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Vocabulary Acquisition in CFL (Chinese as a Foreign Language) Contexts: a Correlation of Performance and Strategy Use

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VOCABULARY ACQUISITION IN CFL (CHINESE AS A FOREIGN LANGUAGE) CONTEXTS: A CORRELATION OF PERFORMANCE AND STRATEGY USE

by

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ABSTRACT

VOCABULARY ACQUISITION IN CFL (CHINESE AS A FOREIGN LANGUAGE) CONTEXTS: A CORRELATION OF PERFORMANCE AND STRATEGY USE

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The present study was anchored in an inquiry of second language Chinese vocabulary acquisition and learning Chinese as a foreign language. It investigated character density in L2 Chinese vocabulary recognition and production: low character density recognition, high character density recognition, low character density production, and high character density production. It also investigated the effectiveness of strategies that students perceived when faced with learning Chinese.

The data was collected from the Chinese program at Brigham Young University across one semester level. Along with this data, students' vocabulary achievement test scores were collected. Descriptive and non-parametric statistics were used. The one-way *ANOVA* was used to investigate the effect of character density on students' vocabulary recognition and production performance. The *Pearson Correlation* was used to

determine whether there was a linear relationship between the strategies they prioritized and their performance in vocabulary recognition and production test. The research found that character density had an effect on vocabulary production performance but not on recognition performance. The research also found strategies that are positively correlated with recognition and production performance, and strategies that are negatively correlated with recognition performance.

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First and foremost, I would like to express my deep gratitude for my BYU experience. I am thankful that I received my education at Brigham Young University. I could never have gained any better academic training and cultural experience that enhances my understanding of languages and cultures at other schools.

I received my BA from BYU-Hawaii in International Cultural Studies. From there, I developed a profound appreciation for how languages were created to serve the exchange of ideas and thoughts between human beings and cultures. I was always fascinated by how beautifully each language sounded to my ears. This had led me to my study of Language Acquisition. Since my native language is Chinese—a language that is considered extremely laborious and yet enriching to learn, I am privileged to study it at a deeper level, which allows me to share this piece of art with foreigners so that they may come to appreciate the beauty of it. I have enjoyed studying this program and the opportunities to practice my teaching skills in the BYU Chinese program.

I also need to thank my committee chair Dr. Matthew B. Christensen, and members Dr. Dana Bourgerie, and Dr. Ray Graham for their effort and time in guiding me to finish off this Thesis. Their knowledge and academic pursuit have enlightened me to approach a higher level of academic scholarship.

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Chapter One

Introduction

L2 vocabulary acquisition has consistently been an area receiving significant focus in the field of second language acquisition. Research on second language acquisition has credited vocabulary acquisition to be imperative in achieving foreign language competence (Laufer, 1992, 1997, 1998; Laufer and Nation, 1995, 1999; Nation, 1990, 2001). Vocabulary competence is believed to be at the heart of communicative competence (Meara, 1996). Vocabulary knowledge especially Chinese vocabulary knowledge has proved to be important in performing reading tasks (Everson, 1986, 1988, 1994; Everson & Ke, 1997; Hayes, 1988, 1990). Additionally, research has identified the major challenge of learning and using a second language to be in the mastery of its vocabulary (Singleton, 1999).

Knowing the paramount importance of vocabulary knowledge in acquiring a second language, the researcher wished to define here the main topic of interest of what is meant by vocabulary acquisition. Vocabulary acquisition entails recognition and production. In this study, vocabulary recognition and production denotes the ability to distinguish words when seeing them in context and/or as separate words, and the ability to produce the right words and to use them correctly in meaningful contexts. The undertaking of learning vocabulary has proven to be laborious by language learners. It requires a learning burden (Nation 2001). Nation defines the learning burden of a word as "the amount of effort required to learn it" (p. 23). The learning burden involved in vocabulary acquisition includes every aspect of what it means to know a word—form,

meaning, position and function (Nation 1990). Different words bear different degrees of learning burdens for learners with various language backgrounds.

In the framework of the learning burdens of words in a different language, the state of affairs regarding learning vocabulary in a second language is compounded further by language systems that are so strikingly different from a learners' native language. For example, the Chinese language employs writing systems that differ tremendously from alphabets. Alphabetic systems and Chinese writing systems differ to a large extent in terms of correspondence between their symbols and their sound systems (Everson 1988). Due to its irregular sound-to-symbol correspondence, Chinese orthography does not always reveal a way to relate the symbol to its sound. Learners with an alphabetic language background, in which sounds and symbols are tightly correlated, would have to come up with approaches to learning Chinese writing, both in word recognition and production. This area of learning Chinese characters has continued to engage interest in the CFL research agenda. In particular, recent CFL studies have focused on the relationship between Chinese character recognition and production (Ke, 1996, 1998; Lin, 2000). Researchers have carried out a handful of experiments and formulated hypotheses. One hypothesis suggests an "orthographic depth" (Liberman, et al. 1980) of the Chinese writing system that would predict the degree of learning difficulties to some extent. Some believe that the complexity of characters hinders character recognition and production and finally the ultimate acquisition of characters (Hayes, 1987; Ke, 1996). Others recognize a strong correlation between being able to pronounce a word and being able to correctly identify its meaning (Everson, 1998; Yang, 2000).

Concerning the effectiveness of learning vocabulary, one area that has drawn considerable attention from researchers deals with the reality that some CFL learners tend to achieve a high performance in character recognition and production, while others do not achieve equivalent levels given the equal amount of time spent in study. This has led many people in the profession, especially language teachers and researchers, to wonder whether language learning approaches (also termed strategies) play a role in determining learners' success. To understand this situation in a CFL context, and to show how CFL students learn, empirical studies have investigated the acquisition of Chinese characters in the beginning proficiency level, including the acquisition of Chinese characters at the earliest stage of study (McGinnis, 1995, 1999; Everson, 1998). They have also investigated of the effects of strategies on the learning of Chinese characters in the first year (Ke, 1998). Yet few studies have been conducted to study strategies in upper proficiency levels. Furthermore, researchers have also failed to make correlations between strategies and their effectiveness in helping learners attain long term vocabulary knowledge.

Rationale

Assuming that CFL learners in upper-proficiency levels learn vocabulary differently than first year learners (as learners move towards more autonomy in the acquisition of vocabulary), it would be meaningful to look at how their strategies in vocabulary learning outside the classroom actually affect acquisition. This study explored how character density affected the acquisition process of intermediate-proficiency level learners, and what strategies learners prioritized to approach learning

characters, and finally, whether the type of strategies they prioritize predicted their achievement performance in learning Chinese vocabulary. For an in-depth understanding of the current issues, research studies that have dealt with various issues of potential difficulties regarding vocabulary acquisition that the learners of CFL encounter somewhere along the line have been reviewed. The purpose of this study was to investigate whether learners' self-perception of the effectiveness of character learning strategies differed as their proficiency level increases, and eventually how the learners' self-perception of the effectiveness of character learning strategies correlated with their actual performance measured in their character recognition and production test scores. This study hoped to discover some effective learning approaches that students employed that proved successful. The study of this area therefore may provide valuable information that could aid learners in their self-study of Chinese vocabulary.

Research Questions

The research questions formulated in this study include the following:

1. Does character density affect the recognition and production of vocabulary (words or compound words) for CFL intermediate level students at BYU?
2. Do the students' perceptions of the effectiveness of vocabulary learning strategies differ in any significant way in intermediate and post intermediate levels as reflected in Chinese 202 and 301 classes?
3. How does students' perception of the effectiveness of strategies for Chinese vocabulary learning predict their performance on Chinese vocabulary achievement tests?

Definitions of Terms

Before going on to reviewing the full body of literature, it is essential to define some of the terminology that will be used in this study. Vocabulary recognition and production by definition here means the ability to distinguish words when seeing them in context and/or as separate words, and the ability to produce the right words and to use them correctly in meaningful contexts.

Other terms to be defined are CFL Chinese 202 class and Chinese 301 class. Regarding the proficiency level, they might constitute different levels in different universities. At Brigham Young University, Chinese language classes are structured as follows: beginning Chinese levels--Chinese 101 and 102, intermediate Chinese levels--Chinese 201 and 202, and intermediate high to advanced low Chinese levels--Chinese 301 and 302. All students that major or minor in Chinese should reach the advanced Chinese language level before they are advised to take literature classes. However, because of the varied backgrounds of the subjects, their time spent studying Chinese ranged from one to 10 years of study; the researcher employed the CATRC (Computer Adaptive Test for Reading Chinese) to match their proficiency level with that of ACTFL standard instead of using their language class placement.

Finally, the term "strategies" refers to the "specific actions or techniques that students use, often intentionally, to improve their progress in developing L2 skills" (Green & Oxford, 1995, p. 262).

Chapter Two

Literature Review

The central theme of this study pinpoints the problems emerging from learner's acquisition of Chinese vocabulary, assuming that inconsistency between speech sound and meaning complicates the learning effort. First and foremost, an overview of previous research will address the unique Chinese writing system, the hypotheses regarding learning Chinese vocabulary, and last, the importance of vocabulary learning strategies in the learning of Chinese vocabulary.

Language Category

In the Defense Language Institute, foreign languages are categorized into levels of difficulty for English speaking learners. These categories from easiest to most difficult include: Category I: English, French, Italian, Portuguese (Brazilian), Portuguese (European), and Spanish; Category II: German, Romanian (DLPT III); Category III: Czech, Greek, Hebrew, Persian-Farsi, Polish, Russian, Serbian/Croatian, Tagalog, Thai, Turkish, Ukrainian, and Vietnamese; and Category IV: Arabic, Chinese Mandarin, Japanese, and Korean (http://www.dliflc.edu/academics/academic_affairs/dli_catalog/acadcred.htm). The categorization is determined according to the length of time it takes for an average learner to achieve varying levels of proficiency. For learners to reach level two proficiency (defined as minimal working proficiency) in Category I, it takes about 480 contact hours, as opposed to 1,320 hours for learners to reach the same proficiency level in Category IV languages (Everson, 1994).

Presently, there are three major orthographic writing systems, alphabetic, syllabic, and logographic used to represent spoken languages in print (Koda, 1997). With alphabets, letter represents limited phonemes, as with t for /t/, and u for /ju/ or / ʌ / in English. Most alphabetic languages have a close phoneme-grapheme correspondence (Goswanmi, 1999). Since the symbol-to-sound correspondence in an alphabetic system is reduced to the phoneme level, a smaller number of symbols are needed to transcribe spoken language (Koda, 1997). Consequently, with languages employing alphabets, there exists a predictive relationship between phonemic awareness and reading and spelling.

An alternative type of orthography is the syllabary, where sound maps onto print at the syllable level. Japanese kana reflects such a syllabary system, with each kana symbol representing a syllable. However, the Japanese writing system does not function with kana alone because it borrowed Chinese characters (kanji) to represent its unique writing. Koda (1997) said that in syllabic orthography, "languages usually have fewer symbols than do logographic" system (p. 38).

The third type of orthography is the logographic system, where the unit of the language is called characters; each character represents a morpheme or word. The Chinese language employs such a script. Unlike the alphabetic orthography, in Chinese there is no unit of writing system that encodes single phonemes. Therefore, grapheme-phoneme mappings are impossible to achieve (Perfetti & Tan, 1998). Traditionally Chinese characters originate from the following major types of graphic structure. These are *xiangxing* the 'pictographic,' *zhishi* the 'ideographic,' *huiyi* the 'compound indicative,' and *xingsheng* the 'phonetic-semantic' compound. Over 90 per cent of

characters in Modern Chinese belong to the *xingsheng* category. *Xingsheng* characters are typically composed of two elements, a phonetic component and a semantic component. An analysis of the *xingsheng* characters in Modern Chinese shows that there are around 1,300 distinct symbols that are used as phonetic determinatives, and 250 as semantic determinatives (Chen, 1999, pp. 132-43). In modern Chinese usage, there are approximately 4,000 commonly used characters (Norman, 1993). When these characters are recombined with other characters they form still other words, such as "上" and "來" to form "上來", "上" and "學" to form "上學". It is estimated that compound words make up 80-90% of Chinese words (Taylor & Taylor, 1995).

Sounds and Symbols

In general, there is a means to indicate the pronunciation of Chinese characters in Chinese orthography. Phonetic systems have been invented to present Chinese sounds using the Roman alphabet. Generically known as Romanization systems, the current most internationally recognized system is called *Hanyu pinyin* or just *pinyin*. *Pinyin* was promulgated in 1957 in mainland China for use as an auxiliary aid in the teaching of standard Chinese (pronunciation) and not as a full-fledged autonomous writing system (Norman, 1993). *Pinyin* is considerably easy for English speaking students to acquire and an average student with an alphabetic script background is able to encode Chinese sounds into *pinyin* in a few weeks. The Chinese program at Brigham Young University has laid out a system that first introduces *pinyin* to the learners at the beginning Chinese 101 class, and then gradually moves towards character learning.

