stage of study have too few characters under their belt to make use of the more sophisticated strategies that emerge after they acquire a critical mass of characters. This suggests that different stages in students' character acquisition require different teaching and learning strategies. The contradictory results from various studies mentioned in this article indicate that much more research is needed in our search for more effective ways to teach Chinese characters.

[7] Aside from its original research, this article is also useful for its discussion of related studies and list of references.

The differentiation at various stages of character acquisition is further supported in the article "An investigation of students' perspectives on Chinese language learning" (Chiang 2002, mentioned earlier in section I), in which the author surmises that the reason most students completing their second year of study do not rate characters and reading/writing as difficult is that the hurdles in this area were largely overcome in the first year. In the same study, the author finds that a significant percentage of students *wished* that they had paid more attention to character-writing and learning radicals and components in their first year of study. Seen against the strategies most favored by beginning students (cf. the McGinnis study mentioned in the last paragraph), it appears that strategies that students find most effective in the early stages of character acquisition may not be perceived to be the most effective *in retrospect*. This suggests that while the "primitive" strategies are effective for learning the first critical mass of characters, students still need to acquire the system of recurrent components and radicals at the same time in order to build a foundation to facilitate further character acquisition. Deng Xiaoping's 两条腿走路 approach triumphs again.

Given all the published scholarship devoted to the question of how to teach Chinese characters, it is rather disturbing to find that the *practice* of character-teaching in America lags far behind the CFL field's collective *knowledge* on this subject. In "美国大学生记忆汉字时使用的方法--问卷调查报告 Strategies used by American college students in memorizing Chinese characters – a survey report" (Yin 2003), the two most significant findings are: 1) Students tend to use mechanical strategies (such as writing characters repeatedly) rather than cognitive strategies, so that they are working hard (苦学) but not working smart (巧学); 2) There is very limited use of computers, and the potential of computer assistance in learning characters is not anywhere near being fully exploited. One aspect that remains to be researched is the correlation between using smart strategies and computers on the one hand, and students' perception of the difficulty of character-learning and their achievement on the other.

The disconnect between research and pedagogical application in teaching characters is depicted in concrete and specific terms in "語言研究與語言教學--以漢字教學為例 Language research and language teaching: an example from the teaching of Chinese characters" (Ma 1997). In this article, the author points out that the teaching of characters in the U.S. is deficient in systematic pedagogical approach and reading materials, and the characters introduced in basic textbooks are not well matched with those of highest frequency in the written language. This article concludes with a set of pedagogical recommendations.

There is obviously no dearth of knowledge about how to teach characters, so how do we close the gap between knowledge and practice? Perhaps what the CFL field needs are supplementary teaching materials (the sort of things that would go into a teacher's manual coordinated with the textbook), complete with ready-made printouts of student exercises. I suspect the authors of the numerous articles mentioned in this section have already created such manuals for their own use. If so, they would do the CFL field a great service by sharing them with colleagues in the field.

V. The process by which natives of phonetic-script languages read the Chinese script

The dream of every serious CFL learner is to attain proficiency approaching that of well-educated natives. There are now examples of CFL learners – yes, even Westerners – who have attained this dream in terms of aural-oral proficiency. But are there any Western learners who have attained native-level proficiency in reading? We don't have an answer to this question, perhaps because reading is a private activity, but more likely because we simply have not researched the question. There have been studies in psycholinguistics on the mental process of reading by natives in the language - in both phonetic and graphemic systems of orthography. Two "cross-over" questions that naturally arise in the CFL field are: 1) How do natives of phonetic-script languages read a graphemic script like Chinese? 2) Are human brains hard-wired in a certain way by their training in their first written language, so that they would never read a different type of orthography in the same way as the natives?