The critical differences between alphabetic and logographic writing systems are revealed in how they relate to the sounds of the words they represent—the two elements in words. An alphabetic writing system has a symbol which represents each sound or the phonemes of a language. Meanwhile, in nearly all the cases, in logographic writing (i.e., Chinese characters), each character represents a word or morpheme. This kind of orthography represents phonology in a manner quite different from alphabetic systems. It has been viewed as "more of a meaning-based system, a stance bolstered by the fact that the pronunciation of characters is represented orthographically in imprecise and irregular ways" (Everson, 1998, p. 196). In contrast to alphabetic systems, characters do not systematically represent the sound. Although both semantic and phonetic elements give some information about a character's meaning and sound for Chinese characters (supposedly, the semantic part gives the meaning, and the phonetic part gives a representation of the sound), for the most part they provide little else than very vague hints. They do not necessarily provide a clear indication of pronunciation. Everson has pointed out that: "…approximately 90% of Chinese characters are 'compound' characters, that is, characters that consist of two elements, one of which classifies the character according to its overall meaning (termed a 'radical' or 'significant') and another that provides clues as to how it is pronounced (termed a 'phonetic')" (p. 196). In fact, these phonetics are characters in themselves, and also need to be learned (p. 197).

The ways in which Chinese writing systems relate to the sound of the words they represent have caused scholars to predict the magnitude of learning difficulties. The term "orthographic depth" suggests that because alphabetic writing is 'shallow,' the connection between sound and writing is more transparent. Logographic writing is

deeper, in that sound-script correspondence is less transparent (Yang, 2000, p. 3). The orthographic depth of the writing system forecasts the learning difficulties that learners of alphabetic L1 backgrounds have to go through as they learn a system such as Chinese characters.

In summary, the differences between alphabetic systems and logographic systems in terms of coherence between the sound system and the meaning system, and the uniqueness of Chinese characters create a large learning burden for students of Chinese. This burden coupled with the nature of character complexity itself embedded in the six different types of graphic structure of Chinese writing system. It can therefore be assumed that learning a logographic system would pose a tremendous challenge to students with an alphabetic L1 background.

Reading and Pronouncing Words Help to Identify Meaning

Lin (2000) has pointed out that the gap from sound identification to character identification in Chinese vocabulary acquisition ultimately is a prominent problem in character production. She states that sound identification might not lead to automatic character identification or to character production. As a result, she indicates that "on the vocabulary knowledge continuum there exists a greater distance from sound identification to character production" in Chinese than in most other languages (p. 89). In learning Chinese, the distance from sound identification to character production somehow needs to be bridged.

Despite the fact that logographic systems represent sound and meaning very differently than alphabetic systems, being able to read and pronounce words helps L2

learners to identify meaning in the Chinese system. This is supported by Yang's (2000) study. She conducted an experiment to investigate whether there is a close relationship between pronouncing a word and identifying its meaning, and whether the subjects' L1 orthography or their level of proficiency affects word recognition. Yang examined a group of 49 university students enrolled in beginning level Mandarin Chinese language courses. These subjects included learners with and without a background in the Chinese writing system. They were given two tasks—the pronunciation task and the identification task to differentiate a list of 46 words in the study. The research confirms Everson's (1998) findings that there is a strong correlation between being able to pronounce a word and being able to correctly identify its meaning. Everson hypothesizes that in order to remember characters, CFL learners employ strategies that could utilize their abilities to pronounce them, as opposed to the "ideographic" approach of memorizing characters purely by visual means without regard to how they are pronounced.

To test this hypothesis, Everson (1998) conducted a study that investigated the relationship between pronouncing aloud and identifying groups of two-character combinations. The findings suggest that CFL learners employ a system based strategy that utilizes resources from the spoken language. According to Everson, the results seem to suggest that these learners learned characters through linking the meaning with the spoken language. Everson's findings on strategy use seem to agree with the empirical findings of other studies that have investigated a reliance of participants upon their spoken language skills when reading. Everson and Ke (1997) conducted a study among advanced Chinese learners, in which they found excessive use of different forms of sound

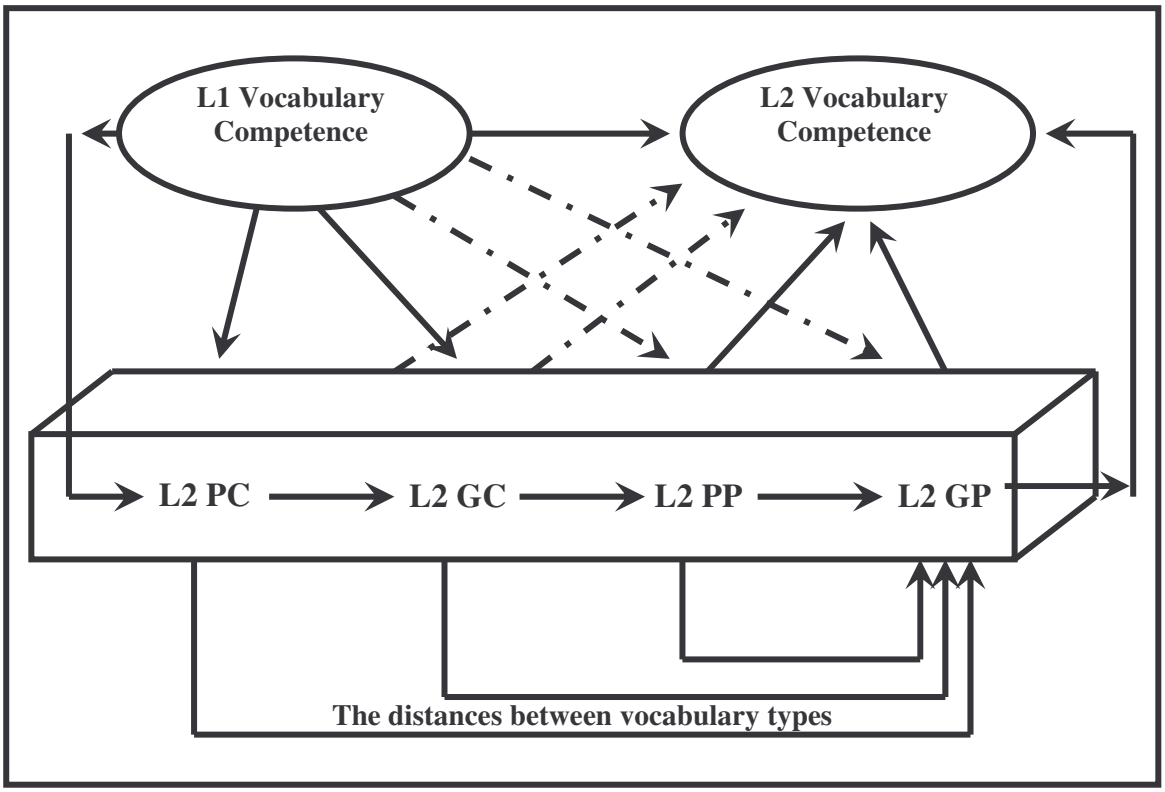
remediation (meaning to figure out the pronunciation in the brain) by participants when performing a silent reading task to be useful. They point out that CFL learners were attempting to bring spoken resources to bear on the reading task.

A Continuum of Vocabulary Knowledge

True vocabulary acquisition requires full vocabulary knowledge, which involves knowing a word's form, meaning, syntactic behavior, and relations with other words (Laufer and Paribakht, 1998). Lin (2000, p. 87) argues that the four elements of vocabulary knowledge "can be ordered in a hierarchical continuum." In other words, it starts from easily recognized sound forms to complicated functions of words. Many SLA researchers have conceptualized vocabulary knowledge as a continuum with learners anywhere along the continuum. The continuum refers to a range or a link between one's passive vocabulary and one's active vocabulary. These two modules are not considered to be on a comparable scale. A distance between one's passive vocabulary and one's active vocabulary can fairly be assumed to exist.

To explore the "hierarchical continuum" of vocabulary knowledge, Lin (2004) investigates four types of Chinese vocabulary acquisition: phonological comprehension (PC), orthographic comprehension (GC), phonological production (PP) and orthographical production (GP). She proposes a conception of vocabulary continuum as in the following graph:

Figure 2.1: A conception of vocabulary continuum



(Lin, 2004, p. 166)

Lin (2004) suggests that there is a "pattern of development for the four types of vocabulary order for second language vocabulary acquisition in CFL" (p. 155). To understand a word in its spoken form seems to be the easiest vocabulary type, while recognizing a word written in characters was not as difficult as perceived. Being able to speak is rated as the third degree of difficulty, while being able to write Chinese in characters appears to be the most difficult task (even for the upper level learners). Lin suggests that there is an order of learners' learning hierarch going from developing receptive abilities to developing productive abilities in learning Chinese vocabulary.

As mentioned previously, Nation (2001) suggests that for learners with their first language closely related to the second language, the learning burden of most words

would be light. Conversely, for learners whose first language is not closely related to the second language, the learning burden will be heavy. He also suggests that there are active and passive vocabulary items in a vocabulary acquisition continuum. The nature of active vocabulary and passive vocabulary can be expressed as:

> Active vocabulary can be activated by other words, because it has many incoming and outgoing links with other words. Passive vocabulary consists of items which can only be activated by external stimuli. That is, they are activated by hearing or seeing their forms, but not through associational links to other words. (p. 25)

Because of the different nature of active and passive vocabulary items, it seems that learning active and passive vocabulary requires different amounts of effort. Nation also suggests that receptive learning and use in general is easier than productive learning and use, because productive learning requires "extra learning of new spoken or written output patterns." The situation will be "particularly noticeable for languages which use different writing systems from the first language and which use some different sounds or sound combinations" (p. 24). This seems to echo what Everson (1998) states specifically about learning Chinese, "Learning to read in the CFL setting involves a two step process, one involving the representation of Chinese for rapid acquisition of the spoken language, and the other involving the learning of actual Chinese characters" (p. 197).

Character Density Effect

The term "character density" or "character complexity" means the degree of density/ complexity of the number of strokes presented in characters. The concept was defined as in "high density" and "low density" and was characterized differently in different studies (Hayes, 1987; Ke, 1996, 1998; Xiao, 2002). According to Hayes (1987), four levels of character complexity were established: Low (1-5 strokes), Medium (6-10

strokes), High (11-15 strokes), and Complex (15 or more). In other studies (Ke, 1996, 1998), subgroup 1 in both the recognition and production tasks consisted of characters of low density with the mean number of strokes being 5.8 for the recognition task and 4.73 for the production task. Subgroup 2 consisted of characters of high density with the mean number of strokes being 13.8 for the recognition task and 12.2 for the production task. Chen (1999, p. 136) has also stated "The primary part in the graphic structure of characters is called the stroke, of which the average number per character for the 7,000 or so most common characters is eleven."

A few studies have looked at the effect of character density on learners' character acquisition (Chin, 1973; Sergent & Everson, 1992; Hayes, 1987; Ke, 1996; Xiao, 2002). These studies have revealed both complimentary and conflicting findings on the effects of character density on character recognition and production tasks. Ke's study (1996) provided an empirical perspective on how CFL learners move from recognition of vocabulary items to being able to produce them. He suggests that character density had a direct effect on character recognition and production. In the study, he ran two different experiments using experimental and control groups, task one being a recognition task and task two being a production task. The participants were selected from four academic college Chinese programs in the U.S. and were all first-year CFL students with no prior knowledge of either the Chinese orthographic system, or its sound system. Sixty frequently occurring characters were selected from the first half of the textbook *Integrated Chinese II* (Yao & Liu, 1997). Thirty of them were used in the recognition task with two subgroups based on character density (number of strokes in a character) from low to high (simpler to more complicated ones). Another thirty of them were used

in the production task based on the same idea of character density. The recognition task tested a student's ability to provide both the meanings of the vocabulary in English and the pronunciation in Romanization (the phonological presentation) given a list of selected words. The production task tested their ability to write the corresponding characters based on the given Romanized pronunciation and the English meanings of the selected words.

Ke (1996) reached the following conclusions. Students performed better on the recognition tasks than on the production tasks in both the experimental and the control group. The study found that character density has an effect on production accuracy, which means that the more strokes a character has, the more mistakes a learner will tend to make in production, and vice versa. Ke hypothesizes that "the graphic as a whole provides visual context that can lead to successful character recognition even when the reader does not have knowledge of all the character's details. In other words, successful activation of a character could occur when enough graphic details of a character match those of a character existing in memory. For character production, however, one must have complete knowledge of the character and then transform that knowledge into motor skill" (p. 347). In the experiment, Ke suggests, "partial information can lead to recognition, but total mastery of the character is required for accurate production" (p. 346). He also suggests that students could significantly improve their recognition and production skills as time goes by (p. 347). This might lead us to wonder if as students' proficiency levels increase, their approaches to learning vocabulary (reflected in vocabulary recognition and production) might become more sophisticated as well. In this

study, students' vocabulary learning strategies are examined in order to find out their effectiveness in the learning and retaining of vocabulary.

Vocabulary Learning Strategies

Before exploring vocabulary learning strategies, it is necessary to define what strategies mean. Learning strategies were defined previously in the introduction as the specific actions or techniques that learners intentionally use to improve their progress in developing L2 skills (Green & Oxford, 1995, p. 262). Cohen defined them as "learning processes which are consciously selected by the learners" (1998, p. 4). Charmot (2001) characterized strategies as means that "facilitate a learning task" (p. 25). Schmitt (1997) employed and modified the definition of strategy use from Rubin (1987) as "the process by which information is obtained, stored, retrieved, and used" (p. 203). Language learners utilize strategies in order to gain access to information in each of the language skill areas (Johnson, 2004, p. 6).