Common sense tells us that learning to read a phonetic script is fundamentally different from learning to read a graphemic script, but how exactly are they different? In the article "對閱讀教學研究的若干思考 Some thoughts on research in the teaching of reading" (Liu 2001), the author presents a survey of the various points of view in the CFL field *in China* regarding the teaching of L2 reading. While he himself has some very clear ideas on how L2 reading should be taught, he concedes that the teaching of reading in CFL is the one area that differs most greatly from the teaching of other foreign languages, and yet our understanding of it is still very rudimentary.

In Light 1976, the author explores the question of how reading a phonetic script differs from reading a graphemic script by comparing how fast students read in romanization vs. in characters after one year of study. Because native Chinese and highly proficient foreigners read faster and more accurately in characters than in romanization, one may hypothesize that at some turning point, students begin to read faster in characters than in romanization. Light was surprised by what he found, which is that students at the end of one year of study still read faster in romanization than in characters, but only marginally faster when translating the text from Chinese into English. In the same article, the author extrapolates from a study of Japanese aphasics - wherein some aphasics retained only kanji (graphemic) reading, and some only kana (phonetic) reading - and posits that reading a phonetic script must involve different psychological processes from reading a graphemic script.

In a more comprehensive study entitled "Speed and comprehension in reading Chinese – romanization vs. characters revisited" (Everson 1988), the author grapples with the same questions that Light explored in 1976. Everson confirmed Light's findings with statistical data from 60 students at the U.S. Air Force Academy. He too found that first year students read faster and comprehend better in romanization than in characters, implying that the expected transition to reading more efficiently in characters takes place later. Everson also hypothesizes that, since different orthographies have different script-speech relationships, native Chinese readers and non-native L2 readers – no matter how advanced – employ different processing strategies. It has been claimed that Chinese orthography maps script more directly onto meaning (bypassing the phonological system), but Everson subscribes to the contrary view that native Chinese readers associate characters with phonetic encoding. A study conducted by Hayes (1987b) provides further evidence to support Everson's view. In his 1988 article, Everson also discusses a 1986 study he did on eye movements during reading made by beginning and advanced L2 learners, as

well as natives. He found that, compared with natives, L2 readers fixate more on characters, though advanced learners do this less than beginners. This finding led Everson to hypothesize that L2 readers employ a mixed strategy of phonological and visual processing. He also suggests that there may be a block in the L2 readers' development of automaticity. Words like "hypothesize" and "suggest" indicate that we don't yet know *with certainty* the significance and the pedagogical implications of the research data. Everson concludes that the Chinese L2 reading puzzle is far from solved, and that much more research is needed if we are to come to understand all the psychological and social variables involved in this process.

In their quest to understand more about the Chinese L2 reading process, Everson and his colleague Ke (Everson and Ke 1997) conducted a study on the qualitative change in the reading process as L2 learners advance. In their article "An inquiry into the reading strategies of intermediate and advanced learners of Chinese as a foreign language," they report that there are differences between intermediate and advanced students, and that as learners advance, they are able to use more strategies and harness more linguistic skills (such as pronouncing the words out loud) in reading. Because the research sample for this study was small – only 5 intermediate and 2 advanced CFL students – and the research procedure was basic, the authors caution that the findings are sufficient only to support hypotheses and to provide some direction for future research.

Another question about the L2 reading process that has intrigued researchers is the effect of character density and frequency on reading effectiveness. The first article on this subject published in the JCLTA was "The relationship between Chinese character complexity and character recognition" (Hayes 1987a). The results of this empirical study indicate that character complexity has no effect on character recognition among Chinese natives and highly proficient non-natives, although natives recognize more characters than non-natives across the complexity spectrum. The pedagogical implication is that greater complexity in characters does not increase reading difficulty.

The results of Hayes' study are partially confirmed but also further refined in a more recent article entitled "The effect of character density on learning Chinese as a foreign language" (Xiao 2002). In this study, the author distinguishes three levels of density and divides students' ability into the three subtasks of dictation, production, and recognition. She finds that students recognize mid- and high-density characters equally well - which is consistent with Hayes' finding, but perform increasingly worse in dictation and production as density rises, and also worse in recognizing mid-density characters as compared with low-density characters. From these findings, the author draws the pedagogical implication that low-density characters should be introduced first, and breaking complex characters down to analyzable units should aid mastery.