Learner strategies have been examined by researchers through interviews, questionnaires, diaries, observations and think-aloud protocols. The research mainly investigated the following three areas: (1) classification of language learning strategies (Oxford, 1990; O'Malley & Chamot, 1990; Wenden & Rubin, 1987), (2) variables affecting language learning strategies (Nyikos & Oxford, 1993; Wharton, 2000; Yong & Oxford, 1997), and (3) the effect of strategy training on second language learning (Kitajima, 1997; Oxford, 1990.)

Regarding the learning strategy of second language vocabulary acquisition, researchers have explored the categories and the importance of learners' strategy use in

lexical acquisition (Brown & Perry, 1991; Cohen & Aphek, 1980, 1981; Cohen, Weaver, & Li, 1998; Lawson & Hogden, 1996). Lawson and Hogben (1996) compared the strategy use of good and poor students (as determined by their recall scores), and came to the conclusion that "the single feature most obviously distinguishing the two groups is the total amount of strategy use: The high-scoring group recorded more than twice the number of word-by-strategy instances" (p. 123). The findings suggested that successful students used a wider range of strategies in a consistent manner. Current research also investigated the relationship of English vocabulary learning strategies on the learning outcomes (Gu & Johnson, 1996; Kojic-Sabo & Lightbown, 1999). Kojic-Sabo & Lightbown's article dealt with students' vocabulary learning approaches and their relationship to success in learning English in two environments-EFL vs ESL. The researchers identified in the study that "The relationship between strategy use and performance on the two language tasks is fairly straight forward: The students' lack of apparent effort to engage in activities that could enhance lexical learning seems to be linked to poor vocabulary knowledge and low achievement level in English overall" (p. 188). Gu and Johnson's (1996) research found a positive correlation between both learners' proficiency and vocabulary size and certain types of strategies such as guessing from context and using dictionaries. They also found that the overuse of visual repetition (repeatedly writing words) as a means of memorizing new vocabulary correlated negatively with proficiency and vocabulary size. The above research findings seem to suggest that using a wider range of strategies consistently contribute to the increase in English vocabulary knowledge in learning English as a second language context.

Chinese Vocabulary Learning Strategies

As mentioned previously, the Chinese writing system is very unique in the way that sounds and meanings correspond. Since learning Chinese vocabulary and Chinese reading tasks are basically tied together, researchers have often put them into the same research category. To explore the subject matter, much CFL reading research has focused on the strategies that readers use and on the effects of strategy instruction on the reader's comprehension levels (Everson, 1986, 1988; Everson & Ke, 1997; Hayes, 1988; Henderson, 1982).

Everson & Ke's study (1997) investigated the reading strategies of intermediate and advanced learners of CFL. The reading strategies investigated here as reflected in the learners' word identification skills (p. 6), closely relates to the topic of vocabulary learning strategies that this study explores. The subjects in the study included five "intermediate" learners who were third-year undergraduate Chinese language students at the University of Iowa, and two "advanced" learners who were graduate students enrolled in 4th year Chinese at the University and had spent time studying Chinese in Taiwan or in Beijing. All of them were native speakers of English. A short newspaper passage taken from a reader by Stanley Mickel was given to the subjects and a verbal reporting task was used to collect research data in the form of verbalized thoughts from learners that they developed in the processes of trying to make sense out of the reading task.

The data in the study, according to the authors, pinpoint a concern with the difficulty that the intermediate learners experienced in the lower level processing of characters; yet this same data highlights the more extensive strategy use among the two advanced learners that led to gains in comprehension (Everson & Ke, 1997, p. 12). The

authors have suggested that "the overall trend in the verbal report data indicates that because of their extensive knowledge of Chinese orthography, morphology, language, and vocabulary, these learners could easily isolate what they did not know, and made intelligent, purposeful, and less random decisions about how to remedy problematic situations" (p. 12). Because the two advanced readers were able to infer the meanings of multi-character words through more developed 'character networks,' or the ability to guess at unknown combinations where the individual characters occur, the authors concluded that the ability (of the advanced learners) to guess the meanings of unknown character combinations through their more developed understanding of Chinese morphology coupled with being able to isolate meaningful units was very effective (p. 13). The study also suggests that that "CFL learners are attempting to bring spoken resources to bear on the reading task" (p. 14).

In the study of Everson (1998), he examined the relationship between naming and knowing the character, and he found the strategy of beginning level learners regarding remembering characters has heavily relied upon their ability to pronounce the characters. According to him, this type of strategy is used "across different levels of proficiency within this beginning level sample" (p. 200). He has also found that "ideographic" processing which is thought to be a traditional way of approaching the characters is not a primary strategy among these learners. There was a mean probability of 91.4% that when the participants knew the meaning of a word, they also knew how to pronounce it. Everson suggested that these students might learn characters in a "package deal" that necessarily links with the spoken language.

Two additional studies that were done during the 1990's were perhaps the two most important studies on Chinese vocabulary learning strategies investigated what beginning students did when faced with the challenge of learning Chinese characters. McGinnis (1999) conducted a study among learners in an intensive nine-week program, with the purpose of discovering the strategies used in their learning of Chinese characters. The study showed that students used a variety of strategies when it came to learning characters. These strategies included rote repetition, creating idiosyncratic stories about how the characters looked or how they were pronounced, and using the character's semantic or phonetic information in the character's components. However, the latter strategy was not one that was favored by the students, who instead favored making up stories or memorizing the characters by rote means.

The other study (Ke, 1998) also sought to investigate the learner strategies of beginning Chinese students, and found that learners value the use of character components in learning the characters; however, Ke found that learners placed more value on learning the characters holistically through repeated writing of characters, especially practicing characters in terms of the two-character compounds than practicing characters individually. Regarding CFL (Chinese as Foreign Language) learners' performance in character recognition and production, Ke found that there were strategies that could predict success in CFL character learning. In this study, the researcher selected a group of 150 subjects who were first-year CFL students from nine different college institutions across America. Data from these subjects were used. The statistical results revealed that learning strategies associated with practicing characters in the context of vocabulary items (such as compounds) and with associating new characters

with characters in terms of graphic structure were the two strategies with the largest significant impact on character recognition. For character production, the data revealed that people who agree with the statement that learning character components (radical and phonetic components) is more effective than learning stroke order tended to have higher scores on character production than those who disagreed with the item statement. The researcher concluded that, keeping site constant, the strategy checklist items 1, 5, and 10 had the largest impact on character learning. Items 1 and 10 regard the learning and using of character components and graphic structure, and item 5 involves practicing characters in the context of vocabulary items (such as components). The study also concluded that family language background did not affect the first-year CFL learners' perceptions on the relative effectiveness of various types of strategies related to Chinese character learning if their first language was English.

In an investigation of strategy use across various language proficiencies, Shen (2005) designed three different survey instruments to collect strategy data over three samples of learners at the university level (first, second, and third year). The first survey questionnaire she used contained open-ended questions to elicit from learners the types of strategies they used for learning characters. She used this method to construct a more thorough inventory of strategies for the study. A second questionnaire using a Likert-scale was developed to determine how frequently the learners used the strategies in the inventory. A third questionnaire was developed to rate the students perceptions about how useful commonly used strategies were across the different learning levels.

Shen's (2005) research was designed primarily to detect a commonality and set of patterns among the strategies that learners indicated they used. Factor analysis with a

total of eight factors was used to achieve this. These eight factors were derived from the 30 commonly used strategies as chosen by students. Importantly, the study found the most heavily loaded factor (Factor 1) which was that of the orthographic knowledge-based cognitive strategies, or using graphic structures, connecting with previously learned characters, visualization of graphic structure, and using semantic and phonetic radicals. Metacognitive strategies related to structured preview and review, are the second most commonly used strategies. However, a total of 24.5% of the variance was explained by the use of orthographic knowledge (Factor 1), far more than even the second most commonly chosen factor. A second important finding of the study was that among cognitive strategies, learners considered those represented in Factor 1 to be most useful, with this perception increasing as learner proficiency increased. In the study, she also found a linear trend between learners' proficiency level and their awareness of the usefulness of those types of strategies, suggesting that "as learning level advances, and as students have acquired more orthographic knowledge, their perceptions of the usefulness of this knowledge in their character learning becomes stronger" (p. 61).

Most previous research investigated first-year Chinese language learners and the strategies they used in reading and character learning. Yet few studies have been conducted to study strategies in upper proficiency levels and few investigated the effectiveness of vocabulary learning strategies that students use. Shen's (2005) study has investigated 2nd and 3rd year Chinese learners and gathered information on a set of patterns among the strategies that learners indicated they used, yet the study failed to investigate the effectiveness of those strategies that learners indicated using in their actually vocabulary performance evaluation. More studies of students with a higher-level

of language proficiency, preferably intermediate level and post immediate levels, would further extend our understandings of how their learning styles and learning strategies are different from first-year Chinese learners, with the consideration that learners move towards more autonomy in their learning of Chinese vocabulary.

Furthermore, it would not be hard to find ample tests that measured learners' vocabulary recognition and production abilities on word lists levels, and yet little research looked at vocabulary use in extensive sentence-based passages. Vocabulary acquisition presupposes that learners would also know how those learned vocabulary items functioned in different meaningful contexts. What is lacking in the CFL research is to actually investigate students' ability to recognize and produce vocabulary that appears in random contexts, and to find out if they can still identify the meaning and produce the right character compounds.

Having put the learning of the vocabulary in context and language proficiency into consideration, this study shows how intermediate and post intermediate learners' choices of strategy correlates with their performance in the task of character recognition and production measured by a set of two tests.

Research Hypotheses

Based on the previous research and the issues addressed above, the following research hypotheses were formulated:

1. Character density will inversely affect the recognition and production of vocabulary (words or compound words) for CFL intermediate level students at BYU.

2. The students' perception of the effectiveness of vocabulary learning strategies will differ significantly in Chinese 202 and 301 classes.
3. The students' perception of the effectiveness of strategies for Chinese vocabulary learning will predict their performance on Chinese vocabulary achievement tests.

Chapter Three

Research Design

This chapter presents a description of the research methodology that answers the research questions generated from the previous chapter. The purpose of the study is to investigate the effect of character density on students' ability to recognize and produce Chinese vocabulary items (words or word compounds) as measured by their test scores, and explores learners' self-perception of the effectiveness of strategies.

Participants

In this study, Brigham Young University (BYU) students in Chinese 202 and 301 classes were recruited. There were 33 students from Chinese 202 class (2nd semester of 2nd year Chinese) and 11 students from Chinese 301 class (1st semester of 3rd year Chinese). These students' age ranges from their early to mid 20's. Among them, 15 were females (14 from Chinese 202 class and one from Chinese 301class). The participants were not selected on a random basis because there was not a very large number of students enrolled in Chinese intermediate classes that would allow for random selection. The study tried to utilize as many of the participants as possible. Participants were basically recruited volunteers who were willing to help with the research study. They were invited to participate in the study, and a consent form that contained an outline of the research proposal was given to them. Those who signed the form were contacted and were invited to participate in the study.

The sample population of the participants from Chinese 202 and 301 classes came from various backgrounds. Some of them had lived in Chinese speaking communities.

These included former church missionary volunteers for Brigham Young University's sponsoring church and children of expatriates whose parents worked overseas in China, Hong Kong, or Taiwan. Many of the returned missionary students had spent from one and a half to two years living in Taiwan, Hong Kong, and Chinese-speaking communities of North America, Australia, and elsewhere. They typically return with an Intermediate-High to Advanced-Low speaking level, but with widely varied literacy skills and a somewhat limited range of language domains.

The sample population also included heritage learners—meaning their parents (one or both) speak Chinese as their native language. These students typically had some exposure to spoken language skills (whether Mandarin Chinese or other Chinese dialects like Cantonese) at home, yet very little literary training in reading and writing skills. Although the majority of learners were either returned missionary or heritage learners, there was a small portion of learners who had only studied Chinese directly through the BYU Chinese language program and therefore had no previous in-country experience or target language contact. However, students' backgrounds (whether or not they had lived in Chinese speaking communities) was not taken into account for this study. Although the target language contact might have helped advance their learning of the language, this study only looked at their learning habits and behaviors as represented in the strategies they utilized in their study of the language. Both female and male students were included in this study. The study did not mark gender as an intervening variable.

Table 3.1 provides a brief description of subjects' demographic information. Amazingly, most participants had former foreign language training before they studied Chinese, but the majority of them studied Indo-European languages. Whether or not

prior language learning experience contributes to learning Chinese has yet to be investigated thoroughly.

Table 3.1 Demographic information for participants included in the analysis

	Total	Male	Female	Prior Language experience	Mean length of learning Chinese	CATRC results (a sample of 21 participants)
Chinese 202	33	19	14	Indo-European (24), Asian including Cantonese (7). None (2)	Mean= 2 ½ years Range: 1-4 years	Intermediate (10) Post-intermediate (4) Novice (3)
Chinese 301	11	10	1	Indo-European (7), Asian including Cantonese (3), None (1)	Mean= 3 years.	Post-intermediate (2) Intermediate (1).
Heritage learners	6	3	3		Range: 2-5 years, and one since childhood.	
Non-heritage Learners	38	26	12		Mean= 2 ½ years, Range: 1-4 years	

Instruments

The proficiency-based Computer Adaptive Test for Reading Chinese (CATRC) was administered in the BYU Humanities lab as a Chinese language assessment at the beginning and end of each semester in the second-year program. The program is available in the BYU Humanities language learning lab.

According to the CATRC results, the proficiency level of the majority of the students would be intermediate and post intermediate. Since students that enrolled in Chinese 202 and 301 classes might represent different proficient levels, these students were tested using CATRC to determine their proficiency levels according to the ACTFL scale. The CATRC was first developed in 1990-1993 with a grant from the United States Department of Education. The test was designed by Tao-chung (Ted) Yao of the University of Hawaii, and the test items were written by Ted Yao, Richard Chi of the University of Utah, and Cynthia Ning of the University of Hawaii. The computer program was written by Ted Yao with the assistance of Kim Smith of Brigham Young University and David Herren of Middlebury College. It is a prototype computer-adaptive test using HyperCard on Macintosh computers. The CATRC determines students' proficiency level according to the ACTFL scale, and its purpose is stated as "to evaluate a person's reading proficiency in Chinese." It functions as following:

> The computer displays one test item at a time on the computer screen. Every time the test taker answers a question, the computer will calculate the score and decide whether the next question should be harder or easier. The test ends when the computer finds an appropriate reading proficiency level for the test taker, and gives a rating based on the ACTFL (American Council on the Teaching of Foreign Languages) Proficiency Guidelines. All test items are based on authentic Chinese language materials from Taiwan, China and the United States gathered by the test development committee (http://eastasia.hawaii.edu/yao/catrc/default.htm).

The test items consist of a sentence, a paragraph, or a multi-paragraph length text given randomly in either traditional or simplified characters. On average, the test administers just 28.5 items and has a reliability rating of .94 (Yao, 1995). Therefore, using the CATRC to test the subjects' language proficiency level helps control one of the variables

in the study as far as investigating intermediate learners' acquiring vocabulary items and their approaches and methods toward learning Chinese words.

The test items of this research study consisted of a paragraph length passage given in traditional characters. Traditional characters and simplified characters are two standard character sets of printed contemporary Chinese written language. As this study tested character density on students' abilities to recognize and produce vocabulary, traditional characters would have shown character density more vividly and precisely than simplified characters because they have retained their original character structures.

The materials to test the students' character recognition and production abilities consisted of two tasks. The recognition task was done by giving the students a set of fifteen low density (meaning less than or equal to 11 character strokes for each single character) and fifteen high density (meaning more than 11 character strokes for either one of characters) vocabulary items each in meaningful contexts (sentences or paragraphs) and providing pinyin for these vocabulary items. Participants were expected to give equivalent English meanings for each item. These vocabulary items were directly taken from the textbook *Integrated Chinese Part II*. Since the students were either in Chinese 202 or Chinese 301 class and the study was carried out at the end of academic semester, this means that they had already been introduced to those items in their previous study.

In the second task (production task), students needed to fill in the blank vocabulary items that were missing in the sentences; again these vocabulary items consisted of another set of fifteen low density and fifteen high density words. They needed to decide what vocabulary to put in the sentences in which *pinyin* and English translation were provided. The order of the two tasks mentioned was laid out as Part I

being the recognition task and Part II the production task. A total of sixty frequently occurring characters for the two tasks were selected from the second half of the textbook *Integrated Chinese II* (Yao & Liu, 1994). They are listed in Appendix E. A sample of the tests is provided in Appendix A.

Although there were different parameters for defining character density and complexity, in order to fit in the designs and the constraints of the vocabulary tests for this study, the definitions of high density and low density were categorized as the average number of strokes being 11. In other words, characters that contain less than or equal to 11 strokes are considered low density characters, and of those that contain more than 11 are considered as high density characters. The justification for using eleven strokes as a standard is provided by a statement to the effect that "The primary part in the graphic structure of characters is called the stroke, of which the average number per character for the 7,000 or so most common characters is eleven" (Chen, 1999, p. 136). Besides, this study looks primarily at vocabulary or word-compounds as opposed to individual characters as in other research studies. In order to manage the study in a systematic manner, the breaking boundary of high and low character density was set at 11 strokes.

The selection of sixty vocabulary items for the test was not an easy task. Word selection that regards high frequency was the most common form used in the research study. In this study, the researcher selected words with high frequency. First, a list of approximately one hundred highlighted vocabulary items was selected from the Chinese 202 textbook. Those vocabulary items were then rated against a file called "the first 30,000 Chinese words by frequency" provided by the Society of Chinese Language and Culture (this file is no longer available online but a hard copy is provided in appendix D).

The file was compiled after researchers rated the frequency of the first 30,000 Chinese words that have appeared in Chinese newspaper articles. Taking into consideration word frequency and character density (from the list, the strokes of each character were counted to separate them as high and low density vocabulary), the sixty vocabulary items were selected from among the most frequently used according to the project. All of the vocabulary selected for the tests appeared more than 2000 times, with some exceeding 10,000 times. Among them, thirty belonged to high character density words, and another thirty belonged to low character density vocabulary. The rationale behind this was to make sure that the study selected important and useful vocabulary items from the textbook and that the items be frequently used in daily literacy as reflected in newspaper reports.

The two parts of the vocabulary test that integrated sentences in meaningful passages were selected from internet articles. The topics of these passages consisted of various descriptions of context, ranging from describing people or life events to literature. In order to test students' vocabulary knowledge on a wider range of literary genres, the researcher selected articles with descriptions from a variety of events. The researcher first selected the vocabulary items and then searched the internet through the Chinese Google search net to find articles that contained those vocabulary items desired. The researcher took out the sentences directly and arranged the samples in the test. There were both high density and low density character compounds in one sentence. The same method was used until the researcher found the desired test samples that contained all of the vocabulary items used to test the participants' vocabulary knowledge.

A questionnaire was used to elicit the information regarding the strategies the participants used. The questionnaire asked the participants' language learning background and experience. It also recorded how they ranked the effectiveness of a list of strategies under the categories of learning Chinese sounds (pronunciation), symbols (characters), and meanings. The questions on the questionnaire were adapted from Jinghua Yin's (2003) questionnaire report on how American college CFL students learn characters. A sample of the questions is provided in Appendix B.

Procedures

The study was a cross-sectional study because students were only tested one time on the vocabulary items. The character recognition and production tasks were carried out by giving the students paper tests that lasted about 60-90 minutes. However, they were allowed to have more time if they requested. The main purpose was to test accuracy of recognition and production, not speed. Immediately after the vocabulary test, a questionnaire was given to the participants. They were asked to answer the questions that applied to them.

The study took place two different times; one was in the department seminar room for the Chinese 301 class, and the other was in a classroom for the Chinese 202 class in the winter semester, 2005. The Chinese 202 class took the test in the morning from eight to nine thirty. The Chinese 301 class took the test in the evening from six to eight on a different day. The reason for two separate test dates was for the sake of the accommodating the participants' schedules. Only two students arranged to take the tests

individually with the researcher because they could not come at the scheduled time for the larger group.

With regard to the fact that some of the learners have a high speaking proficiency level and yet relatively lower reading and writing levels, this study controlled any possible prior knowledge by providing the *pinyin* of the vocabulary items being tested in the Vocabulary Recognition task. In addition, an auditory version of the test was administered to the participants. It ensured that the test truly tested the participants' ability to recognize and produce vocabulary. After the finish of the test, the same test was provided to the participants by the test-administer reading the questions aloud. The participants could then have both a visual and auditory presentation of the vocabulary items. The results were used to bridge the gap that covered the missed information in the first administrating of the test.

Extra credit was offered to the students who participated in the study. Participants received extra credit points in their classes for completing the vocabulary test and the questionnaire. For those who did not wish to participate in the research, the same amount of extra credit points could be earned by reading two news articles and by writing a one page paper on each article.

Analysis

After administering the character recognition and production tasks portions of the test, the participants' performances were evaluated. In Part I of the test, the standard of evaluation was set as follows: one point was given if the English was correct, and a half point given if the part of speech was not given correctly but the meaning was close. In

Part II, five categories were created to score the production data (Ke, 1996). Category one was for vocabulary that was perfectly formed (regardless of aesthetics) and easily recognizable by native speakers. Category two was for vocabulary with structure intact and strokes missing, which was still recognizable by native speakers. Category three was for vocabulary that missed one character in a compound word. Category four was for vocabulary items that were incomprehensible to native speakers. Category five was for vocabulary items that were perfectly formed by themselves but were not the target vocabulary. Only test data that belonged to categories one and two were rewarded with a full point. The test data that belonged to category three was rewarded a half point. Categories four and five were not rewarded any points.

The scoring of the instrument was conducted as stated. The researcher, a native Chinese speaker, graded all of the tasks and scored the data. The data were then sent over to another native Chinese speaker from Taiwan to evaluate. This native was a summer intern as a Chinese teacher at the BYU Center for Language Studies in 2005. She had earned a BA from Taiwan Zhengzhi University and is currently working on an MA in Teaching Chinese as a Second Language at National Taiwan Normal University. She had a wide range of experience teaching foreign students at different levels of Chinese in Taiwan as a part of her MA program. The inter-rater reliability was close to 97%, which means the two graders reached almost complete agreement on how the tests were graded.

The information that the participants provided on the questionnaires was transcribed from the raw data of the participants' ranking the effectiveness of the

strategies into the numerical data. The most effective strategy rated was given a score of 10, and the number given moved down from the most effective to less effective.

Statistical Procedures

Data analysis was conducted using the *Excel Data Analysis Plus* and the *R statistical analysis*. The current study investigated whether character density affects the recognition and production of Chinese vocabulary, therefore analysis of variance (*ANOVA*) with a one-between, one-within (*one-way ANOVA*) measures design was used. The purpose was to find out if there was a significant difference between character density and the students' vocabulary recognition and production abilities. The research questions number two and three of this study also required the use of univariate and multivariate inferential statistics, such as correlation analyses, specifically *Pearson's Correlation* in data analyses.

Pearson's Correlation is a statistical analysis of the linear relationship between two quantitative variables. It provides information about the direction and strength of the linear relationship between the two variables. This linear relationship can be either positive or negative. The *r* value generated from this analysis served to distinguish the nature of the relationship, whether positive or negative. The research study investigated the relationship of the participants' prioritized strategies and their effect on the participants' vocabulary achievement test. Therefore, the *Pearson Correlation* analysis was suitable in this case. The *p* value was set at the conventional .05 level.

Chapter Four

Research Findings--Results and Discussion

This chapter reports findings related to the research hypotheses tested in this study:

1. Character density will inversely affect the recognition and production of vocabulary (words or compound words) for CFL intermediate level students at BYU.
2. The students' perception of the effectiveness of vocabulary learning strategies will differ significantly in Chinese 202 and 301 classes.
3. The students' self-perception of the effectiveness of strategies for Chinese vocabulary learning will predict their performance on Chinese achievement tests.

Before the research data was analyzed, let us take a look at the sample of the participants' CATRC results provided in Table 4.1 below.

Table 4.1. The CATRC results:

Current Chinese Class	Number of students	Proficiency level-Below Intermediate	Proficiency level-Intermediate	Proficiency level-Post Intermediate
202	18	4	10	4
301	3		1	2

Table 4.1 provides a sketch of how the participants' language proficiency levels match with the ACTFL scale measured by CATRC results. Here, the participants were mainly intermediate levels (including intermediate low, mid, and high) with 11 out of 21

students. There are six in post intermediate levels (including advanced, advanced plus, and superior). Only four are measured as below intermediate levels which included novice low, mid, and high.

The following table (Table 4.2) shows the mean scores of each task for Chinese 301 and Chinese 202 students.

Table 4.2 The means of character recognition and production scores

Task	Chinese 202 class (n=33)	Chinese 301 class (n=11)
Character recognition	19.02	26.14
Character production	11.92	18.14

Figure 4.2 The bar graph of the means of character recognition and production scores

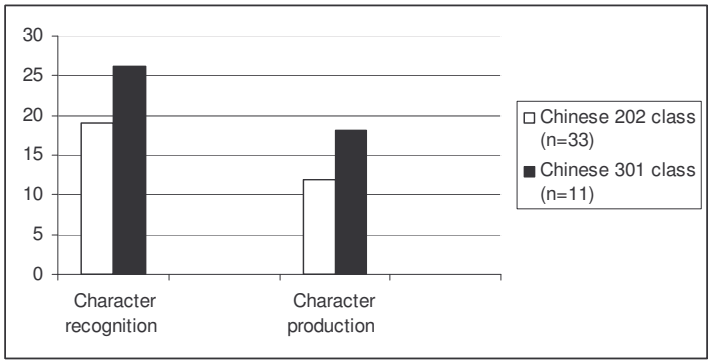


Table 4.2 and Figure 4.2 reveal the mean scores of character recognition and character production tasks for the two classes both in written and in graphic form. The mean for Chinese 301 are higher than for Chinese 202 out of 30 points in each task: in the recognition task, Chinese 301 class scored 7.12 points higher than the average of Chinese 202; in the production task, Chinese 301 scored 6.22 points higher than Chinese 202 on

average. The data also reveals that both classes performed better in the character recognition task than in the production task.

Reflection of Character Density in Character Recognition and Production

The first hypothesis stated that character density affects the recognition and production of vocabulary (words or compound words) for the CFL students. To test this hypothesis, character recognition and production tests' data is analyzed[1] and the one-way ANOVA statistics for each recognition and production task is provided in Tables 4.3 (a, b, c, d) below.