A similar but broader study by Sergent and Everson (1992), entitled "The effect of frequency and density on character recognition speed and accuracy by elementary and advanced L2 readers," for the most part supports Xiao's findings and contradicts Hayes' findings. The results of this study indicate that, for all levels of ability, density correlates negatively with both speed and accuracy in character recognition. As for the effect of character frequency, the data show positive correlation between frequency and accuracy, but no effect on speed. The authors note discrepancies between their findings and those from three other studies – two involving non-natives

and one involving natives, and offer some hypothetical explanations for the discrepancies. So again we end with the refrain "more research is needed…"

Hayes followed his 1987 study on the effect of character density with another one on the relationship between word length and memorability among Chinese native and advanced non-native readers (Hayes 1990). Specifically, the experiment tested the subjects' ability to recall nouns of different lengths (1 – 4 characters). The author found that non-natives basically mimic natives in recalling 1- and 4- syllable words best, and 2-syllable words worst. A related type of study mentioned in this article is that of eye-fixation in reading texts with and without word-parsing.[8] Hayes draws from his findings the pedagogical implication that it is important to teach the meaning of single morphemes within words, as well as the lexical relationships between characters in words. Like Everson (1988), Hayes concludes that much more research is needed before we understand how non-natives acquire reading skills.

To conclude our discussion in this section, we now turn to the relatively comprehensive study "An empirical study on the relationship between Chinese character recognition and production" (Ke 1996). This study is directed at the following questions, each listed below along with a summary of the study's findings:

1. What is the correlation between character recognition and character production?
   There is positive correlation between the two, but less so with advancing proficiency.
2. Do students perform better in character recognition or in production?
   They perform better in recognition.
3. Do students perform better with high density characters or low density characters in recognition and production? (Other studies on this question have been discussed above.)
   Character production is better with low density characters than with high density characters, and this applies to recognition as well in the beginning level, but the difference tapers off as learners advance in proficiency.
4. Are there any instruction effects (effects brought about by longer instruction) on recognition and production?
   Longer instruction improves performance in recognition and production.

This article also provides a good review of related studies and direction for further research.

VI. New horizons in the computer age

In the early 1980's, when computer usage by academics and other professionals underwent a period of exponential growth, the CFL field in the U.S. was invigorated by the vision of a potential great leap forward in "computer assisted language instruction," so much so that the acronym CALI was coined for this concept. Now almost a quarter century later, we are in a position to assess what we have accomplished by way of CALI, but also to recognize that the potential of computer assistance remains largely unexploited today. In this section, we will discuss articles on computer technology published in the JCLTA relevant to L2 reading, setting aside those that pertain to aspects of CFL which are outside the purview of this conference.

[8]Separate studies were conducted by Everson and Carpenter & Just. Hayes 1987a, p. 32.

In 1986, Yao and Peterson (1986) presented a narrative review of a program called Chinese Character Tutor, designed to help students learn characters using personal computers. This program contains such things as pinyin, meaning, compounds, and practice routines. Several similar programs have been developed in the U.S., and all of them are available on the market. However, there has not been any published empirical study on how widely used and how effective these programs are. The only inkling we have on this question is from a study done by Yin (2003), which indicates that - at least at the well-respected summer intensive Chinese program on which the study was based - computer use is very limited

An area in which computer technology has been widely applied is testing, although it is fair to say that the CFL field has only begun to exploit this potential. In the article "A computer-adaptive test for reading Chinese (CATRC) – a preliminary report" (Yao 1995), the author reports on how the test was created and gives a list of trial-testing centers around the U.S. As its name implies, this test adapts the level of successive test items to the examinee's reading proficiency range, and gradually narrows the range to a specific proficiency rating.