Table 4.3a

Low and high character density recognition task for 33 Chinese 202 students

	Statistics		
Scores	Mean	SD	p-value
Low Density Recognition scores	9.73	3.36	0.59
High Density Recognition scores	9.23	4.17	

Table 4.3a suggests that although recognition scores in low density words generally ranked higher than recognition scores in high density in Chinese 202 class, after one-way-ANOVA test was employed, the statistics show that character density has no significant effect on the recognition task. Table 4.3a reveals that the *p*-value for the character density on the recognition task for Chinese 202 class is 0.59, which is higher

[1] Because the Chinese program at BYU allows the students to use either traditional characters or simplified characters (two standard character sets of printed contemporary Chinese written language), there were approximately 5 students that wrote simplified characters on the vocabulary production test.

than the statistical significance level set at .05 for this study. Therefore, the statistics is not significant enough to infer that character density has an effect on learners' vocabulary recognition task as measured in the research study.

Table 4.3b

Low and high character density production task for 33 Chinese 202 students

	Statistics		
Scores	Mean	SD	p-value
Low Density Production scores	7.70	3.03	0.0001
High Density Production scores	4.06	3.19	

Table 4.3b provides a strong indicator to suggest that character density has a significant effect on the Chinese 202 learners' vocabulary production task, given that the *p*-value is equal to 0.0001, far smaller than the significance level of .05.

Table 4.3c

Low and high character density recognition task for 11 Chinese 301 students

	Statistics		
Scores	Mean	SD	p-value
Low Density Recognition scores	13.18	1.38	0.69
High Density Recognition scores	12.95	1.23	

Table 4.3c is a set of data to measure the same parameter for Chinese 301 class, and the data shows that the *p*-value is .69 (bigger than the statistical significance

level .05), which is not a strong indicator to suggest that character density has an effect on Chinese 301 learners' vocabulary recognition task as measured in the research study.

Table 4.3d

Low and high character density production task for 11 Chinese 301 students

	Statistics		
Scores	Mean	SD	p-value
Low Density Production scores	11	2.97	0.012
High Density Production scores	7.09	3.61	

Table 4.3d shows that the *p*-value is 0.012 (the number is smaller than the statistical significance level .05), which is another strong piece of evidence to infer that character density has an effect on the Chinese 301 learners' vocabulary production task.

The tables above reveal that recognition scores generally rank higher than production scores for both Chinese 202 and Chinese 301 classes; however, after applying one-way-ANOVA tests, the statistics show that character density does not have a significant effect on the recognition task as opposed to the production task.

The Differences between Chinese 202 and 301 Students' Vocabulary Learning Strategies

The hypothesis tested here is to explore whether or not students' vocabulary learning strategies differ significantly between Chinese 202 and 301 classes. Pertinent statistical analysis-- one-way ANOVA for each set of strategy tracks-- was run to find out the results. The results are provided in the following tables:

Table 4.4a

The difference between Chinese 202 and 301 students' strategies used in remembering the way characters are written

	Chinese 202 class		Chinese 301 class		
Strategy	Mean	SD	Mean	SD	p-value
4A- Learn character components	6.67	3.16	7.55	2.91	0.418
4B- Character parts associate with a story	5.42	3.39	4.09	3.33	0.263
4C- Write character repeatedly	9.12	1.11	8.82	1.54	0.482
4D- Associate with familiar character in terms of shapes	5.94	3.72	6.73	2.53	0.518
4E- Read Chinese texts regularly	4.94	3.57	7.18	2.71	0.064
4F- Use hand-made flashcards	5.15	3.43	5.91	3.51	0.531
4G- Use computerized flashcards	2.73	3.56	1.91	2.98	0.497

Table 4.4a shows the Mean, SD (standard deviation), and the *p*-values of each individually compared strategy in the subset of strategies used in recalling the way characters are written. The differences between the two groups of learners' choice of strategies were not statistically significant. None of the *p*-values (all greater than .05) suggest statistical significance.

Table 4.4b

The difference between Chinese 202 and 301 students' strategies used in remembering the pronunciation of characters

	Chinese 202 class		Chinese 301 class		
Strategy	Mean	SD	Mean	SD	p-value
5A- Use phonetic components	5.97	3.77	5.36	4.46	0.661
5B- Keep listening to the recordings	3.52	3.68	3.73	3.61	0.869
5C- Read characters out loud repeatedly	7.58	3.02	5.82	3.87	0.127
5D- Look at pinyin in the vocabulary list repeatedly	7.39	3.44	8	2.93	0.603
5E- Read Chinese texts regularly	5.36	3.89	7	3.58	0.225
5F- Use hand-made flashcards	4.24	3.69	5	3.69	0.559
5G- Use computerized flashcards	1.97	3.01	1.73	2.53	0.811

Table 4.4b reveals the Mean, SD (standard deviation), and the *p*-values of each individual strategy in the subset of strategies used in recalling the pronunciation of characters. The differences between the two groups of learners' choice of strategies were not statistically significant. From the p-values (all greater than .05) above, none of them are statistically significant.

Table 4.4c

The difference between Chinese 202 and 301 students' strategies used in remembering the meanings of learned characters

	Chinese 202		Chinese 301		
Strategy	Mean	SD	Mean	SD	p-value
6A- Use character components as a clue	7.52	3.37	7.36	2.98	0.895
6B- Associate characters with stories	5.76	4.24	5.27	3.47	0.734
6C- Keep listening to the recordings	2.58	3.31	4.36	4.27	0.157
6D- Memorize in the context of vocabulary items and in the sentences	8.58	2.45	9.46	0.82	0.25
6E- Use hand-made flashcards	4.55	3.88	5.64	3.78	0.421
6F- Use computerized flashcards	2.46	3.44	2.18	3.22	0.818

Table 4.4c reveals the Mean, SD (standard deviation), and the *p*-values of each individually compared strategy in the subset of strategies used in recalling the meanings of learned characters. Again, the differences between the two groups of learners' choice of strategies were not statistically significant. The *p*-values (all greater than .05) are not significant enough to suggest that there are differences between the two groups.

According to the statistics, the differences between the two groups of learners' choice of strategies in all three sunsets were not statistically significant. However, practical differences might exist. At this moment, there is not enough evidence to state that practical differences can suggest the existence of difference in learning strategy

usage. There is too much variability in the students' rating of the strategies. Thus, numbers do not stand out or look particularly informative. If we gather more data on more subjects, the result may or may not be significant. At this point in time, we cannot conclude that significant differences exist.

The reason could be that, even though Chinese 301 students are one level higher than Chinese 202 students, they still share similar traits in their study methods and approaches to vocabulary learning. "The time-on-task variable" is probably the reason for this, because in just a semester apart there might not be enough practice for strategy approaches to change in a few months time.

The Correlation between Students' Perception of the Effectiveness of Strategies and Their Vocabulary Performance Test

Research hypothesis three tested whether or not learners' strategy selection would predict their scores on the Chinese achievement test as measured by the two sets of tests covered in this study. In order to provide a detailed description, learners' recognition and production scores were broken up individually to compare with each strategy selected by the learners. The statistical procedure that is apt for answering this question is *Pearson Correlation*. The data is shown below:

Table 4.5a

Vocabulary test scores correlated with strategies used in remembering the way characters are written

Key: *r* = Class 202+ Class 301 (N=33+11=44)		
	Character Recognition	Character Production
4A. Learn character components		
(radical and phonetic components)	*r* 0.340*	*r* 0.459**
4B. Memorize character parts		
by associating with a story	*r* -0.444**	*r* -0.136
4C. Write character repeatedly	*r* -0.028	*r* -0.066
4D. Associate new characters with		
those already familiar in terms of shapes	*r* 0.096	*r* 0.170
4E. Read Chinese character texts		
frequently and regularly	*r* 0.351*	*r* 0.116
4F. Use hand-made flashcards	*r* 0.075	*r* 0.01
4G. Used computerized flashcards	*r* -0.115	*r* -0.04

**p*-value< 0.05, ***p*-value<0.005

Table 4.5b

Vocabulary test scores correlated with strategies used in remembering the pronunciation of characters

Key: *r* = Class 202+ Class 301 (N=33+11=44)		
	Character Recognition	Character Production
5A. Use phonetic components if available in characters	*r* 0.166	*r* 0.155
5B. Keep listening to the recordings	*r* -0.201	*r* -0.135
5C. Read the characters out loud repeatedly	*r* -0.270*	*r* -0.059
5D. Look at the pinyin for the characters in the vocabulary list repeatedly	*r* 0.02	*r* -0.098
5E. Read Chinese character texts frequently and regularly	*r* 0.406**	*r* 0.079
5F. Use hand-made flashcards	*r* 0.039	*r* 0.09
5G. Used computerized flashcards	*r* 0.017	*r* 0.13

*p-value< 0.05, **p-value<0.005

Table 4.5c

Vocabulary test scores correlated with strategies used in remembering the meanings of learned characters

Key: *r* = Class 202+ Class 301 (N=33+11=44)		
	Character Recognition	Character Production
6A. Use character components (radical and phonetic components) as a clue	*r* 0.304*	*r* 0.298*
6B. Associate the characters with stories	*r* -0.274*	*r* -0.035
6C. Keep listening to the recordings	*r* -0.046	*r* -0.119
6D. Memorize them in the context of vocabulary items and in the context of sentences	*r* 0.301*	*r* 0.156
6E. Use hand-made flashcards	*r* 0.075	*r* 0.092
6F. Used computerized flashcards	*r* -0.08	*r* -0.05

*p-value< 0.05, **p-value<0.005

Values of *r* (correlation coefficient) in the *Pearson Correlations* range from +1 (perfect correlation), through 0 (no correlation), to -1 (perfect negative correlation). The statistical results in tables 4.5a, 4.5b, and 4.5c show that learning strategies associated with learning character components (radical and phonetic components), reading Chinese character texts frequently and regularly, and memorizing characters in the context of vocabulary items and in the context of sentences, were the three strategies with the largest and most significant correlation on character recognition. For a learning strategy associated with reading Chinese character texts frequently and regularly, $r = 0.406$ and

the *p*-value is equal to 0.003. For a learning strategy associated with learning character components (radical and phonetic components), the statistics show that $r = 0.34$ and the *p*-value is equal to 0.012. For a learning strategy associated with memorizing characters in the context of vocabulary items and in the context of sentences, $r = 0.301$ and the *p*-value is equal to 0.023.

The statistical results also found negative correlation between students' selections of certain learning strategies and students' vocabulary recognition scores. Learning strategies associated with memorizing character parts by associating with a story and repeatedly reading the character out loud and associating characters with stories were those that had a negative correlation with vocabulary recognition scores. They respectively had an $r = -0.444$ and *p*-value = 0.001; $r = -0.270$ and *p*-value = 0.038; and $r = -0.274$ and *p*-value = 0.036.

For vocabualry production, the data revealed that people who selected the statement of learning character components (radical and phonetic components) as the most effective tend to have higher scores on vocabulary production than those who selected the other item statements. The statistical results showed that $r = 0.459$ and the *p*-value= 0.001.

These positive and negative correlation relationships can be explained in this manner. A positive correlation relationship as seen in numbers like $r = 0.406$, $r = 0.340$, , and $r = 0.459$ indicate that the results are in harmony with the expectation that the more learners perceive that certain strategies are more effective in learning Chinese vocabulary, the higher scores they would get in the Chinese vocabulary recognition or production tests. On the other hand, a negative correlation relationship, such as $r = -0.444$,

r = -0.270, and r = -0.274, denote that the results are contrary to the expectation the learners have; that is, in reality certain strategies learners selected as effective are less effective than what they perceived them to be. Those negative figures mean that the data revealed that there a significant disadvantage of those strategies among all.

Although items 4H, 5H, and 6G provide a space for students to list any exceptional strategies that they might use even though they are not listed in current strategy items, this study does not treat them as independent variables as the other strategies were. This is due to a variety of different inputs. However, they did yield a number of interesting insights. They will be stated in the end of the chapter as additional information for researchers and teachers.

A total of nine subjects provided detailed input on items 4H, 5H, and 6G. Student 1 who scored 47 (out of 60) stated in item 5H that I "Look for a character I know in the word and figure the unknown character out from there." Student 2 who scored 42 stated in 6G that "Association as a part of word (i.e. multiple character sets) and not as a single character;" student 3 who scored 37 stated in 4H said "read Chinese children's books with pinyin." Student 4 who scored 32 stated in 6G stated: "Read from the stories, and apply to story context." Student 5 who scored 24.5 stated in 6G said "put characters in context." Student 6 who scored 21.5 stated in 6G said "say it out loud." Student 7 who scored 19.5 stated in 5H stated "Associate characters with a story." Student 8 who scored 11.5 stated in 4A mentioned "draw in my head while thinking about English/Chinese definition." Student 9 who scored 55.5 stated in 5H "I associate it with speech. There are lots of things I can speak that I haven't learned the characters for yet. So when I learn a new character most likely I already use it in speech and it's easy to remember."

The study incorporated appropriate statistical procedure into data analysis. It yielded a number of statistically significant findings with regard to exploring the effect that character density has on vocabulary recognition and production, and the difference between the use of strategies across Chinese 301 and 202 classes. Lastly, the study showed certain strategies that students found most effective and the correlation these strategies had with the students' vocabulary achievement scores. The explicit explanations of the findings are provided in the next chapter.

Chapter Five

Conclusions

After conducting a statistical analysis on the data collected, the study found a number of significant findings. This chapter will discuss the conclusions that can be drawn from the findings that were discussed in the previous chapter.

The first hypothesis tested was whether character density affected students' abilities in recognition and production of vocabulary (words or compound words). The research findings from the data collected from a sample of Chinese 202 and 301 students were consistent with previous research findings. In line with previous findings, the findings of this study corresponds with Ke's (1996) and Chin's (1973) conclusions, that is, students performed better on character recognition tasks than on production tasks, and that character density has an effect on production accuracy. Regarding the effect of character density on word recognition, the findings were also consistent with the conclusions of Hayes' (1987) study, which states that "correct recognition of Chinese characters on the word recognition test given was in no way influenced by the number of strokes present in the character" (p. 53). Chin (1973) and Sergent & Everson (1992) found character density affected recognition, while in this study the researcher didn't found character density affected recognition. The finding from this study was somewhat in agreement with Xiao's (2002) study which concludes that students perform better with low-density character than with mid/high-density characters in all of the tasks of recognition, production, and dictation. Xiao's other finding, that "students perform better with mid-density character than with high-density characters in dictation and production

but not in recognition" (p. 79), has revealed a potential direction of research in the study of mid-density and high-density characters.

The results suggested a few possible explanations. First, as put forward by Nation (2001), receptive learning and use in general are easier than productive learning and use, because productive learning requires "extra learning of new spoken or written output patterns." The situation will be "particularly noticeable for languages which use different writing systems from the first language and which use some different sounds or sound combinations" (p. 24). Second, in learning Chinese vocabulary as reflected by Chinese characters, the complexity is just what Ke (1998) suggests, that "partial information can lead to recognition, but total mastery of the character is required for accurate production" (p. 346). The complexity of vocabulary acquisition might suggest a conception of a vocabulary continuum (Lin, 2001, 2004). Lastly, the subjects in this study were higher-level learners when compared with previous studies. This might also suggest that high-level learners encode and decode characters differently than beginning-level learners after having acquired a sufficient orthographic awareness.

To test whether learners' self-perception of the effectiveness of character learning strategies differs as their proficiency level increases, and finally whether these different learners' self-perceptions of the effectiveness of character learning strategies correlate with their learning outcomes, the results suggest that there is no significant evidence to indicate that their strategy approaches are different from each other.

Other researchers (Ke, 1998; McGinnis, 1999; Shen, 2005) have found that language proficiency levels of learners do affect the way they approach learning characters and other aspects of language. First-year learners learn characters vastly

differently from second year learners. Particularly, in an attempt to evaluate the students' perceptions about the effectiveness of their commonly used strategies across different learning levels, Shen (2005) found a linear relationship between learners' proficiency level and their awareness of the usefulness of those types of strategies. However, how do changes start to happen? Does it happen gradually or dramatically? This type of question needs to be investigated further. At this moment, this study can only suggest that within one class difference, there is no significant evidence that Chinese 301 learners valued the usefulness of the learning strategies differently as opposed to Chinese 202 learners. For more distant groups of proficiency level like Chinese 202 and 4th year classes, the results might be different.

From the statistical results that were drawn from the *Pearson Correlation* analysis, there are three major strategies that have been found to have significant positive correlations with learners' performance on Chinese vocabulary recognition achievement tests. These are the learning strategies associated with (1) learning character components (radical and phonetic components), (2) reading Chinese character texts frequently and regularly, and (3) memorizing characters in the context of vocabulary items and in the context of sentences. In addition, the strategy associated with learning character components (radical and phonetic components) has shown a positive correlation with learners' performance on Chinese vocabulary production achievement tests.

It is also worth noting that the research has also found negative correlations between students' selections of certain learning strategies and students' vocabulary recognition scores. The strategies associated with (1) memorizing character parts by associating with a story, (2) repeatedly reading the character out loud, and (3) associating

characters with stories were those that had a negative correlation with vocabulary recognition scores.

Implications and Application

Although the research data revealed a number of positive and negative correlations between students' perception of the effectiveness of strategies for Chinese vocabulary learning and their performance on Chinese achievement tests, this does not imply causality. Rather, such correlations simply indicate that the higher ranking of effectiveness the students marked on certain strategies was related to a higher score that they had achieved on the Chinese vocabulary achievement tests, and vise versa.

This study has provided several significant innovations. First, unlike previous studies that investigated first year beginning learners, this study observed higher-level learners (mostly intermediate and post intermediate learners) in the inquiry of how character density affects vocabulary learning. Using higher-proficiency-level learners might reveal a different story than that of first year learners. The information will help language teachers formulate better teaching methods to enhance learners' language skills and further meet their needs as they move towards achieving learning autonomy. Second, the study used extensive sentence passages in preference to individual characters that were used in previous studies. This gives more insight into how learners connect vocabulary in meaningful contexts. It affirms that the study covered a wider scope of what it means to know a word. Third, the study investigated the strategies learners perceived important and the relationship that those strategies have to their vocabulary achievement. The study was intended to discover how effective each learning strategy

was in a student's vocabulary learning. This knowledge will assist us in knowing which strategies should be utilized most often and which strategies should be employed less often. However, the effective application of strategies may be more important than just the type of strategy being used (Paul, 2005). Nevertheless, without the knowledge of what strategies are most effective in learning Chinese characters, it would be extremely arduous for learners to successfully apply those strategies in their learning.

Pedagogical Implications

In pedagogical implications, the study was undertaken to investigate whether there are some effective learning approaches that students employ in their self-study of Chinese vocabulary that could predict their vocabulary achievement. Researchers and teachers need to be cautious about effective strategy use for CFL learners and thus promote the autonomy of language learning.

Based on this study, it was found that the learning strategy associated with learning character components (radical and phonetic components) to be significantly correlated with both vocabulary recognition and production tasks. It is suggested that language teachers can consciously promote students' awareness in the unique structure of Chinese orthography embedded especially in their phonetic and radical components. Language teachers can effectively introduce strategies in class that have also been found prominent in predicting learning performance in previous research studies, when they introduce new vocabulary items, to ensure fruitful vocabulary learning outcomes. In other words, teachers should train students in what strategies are most effective in learning Chinese characters/ vocabulary.

Limitations

As with all studies of this magnitude, there are various limitations. The study was intended to be of an exploratory nature; furthermore, there were limitations about the students' self-report of strategies used, that is, they might not represent all strategies that they have used or have not used.

The sample size is rather small compared to other large scale exploratory studies. It might not be large enough to reveal more potential correlation patterns. There would not be enough significance to indicate a correlation if the sample size is small. The results could be significant if the sample size would be bigger. Some strategies proved insignificant in term of their correlation to test performance, while in reality they might stand out as the sample size increased to a significant amount. Data that is not statistically significant has two meanings: either the data collected did not have enough spread, or the results were not related. Due to a limited number of students participating in the study, the results can only be reflected as has been presented above.

In previous research studies that tested participants' abilities to recognize characters, *pinyin* was not given to them; instead, participants were asked to produce both *pinyin* and the English translation of the characters. However, in this study *pinyin* was provided for each vocabulary item tested in the vocabulary recognition task. The use of *pinyin* may have compromised the vocabulary recognition performance. The orthographical effects of Chinese characters may have been nullified because students may have just recognized the words from the *pinyin*. In acknowledge of this, data was also collected in summer 2005 and winter 2006 on different groups of students of

Chinese 301 and 202 classes with the same vocabulary test but *pinyin* was omitted. Their performance showed that there was not a significant difference between providing providing *pinyin* and not providing *pinyin* in order for the test takers to recognize the meaning of the vocabulary.

Another limitation of the study is its emphasis on the self-perception of effectiveness of a strategy rather than on the frequency of use of a strategy. The concern is that the measurement of students' self-perception is relatively opinion-oriented. The data has not shown that the strategies they perceived as important are the ones that they would actually put into use. In this case, a section of interview using think aloud protocols might better reveal the reality of how students use strategies. This is because think aloud protocols consist of observing a user working with an interface while encouraging them to "think-aloud", that is, to say what they are thinking and wondering at each moment.

Future Research

Further research may involve investigating other types of data solicited on vocabulary learning strategy (e.g. think aloud protocols) and their effect on learners' vocabulary acquisition in the same research setting. Meanwhile, the study has exclusively investigated vocabulary items in a written language setting; oral vocabulary also needs to be examined to present a broader range of vocabulary acquisition.

Bibliography

Brown, T., & Perry, F. (1991). A comparison of three learning strategies for ESL vocabulary acquisition. *TESOL Quarterly, 25*: 655-70.

Charmot, A. U. (2001). The role of learning strategies in second language acquisition. In M.P. Breen (Ed.), *Learner Contributions to Language Learning: New Directions in Research* (pp. 25-43). Harlow, England: Longman.

Chen, P. (1999). *Modern Chinese: its History and Sociolinguistics*. UK: Cambridge University Press.

Chin, T. (1973). Is it necessary to acquire writing in learning Chinese characters? Journal of Chinese Language Teachers Association, *8*, 167-170.

Cohen, A. D., & Aphek, E. (1980). Retention of second language vocabulary over time: investigating the role of mnemonic associations. *System,* 8, 1-235.

_____. (1981). Easifying second language learning. *Studies in Second Language Acquisition, 3*, 221-36.

Cohen, A. D., Weaver, S., & Li, T-Y. (1998). The impact of strategies-based instruction on speaking a foreign language. In A.D. Cohen, *Strategies in learning and using a second language* (pp. 107-156). London: Longman.

Everson, M. E. (1986). *The effect of word-unit spacing upon the reading strategies of native and L2 readers of Chinese: An eye-tracking study*. Unpublished doctoral dissertation, Ohio State University, Columbus.

_____. (1988). Speed and comprehension in reading Chinese: Romanization vs. characters revisited. *Journal of the Chinese Language Teachers Association*, *23*, 1-16.

_____. (1994). Toward a process view of teaching reading in the second language Chinese curriculum. *Theory into Practice, 33*, 481-507.

_____. (1998). Word recognition among learners of Chinese as a foreign language: investigating the relationship between naming and knowing. *The Modern Language Journal*, *82*, 194-204.

Everson, M. E., & Ke, C. (1997). An inquiry into the reading strategies of intermediate and advanced learners of Chinese as a foreign language. *Journal of the Chinese Language Teachers Association*, *32*, 1-20.

Gosswami, U. (1999). Phonological awareness and orthographic representation. In H. Margaret & G. Hatano (Eds.), *Learning to Read and Write—A Cross-Linguistic Perspective* (pp. 134-156). Cambridge University Press.

Green, J. M., & Oxford, R. (1995). A closer look at learning strategies, L2 proficiency, and gender. *TESOL Quarterly*, *29*, 261-297.

Gu, Y., & Johnson, R. K. (1996). Vocabulary learning strategies and language learning outcomes. *Language Learning, 46*, 643-679.

Hayes, E. B. (1987). The relationship between Chinese character complexity and character recognition. *Journal of the Chinese Language Teachers Association*, *22*, 45-57.

_____. (1988). Encoding strategies used by native and non-native readers of Chinese Mandarin. *Modern Language Journal*, *72*, 188-195.

_____. (1990). The relationship between ‘word length’ and memorability among non-native readers of Chinese mandarin. *Journal of the Chinese Language Teachers Association*, *25*, 31-41.

Henderson, L. (1982). *Orthography and Word Recognition in Reading*. London: Academic Press.

Hsiao, T. Y. & R. L. Oxford. (2002). Comparing theories of language learning strategies: a confirmatory factor analysis. *The Modern Language Journal*, *86*, 368-383.

Johnson, C. A. (2004). Vocabulary learning strategy use across cultures, L2 proficiency levels, and learning context. Unpublished Master's Thesis, Brigham Young University, Utah.

Ke, C. (1996). An empirical study on the relationship between Chinese character recognition and production. *The Modern Language Journal*, *80*, 340-350.

_____. (1998). Effects of strategies on the learning of Chinese characters among foreign language students. *Journal of the Chinese Language Teachers Association*, *33*, 93-112.

Kitajima, R. (1997). Referential strategy training for second language reading comprehension of Japanese texts. *Foreign Language Annals, 30*, 84-97.

Koda, K. (1997). Orthographic knowledge in L2 lexical processing: a cross-linguistic perspective. In J. Coady & T. Huckin (Eds.), *Second language vocabulary acquisition* (pp. 35-52). Cambridge: Cambridge University Press.

Kojic-Sabo, I. & P.M. Lightbown. (1999). Students' approaches to vocabulary learning and their relationship to success. *The Modern Language Journal*, *83*, 176-192.

Laufer, B. (1992). Reading in a foreign language: how does L2 lexical knowledge interact with the reader's general academic ability? *Journal of Research in Reading, 15*, 95-103.

_____. (1997). The lexical plight in second language reading: words you don't know, words you think you know and words you can't guess. In *Second Language Vocabulary Acquisition: a Rationale for Pedagogy*, eds. J. Coady and T. Huckin. Cambridge University Press.

_____. (1998). The development of passive and active vocabulary in a second language: same or different? *Applied Linguistics, 12*, 255-271.

Laufer, B. and P. Nation. (1995). Vocabulary size and use: lexical richness in L2 written production. *Applied Linguistics, 16*, 307-322.

_____. (1999). A vocabulary size test of controlled productive ability. *Language Testing, 16*, 33–51.

Laufer, B. and T.S. Paribakht. (1998). The relationship between passive and active vocabularies: effects of language learning context. *Language Learning*, *48*, 365-391.

Lawson, M. J., & Hogben, D. (1996). The vocabulary-learning strategies of foreign-language students. *Language Learning*, *46*, 101-135.