A project carried out at the University of Southern California (USC) to promote reading proficiency was presented in two JCLTA articles. The first, "Computer-aided training in reading Chinese" (Lu 1997), describes how the program NJStar's dictionary function is used both in reading and writing. The reading materials generated by this project have two distinctive features: 1) each essay comes in several editions with different level of difficulty; 2) word boundaries, hyphens, and grammatical markings are added to the text as reading aids. The second article - "Steps towards reading proficiency: progressive reading" (Li 1998) - focuses on how the corpus of reading materials is used by learners independently outside of class and how learners at varying levels of reading proficiency can participate in group discussion in class. This article ends with an appeal to colleagues in the CFL field to contribute materials for online use by the "public." Several institutions in the U.S. now have online materials, including USC's "General Reading and Treasure Box."

Language teaching in general, and TCFL in particular, is an extremely labor-intensive enterprise. One motivation for developing CALI is to have more effective tools and procedures for learners, the other is to allow institutions with limited teacher hours to provide the "instructional services" that can be performed equally well or even better by computers. The CyberChinese program developed at the University of California Santa Barbara (UCSB) is an outgrowth from this two-pronged motivation. In the article "CyberChinese, a multimedia aid for elementary Chinese language instruction: overview and evaluation" (Yu and Michaels 1998), the authors characterize this program as a "computer TA" which provides online exercises for pronunciation and tone recognition, vocabulary, radicals, and grammar. The character module in each lesson includes definitions, radicals, phonetic components, pronunciation, stroke order, and examples of characters with the same radical. The program includes games and exercises with instant feedback. Through this program, instructors can also track students' performance online, and to find out where students are having difficulties. This article assesses the effectiveness of this program by way of students' perception of the utility of each component.

We are now well into the twenty-first century, and the vast majority of us in the West have come to rely on the computer to perform the mechanical part of our writing. To no lesser extent, native Chinese academics and professionals too have transitioned to writing on the computer keyboard. Given the enormous time and effort required for students to write Chinese characters by hand, it is surprising that the CFL field has not yet been pressured to liberate students from the tedium of writing characters *by hand* in favor of the computer keyboard. It is widely believed that writing on the computer will erode our ability to write by hand (just as doing calculations on a calculator will erode our own mental ability to calculate) – and this has been proven to be true even for native Chinese. But we may ask: So what? This is not a flippant question, but a serious one. In other words, what kind of impact would writing on the computer as opposed to writing by hand have on Chinese L2 learners? Would writing on the computer reduce the quality of the written product? Would it erode the learners' ability to produce text? Would it negatively impact on the learners' ability in other language skills - particularly reading? If we have empirical evidence to answer the last three questions in the negative, then we may ask: If the only negative consequence of allowing students to write on the computer is that they will no longer be able to write by hand, how serious a problem is that?

To date, only one study on this subject has been published in the JCLTA. In "'Penless' Chinese language learning: a computer-assisted approach" (Xu and Jen 2005), the authors compare the learning effectiveness of having students write on the computer vs. by hand. Data from this study indicate that students who learn to write on the computer perform better in character recognition as well as production.[9] Moreover, there is some evidence – though not solidly documented – that the "penless" learners also perform better in aural-oral tasks. It is not clear if the enhanced performance of the "penless" learners can be attributed only to applying their freed-up time (not used for practicing writing by hand) to other learning tasks, or if there are more subtle connections between the writing method and the learning efficiency. While the results of this single study should not be considered definitive, this study has opened up a new frontier in which further empirical research could potentially transform the way we teach CFL reading and writing.

Recommendations for Future Research

Among the topics covered in the foregoing survey of studies published in America, the two broad areas where further research is likely to yield results that can help boost the success rate of Western learners in mastering Chinese reading are: 1) The process by which natives of phonetic-script languages read the Chinese script; and 2) Utilization of computer technology to increase learning effectiveness. For example, computer dictionaries and reading aids such as Wenlin, Clavis Sinica, and 金山词霸 have been available for quite some time now. We have the impression that they are widely used, but there is to date no empirical study on their effect on the learning process.