Liberman, I.Y. et al. (1980). Orthography and beginning reader. In J. Kavanaghe & R. Venezky (Eds.), *Orthography, Reading, and Dyslexia* (pp 137-153). Baltimore, MD: University Park Press.

Lin, Y. (2000). Vocabulary acquisition and learning Chinese as a foreign language (CFL). *Journal of the Chinese Language Teachers Association*, *35*, 85-108.

_____. (2004). Chinese vocabulary acquisition and learning Chinese as a foreign language. Unpublished Ph.D. Dissertation, University of Iowa.

Meara, P. (1996). The classical research in L2 vocabulary acquisition. In G. Anderman & M. Rogers (Eds.), *Words, words, words: The translator and the language learner* (pp. 27-40). Clevedon: Multilingual Matters.

McGinnis, S. (1995). *Student attitudes and approaches in the learning of written Chinese*. Paper presented at the Annual Conference of the American Association Applied Linguistics, Long Beach, CA.

_____. (1999). Student goals and approaches. In Chu, M. (Ed.), *Mapping the Course of the Chinese Language Field* (pp. 150-188). Kalamazoo, MI: Chinese Language Teachers' Association.

Nation, P. (1990). *Teaching and Learning Vocabulary*. New York: Heinle & Heinle.

_____. (2001). *Learning Vocabulary in Another Language*. New York: Cambridge University Press.

Norman, J. (1993). *Chinese*. Cambridge University Press.

Nyikos, M. and Oxford, R. L. (1993). A factor analytic study oflanguage-learning strategy use: Interpretations from information-processing theory and social psychology. *Modern Language Journal*, ***77***: 11-22.

O'malley, J. M., & Chamot, A. U. (1990). *Learning Strategies in Second Language Acquisition.* Cambridge: Cambridge University Press.

Oxford, R. L. (1990). *Language Learning Strategies: What Every Teacher Should Know*. New York: Newbury House.

Paul, M. A. (2005). The forgotten skill remembered: identifying reading strategies of intermediate and advanced level Chinese foreign language readers. Unpublished Master's Thesis, Brigham Young University Utah.

Perfetti, C. A., & Tan, L. H. (1998). The time course of graphic, phonological, and semantic activation in Chinese character identification. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 24*, 101-118.

Rubin, J. (1987). Learner strategies: Theoretical assumptions, research history and typology. In A. Wenden & J. Rubin (Eds.), *Learner Strategies and Language Learning* (pp. 15-29). Englewood Cliffs, NJ: Prentice Hall.

Schmitt, N. (1997). Vocabulary learning strategies. In N. Schmitt & M. McCarthy (Eds.) *Vocabulary: Description, Acquisition, and Pedagogy* (pp. 199-227). Cambridge, MA: Cambridge University Press.

Sergent, W., & Everson, M. E. (1992). The effects 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*, 29-44.

Shen, H. (2005). An investigation of Chinese-character learning strategies among non-native speakers of Chinese. *System 33*, 49-68.

Singleton, D. (1999). *Exploring the Second Language Mental Lexicon*. New York: Cambridge University Press.

Taylor, I., & Taylor, M. M. (1995). *Writing and Literacy in Chinese, Korean, and Japanese.* Philadelphia: John Benjamins.

Wenden, A. and Rubin, J. (1987). *Learner Strategies in Language Learning*. Englewood Cliffs: Prentice-Hall International.

Wharton, G. (2000). Language learning strategy use of bilingual foreign language learners in Singapore. *Language Learning, 50*, 203-244.

Xiao, Y. (2002). The effect of character density on learning Chinese as a foreign language. *Journal of the Chinese Language Teachers Association*, *37*, 71-84.

Yang, J. (2000). Orthographic effect on word recognition by learners of Chinese as a foreign language. *Journal of the Chinese Language Teachers Association*, *35*, 1-18.

Yao, T. (1995). A computer-adaptive test for reading Chinese (CATRC): A prelimanary report. *Journal of the Chinese Language Teachers Association*, *30*, 75-85.

Yao, T., Liu, Y. et al. (1997). *Integrated Chinese II*. Boston, MA: Cheng & Tsui.

Yin, Jing-hua. (2003). The method of American students in memorizing Chinese characters: a report on a questionnaire investigation 美國大學生記憶漢字時使用的方法—問卷調查報告. *Journal of the Chinese Language Teachers Association*, *38*, 69-90.

Young, D. J., & Oxford, R. L. (1997). A gender-related analysis of strategies used to process written input in the native language and a foreign language. *Applied Language Learning*, *8*, 43-73.

Academic Credit. http://www.dliflc.edu/academics/academic_affairs/dli_catalog/acadcred.htm. 2/7/2006.

The Computer-Adaptive Test for Reading Chinese (CATRC). http://eastasia.hawaii.edu/yao/catrc/default.htm. 2/10/2005.

Appendix A

Research Consent Form

Introduction
This research is being conducted by Kayla Lam, a Graduate student in Language Acquisition program under the direction of Dr. Matthew Christensen from Asian and Near Eastern Languages department, and two committee members Dr. Ray Graham from Linguistics department and Dr. Dana Bourgerie from Asian and Near Eastern Languages department. The study examines how character density affects the acquisition process of the upper proficiency level learners, and what strategies the learners choose to approach characters that are denser, and whether the type of strategies learners use predicts the performance in learning Chinese vocabulary. You were selected to participate because you are currently taking Chinese 202 or Chinese 301 class.

Procedure
You will be asked to complete two vocabulary tests and a questionnaire. Some of you may also be invited to come to a one-on-one interview with the researcher. The task consists of two sets of character recognition and production tests. The questionnaire consists of about 12 questions. All of them will take approximately 60 to 90 minutes. Questions will include details about your background as a Chinese language learner and your study habits and strategies of learning Chinese vocabulary. Participants may volunteer to be a part of a focus group. Researchers will contact those who volunteer with more information regarding the time and the place. The focus group will last for approximately 30 minutes and consist of more in-depth questions similar to those in the questionnaire. It will be tape-recorded and then transcribed.

Risks/Discomforts
There are minimal risks for participation in this study. However, you may feel emotional discomfort when answering questions about personal studying habits. The moderator will be sensitive to those who may become uncomfortable.

Benefits
There are no direct benefits to subjects. However, it is hoped that through your participation researchers will learn more about learning approaches that subjects employ that prove successful. The study of this area would therefore provide valuable information that can aid learners in their self-study of Chinese vocabulary.

Confidentiality
All information provided will remain confidential and will only be reported as group data with no identifying information. All data, including questionnaires and tapes/transcriptions from the focus group, will be kept in a locked storage cabinet and only those directly involved with the research will have access to them. After the research is completed, the questionnaires and tapes will be destroyed.

Compensation
Extra credit will be offered as a part of required out of class work to the students who participate in the study. Participants will receive 5 extra credit points in their class for completing the vocabulary tests and the questionnaire. An additional 5 extra credit point will be given to focus group participants. For those who do not wish to participate in the research, 5 extra credit points can be earned by reading two articles. An additional 5 points are available to those who wish to write a one page paper on each article.

Participation
Participation in this research study is voluntary. You have the right to withdraw at any time or refuse to participate entirely without jeopardy to your class status, grade or standing with the university.

Questions about the Research
If you have questions regarding this study, you may contact Kayla Lam at 377-1376, kaylalam@yahoo.com, or Dr. Matthew Christensen at 422-5303.

Questions about your Rights as Research Participants
If you have questions you do not feel comfortable asking the researcher, you may contact Dr. Renea Beckstrand, IRB Chair, 422-3873, 422 SWKT, renea_beckstrand@byu.edu.

I have read, understood, and received a copy of the above consent and desire of my own free will and volition to participate in this study.

Signature: _____ Date: _____

Appendix B

Vocabulary Test

Student Name (please print) _____
Class _____

Part I

1. 所以書法成為一門特殊的藝術, 它可以讓人表現出自己的情感與個性, 體現一種獨特而高雅的創造精神。

可以: ke yi English translation: _____
表現: biao xian English translation: _____
精神: jing shen English translation: _____

2. 原始文字逐漸發展、成熟、完善, 在大約三千七百年前, 形成了可以完整地記錄漢語的文字體系。

發展: fa zhan English translation: _____
形成: xing cheng English translation: _____

3. 到了東漢年代, 蔡倫在總結了前人造紙經驗的基礎上改進了造紙技術, 終於造出了便于書寫繪畫的紙。紙成為主要的書寫材料以後, 造紙技術不斷 提高, 有不少地方製造出聞名全國的好紙。

年代: nian dai English translation: _____
經驗: jing yan English translation: _____
基礎: ji chu English translation: _____
主要: zhu yao English translation: _____
不斷: bu duan English translation: _____
提高: ti gao English translation: _____
技術: ji shu English translation: _____

4. 誰知看熱鬧的人太多了, 擠了半天還是擠不進去。

擠: ji English translation: _____

5. 我朋友的描述印證我的觀察與了解的結果，當時天氣雖然是寒冷的，但我內心充滿激情的火熱 。

觀察: guan cha English translation: _____
結果: jie guo English translation: _____

6. 感情生活雖然不是生命的全部，但它卻決定了生命的色彩。我們為之而歡，為之而泣的勞心過程，幾乎是每個人必經的過程，

全部 : quan bu English translation: _____
決定 : jue ding English translation: _____
幾乎: ji hu English translation: _____

7. 而在形式上，古詩、樂府、律絕，各體皆備。

形式: xing shi English translation: _____

8. 其實，就算沒有貴妃從中作梗，唐玄宗也不敢對李白委以重任，主要的原因是玄宗看出李白的思想和行為都不適合從政。

原因: yuan yin English translation: _____
思想: si xiang English translation: _____

9. 整篇文章，表面看起來有歌有舞熱鬧非凡，骨子裡仍然是很寂寞孤獨的，而李白的寂寞來自政治抱負與理想的幻滅。

文章: wen zhang English translation: _____
表面: biao mian English translation: _____
而: er English translation: _____

10. 提到白居易，我們最先想到的，不是長恨歌就是琵琶行。

不是: bu shi English translation: _____
就是: jiu shi English translation: _____

11. 就白居易來說，貶謫江州這件事情，對他來說，可以說是人生影響非常大的。在寫長恨歌之前，白居易的詩歌並沒有建立什麼特色。

建立: jian li English translation: _____

12. 小小一首詩，寫出濃濃的生活情味。意境樸素自然，表現了白居易和劉十九渾厚真率的友誼。

自然 : zi ran English translation: _____

13. 漢字具有美的價值。它的造形非常獨特, 筆畫形態豐富多樣。
價值: jia zhi English translation: _____

豐富：feng fu　　English translation: _____

Part II

1. 里根(Reagan)總統對一個股票經紀人(stock broker)說：“現在 1_____ 2_____很好，如果我不是總統而是一個 3_____老百姓，我就會買進很多股票。”股票經紀人回答：“是的，如果不是你當總統，我就會去買很多股票。″

   jing ji (economic) 1
   qing kuang (condition) 2
   pu tong (common) 3

2. 胡同, 就是一般常說的巷。稱巷為胡同，只是以北京為中心的北方幾個城市的_____。

   xi guan (habit)

3. 漢字和中國人的 1_____有很密切的 2_____, 平時常常要用到它，走到哪兒都能看到它。

   sheng huo (living, life) 1
   guan xi (relationship) 2

4. 愛好刺激的朋友可到此享受從兩層樓往下跳的刺激_____。

   gan jue (feelings, sensation)

5. 兩千多年以前, 中國人就發現了能吸鐵的磁石, 如果把磁石吊起來, 它的一頭就指向南方, 另一頭指向北方。人們 1_____磁石的這種 2_____的特性, 發明了各種指南工具。

   gen ju (according to, depend on) 1
   zhong yao (important) 2

6. 到了十一世紀, 北宋時畢升(？-- 1051)發明了活字印刷。他把字刻在一個個用膠泥做成的長方塊上, 用火燒硬, 這就成了一個個活字。畢升的膠泥活字印刷為以後的鉛字活字印刷鋪平了道路。他的 1_____非常了不起, 2_____極大。這種方法不久傳到朝鮮, 後來又傳到日本、越南和歐洲。3_____了文学界上巨大的成就。

   gong xian (contribution) 1
   ying xiang (influence) 2
   yin qi (to beget, or bring) 3

7. 著名的語言學家 Whorf, B.L.1_____人類的真實世界是存在於他的語言所架構的世界中，他 2_____語言與文化的關係中以一印地安族(Hopi)的語言為例。在 Hopi 族的語言中 3_____是沒有 4_____、沒有單複數、沒有時態（現在、過去、未來），沒有性別之分的……

ren wei (to think) 1
fen xi (to analyze) 2
yuan lai (originally, formerly) 3
wu zhi (matter, substance) 4

8. 「其實年輕的原住民對山林的了解已經很有限了，我一開始要教會學員的不是 1_____上山、下水，而是 1_____在山林的環境中，2_____自己的安全，才具備有走入山林的 3_____。」

ru he (how to) 1
bao hu (to protect) 2
tiao jian (condition) 3

9. 陳教授 1_____之理論，雖然經過多項 2_____試驗證實，可提供較傳統設計高出三倍以上的耐震韌性，然而，他所建議之切削 3_____，卻違反了傳統 4_____鋼板補強之 5_____，6_____，學者專家雖然無法反駁陳教授的理論，但卻也無人願意接受。

ti chu (to bring forward, put forward) 1
po huai (to destroy) 2
fan fa (method, ways and means) 3
cai yong (to adopt, implement) 4
guan nian (idea, concept) 5
yin ci (therefore) 6