[9]The character-production aspect of the comparison between the two groups was not carried out with the two groups "writing" in exactly the same way. The "penless" group wrote on the computer (typing in romanization and selecting the correct character from a number of choices), and the control group wrote by hand. Therefore, the two groups were not being compared on a level playing field, which renders the claim that one group outperformed the other in character production dubious.

It has been said that Americans tend to be insular, and one reflection of that is the fact that Americans in general are neither interested nor proficient in foreign languages. Those of us who devote our lives to foreign language teaching might think that this assessment cannot possibly apply to us, but one thing that we can do to break out of our own insularity is to examine how peoples of other nations succeed in mastering foreign languages. We probably don't need to dig very deep to find *some* of the answers. These may be as simple as starting foreign language studies early, allocating more class hours to foreign language studies in the curriculum, studying the language with concentrated effort (rather than spreading effort over four or five academic courses concurrently), and even plain old-fashioned studying hard and memorizing passages. Other answers will no doubt require more sophisticated research in the realm of psycholinguistics and sociolinguistics. The examples that are likely to be most useful for our inquiry are those from the learning of non-cognate languages or fundamentally different types of orthography, such as the acquisition of English by Chinese, Koreans, and Japanese, and the acquisition of Asian languages by Russians and other peoples from the former Soviet bloc (who have good track records). In sum, our research should extend beyond the teaching of CFL to Westerners to encompass the teaching of other foreign languages in various different cultures.

In our own backyard, there is now a small but growing contingent of successful L2 readers and writers of Chinese, whose proficiency approaches that of natives. We in the TCFL profession are naturally aware of our own students who have attained "professional functionality," or even near-native proficiency, for they are the precious few who bring us pride and joy. While we would like to believe that they are the products of our fine teaching, I myself, in all honesty, must concede that they produced themselves with some help from us. Recently, some concrete evidence has surfaced that a significant proportion of the successful learners are indeed self-made. Several months ago, I discovered a group of Western Chinese bloggers (mostly Americans) by reading their written works on the internet. My preliminary research into this group indicates that they tend to be quite individualistic, and many have learned Chinese by unconventional paths and therefore had slipped under the academic radar screen. Now that non-traditional language learning resources are increasingly available, that China has become wide-open to foreign students, and foreigners are able to freely associate with native Chinese in China, it stands to reason that there are alternatives to the conventional academic path to achieve high-end proficiency in Chinese. Because many of these bloggers have attained high-end functionality in Chinese without formal training in programs recognized to be superior, they could be fertile ground for CFL research.[10] As teachers, we tend to focus more of our research attention on the 教 side of the 教学 enterprise than the 学 side. Among the Chinese bloggers, we have some successful Chinese L2 learners whose 教学 experience has been predominantly in the 学 side. In future research, we would do well to strike a better balance between 教 and 学 than we have so far, and to use as research subjects the learners who have achieved high-end proficiency, both the self-made ones and those who have come through the conventional academic path.

[10] The bloggers' writing proficiency can be assessed from their online postings. Assessment of their proficiency in the other language skills is only from a couple of "voice blogs" and from my correspondence with them. The evidence is anecdotal and scanty, and therefore assessment of their proficiency other than in writing is only inferred and imprecise.

This paper is primarily an analysis of articles relevant to L2 acquisition of the Chinese script published in the JCLTA, and does not pretend to have surveyed all research and scholarship done in the U.S. Aside from studies published in other academic journals, a significant lacuna is dissertations.[11] And of course this study has neglected all the scholarship published outside of the U.S., for which I extend my sincere apologies. I can only hope that this limitation of the present paper will be remedied by colleagues in other parts of the world in the near future.

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