10．在白雪飄飄的季節再度來到紐約，1_____這一回決定重拾書本當學生，看看 2_____生活與書本理論是否有差距。

zhi shi (just, simply) 1
shi ji (reality) 2

11. 到了雅典，1_____對故鄉巨大的的思念，2_____格格不入的新環境，使凡尼斯成了問題 3_____，一天到晚膩在廚房作菜，甚至躲進浴室不理會父母。

suo you (having possession) 1
yi ji (along with, as well as) 2
xiao hai (little kid) 3

Appendix C

Questionnaire

This questionnaire is intended to help researchers get to know what kind of strategies students actually use when learning Chinese vocabulary (characters). It will take about 10-15 minutes for you to respond to all the questions right after you complete the two sets of vocabulary tests. Please return the completed questionnaire to the researcher who monitors your vocabulary tests. Your help is greatly appreciated. (You are required to put down your name. Note: the name you provide will be used to gather the focus group)

I. Questions about yourself

1. How long have you studied Chinese? _____

2. Do any of your parents speak Chinese? _____

3. Are you male or female? _____

4. What level of Chinese do you consider you are at now?
   A) Beginning B) Intermediate
   C) Post Intermediate D) Advanced
   E) Post Advanced

5. What level are you in now?
   A) Chinese 202
   B) Chinese 301

6. What foreign language learning experiences have you had before learning Chinese? (Choose all that is applicable.)

   A) European language Please specify _____
   B) Asian language Please specify _____
   C) African language Please specify _____
   D) American Indian language Please specify _____
   E) None

II. Questions about Chinese characters

1. What form of Chinese characters do you **read**?
   A) The traditional form only
   B) The simplified form only
   C) Most of time the traditional form and sometimes the simplified form
   D) Most of time the simplified form and sometimes the traditional form

2. What form of Chinese character do you **write**?
   A) The traditional form only
   B) The simplified form only
   C) Most of time the traditional form and sometimes the simplified form
   D) Most of time the simplified form and sometimes the traditional form

3. What is most troubling with your learning of Chinese characters (vocabulary)?
   A) Remember the way characters are written
   B) Remember the pronunciation of the learned characters (vocabulary)
   C) Remember the meanings of the learned characters (vocabulary)

(Note: For the next three questions in this section, please number those study methods you have used with the one you feel most effective as number 1, the second most effective as number 2 and so on. Put your numbers in the boxes provided. Leave the boxes empty for those study methods you have never used.)

4. What study methods have you been using in remembering the **way characters are written**?

   A) ☐ Learn character components (radical and phonetic components)
   B) ☐ Memorize character parts by associating with a story
   C) ☐ Write character repeatedly
   D) ☐ Associate new characters with those already familiar in terms of shapes
   E) ☐ Read Chinese character texts frequently and regularly
   F) ☐ Use hand-made flashcards
   G) ☐ Used computerized flashcards
   H) ☐ Others. Please specify:
   _____
   _____
   _____

5. What study methods have you tried in remembering **the pronunciation of characters**?

   A) ☐ Use phonetic components if available in characters
   B) ☐ Keep listening to the recordings
   C) ☐ Read the characters out loud repeatedly
   D) ☐ Look at the pinyin for the characters in the vocabulary list repeatedly
   E) ☐ Read Chinese character texts frequently and regularly
   F) ☐ Use hand-made flashcards
   G) ☐ Used computerized flashcards
   H) ☐ Others. Please specify:
   _____
   _____
   _____

6. What study methods have you tried in remembering **the meanings of learned characters**?

A) ☐ Use character components (radical and phonetic components) as a clue
B) ☐ Associate the characters with stories
C) ☐ Keep listening to the recordings
D) ☐ Memorize them in the context of vocabulary items and in the context of sentences
E) ☐ Use hand-made flashcards
F) ☐ Used computerized flashcards
G) ☐ Others. Please specify:

_____
_____
_____

Appendix D

A List of "the First 30,000 Chinese Words by Frequency" (a fraction of the hard copy of "the first 30,000 Chinese words by frequency" provided by the Society of Chinese Language and Culture)

Simplified	Rank	Part of speech	Trad	Pinyin	English
我们	33754	人称代	我們	wǒmen	We
可以	26138	助动	可以	kěyǐ	can, may
他们	22123	人称代	他們	tāmen	They
进行	19085	行为动词	進行	jìnxíng	to carry out, conduct, execute
没有	18568	确否副	沒有	méiyǒu	do not have, have not, there is not
工作	17895	动名词	工作	gōngzuò	work; to work
人民	17268	事物名—	人民	rénmín	the people
生产	17189	动名词	生產	shēngchǎn	production; to produce
这个	17149	指示代	這個	zhège	This
发展	16952	动名词	發展	fāzhǎn	development; to develop
就是	16692	判断动	就是	jiùshì	is exactly (and other contextual meanings)
问题	15649	事物名—	問題	wèntí	question; problem
国家	15136	事物名—	國家	guójiā	country, state
中国	15069	处所名	中國	zhōngguó	China
我党	14963	事物名—	我黨	wǒdǎng	our party (CCP)
这样	13951	指示代	這樣	zhèyàng	so, like this, this way
革命	13787	动名词	革命	gémìng	Revolution
自己	13514	事物名—	自己	zìjǐ	self, oneself
不能	13242	助动	不能	bùnéng	Cannot
这些	12150	指示代	這些	zhèxiē	these, these few
所以	12039	独立连	所以	suǒyǐ	so, therefore, because
因此	11541	独立连	因此	Yīncǐ	so, therefore, consequently
作用	11364	动名词	作用	zuòyòng	effect; purpose, motive; to act on, affect
什么	11283	疑问代	什麼	shénme	what?
如果	11250	接头连	如果	Rúguǒ	if, in case
情况	11080	事物名—	情況	qíngkuàng	circumstance(s)
必须	10792	助动	必須	Bìxū	must, have to
方法	10791	事物名—	方法	Fāngfǎ	method, means
因为	10637	接头连	因為	Yīnwèi	Because
主要	10557	普通形容	主要	Zhǔyào	main, principal
要求	10177	使令动	要求	Yāoqiú	to ask, demand, require; requirement,

					demand
社会	10141	事物名—	社會	Shèhuì	Society
		目的方式			
为了	9926	介	為了	Wèile	in order to, for the sake of
					to rise, stand up; verb comp.
起来	9865	趋向动	起來	Qǐlái	(completion)
经济	9844	事物名—	經濟	Jīngjí	Economy
不是	9773	判断动	不是	Búshì	is not
一定	9688	确否副	一定	Yídìng	Certainly
条件	9669	事物名—	條件	Tiáojiàn	condition(s)
但是	9579	独立连	但是	Dànshì	but, however
研究	9569	动名词	研究	Yánjiū	research, studies; to research, deliberate
关系	9370	动名词	關係	Guānxì	relation(ship), connection
		目的方式			
根据	9214	介	根據	Gēnjù	on the basis of, in line with
需要	9083	及物动—	需要	Xūyào	to need, want demand; needs
部分	8789	些—	部分	Bùfen	part, section
我国	8677	事物名—	我國	Wǒguó	our country
一些	8668	指示代	一些	Yìxiē	Several
同时	8664	时频副	同時	tóngshí	at the same time, besides, moreover
思想	8579	事物名—	思想	Sīxiǎng	thought, thinking
已经	8572	时频副	已經	Yǐjīng	Already
过程	8487	事物名—	過程	guòchéng	Process
		不及物			
发生	8467	动—	發生	fāshēng	to happen
群众	8424	事物名—	群眾	qúnzhòng	the masses
现在	8407	时频副	現在	Xiànzài	Now
通过	8371	行为动	通過	tōngguò	to pass through; by way of
方面	8352	量名词	方面	fāngmiàn	side, aspect
它的	8231	非谓形容	牠的	Tāde	Its
运动	8198	动名词	運動	yùndòng	movement, sport; to move
这点	8132	指示代	這點	zhèdiǎn	this aspect, this part
提高	8117	动名词	提高	Tígāo	to raise, improve
小孩	8110	事物名—	小孩	Xiǎohái	small child
以后	7990	时频副			
组织	7968	动名词			
影响	7798	动名词			
领导	7720	动名词			
斗争	7710	动名词			
不同	7609	非谓形容			
第一	7490	序数			

重要	7375	普通形容
时间	7268	事物名—
产生	7266	行为动
时候	7243	事物名—
增加	7150	动名词
政府	7050	普通名
以及	7046	普通连
许多	6995	程度形容
他的	6993	非谓形容
例如	6978	独立连
技术	6966	事物名—
而且	6947	接头连
生活	6802	事物名—
使用	6785	及物动—
具有	6720	存在动
历史	6644	普通名
同志	6617	称谓名—
其他	6610	非谓形容
采用	6565	及物动—
表示	6495	动名词
比较	6433	程度副
开始	6425	助动
政治	6411	事物名—
活动	6367	动名词
温度	6257	事物名—
一切	6246	指示代
知道	6245	行为动
变化	6234	动名词
代表	6180	动名词
规定	6166	动名词
地区	6062	普通名
经过	6042	动名词
实际	6030	非谓形容
劳动	5972	动名词
世界	5951	事物名—
地方	5887	普通名
只有	5848	存在动
完全	5742	程度形容
物质	5717	普通名
认为	5679	心理动
存在	5559	形动词

得到	5524	及物动—
出来	5501	趋向动
美国	5487	处所名
作为	5471	动名词
工业	5461	普通名
注意	5453	行为动
学习	5370	动名词
决定	5354	行为动
它们	5269	人称代
形成	5260	行为动
也是	5259	判断动
基础	5228	普通名
速度	5068	事物名—
农民	5039	人名—
应该	5032	助动
工人	5021	人名—
企业	5017	普通名
并且	4993	接头连
全国	4972	形名词
有的	4965	非谓形容
成为	4960	及物动—
队伍	4944	普通名
出现	4915	行为动
人们	4883	形名词
提出	4881	及物动—
社会主义	4868	形名词
单位	4809	普通名
叫做	4808	行为动
反对	4787	行为动
个人	4781	非谓形容
这里	4773	指示代
		合成方位
以上	4745	名
管理	4744	动名词
解决	4682	行为动
不可	4664	助动
结果	4633	事物名—
现象	4599	事物名—
建设	4581	动名词
建立	4573	行为动
可能	4570	助动

之间	4526	普通名
苏联	4492	处所名
		合成方位
其中	4478	名
参加	4469	行为动
科学	4451	普通名
因故	4432	情态副
还是	4430	时频副
能够	4402	助动
法律	4397	普通名
当时	4396	时频副
方向	4390	普通名
时期	4382	普通名
分子	4376	普通名
控制	4344	及物动—
指出	4343	行为动
政策	4306	普通名
基本	4301	普通形容
阶级	4293	普通名
产品	4292	普通名
表现	4291	动名词
干部	4258	人名—
北京	4244	处所名
有关	4238	普通形容
然后	4237	接头连
任何	4233	非谓形容
计划	4221	普通名
达到	4219	行为动
那么	4191	动名词
主席	4161	称谓名—
主义	4160	普通名
正确	4141	普通形容
制度	4136	普通名
不断	4135	时频副
经验	4112	普通名
质量	4110	普通名
说明	4110	动名词
直接	4107	助动
力量	4085	事物名—
一次	4063	数量组
日本	4056	处所名

形式	4053	普通名
自然	4043	普通形容
计算	4031	动名词
农业	4027	普通名
空气	4006	事物名—
组成	3989	行为动
虽然	3975	接头连
所谓	3973	接头连
或者	3964	普通连
证明	3958	动名词
实现	3942	行为动

Appendix E

Vocabulary List Used in the Vocabulary Recognition and Production Test

Low Density Vocabulary

可以
形成
年代
主要
全部
決定
就是
形式
原因
文章
表面
而
不是
建立
表現

情況
所有
以及
小孩
因此
只是
分析
引起
生活
如何
原來
方法
採用
提出
重要

High Density Vocabulary

幾乎

自然
精神
發展
經驗
基礎
不斷
提高
技術
價值
豐富
擠
觀察
思想
結果

經濟
普通
習慣
關係
感覺
根據
貢獻
影響
認爲
物質
保護
破壞
觀念
實際

Appendix F

The Statistics Output for ANOVA Analysis (Comparing the Use of Strategies between Class 202 and 301)

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
4A-202	33	220	6.666667	9.854167
4A-301	11	83	7.545455	8.472727

ANOVA

Source of Variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	6.371212	1	6.371212	0.668876	0.41806	4.07266
Within Groups	400.0606	42	9.525253			
Total	406.4318	43				

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
4B-202	33	179	5.424242	11.50189
4B-301	11	45	4.090909	11.09091

ANOVA

Source of Variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	14.66667	1	14.66667	1.286094	0.263201	4.07266
Within Groups	478.9697	42	11.40404			
Total	493.6364	43				

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
4C-202	33	301	9.121212	1.234848
4C301	11	97	8.818182	2.363636

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.757576	1	0.757576	0.503839	0.481741	4.07266
Within Groups	63.15152	42	1.503608			
Total	63.90909	43				

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
4D-202	33	196	5.939394	13.80871
4D-301	11	74	6.727273	6.418182

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	5.121212	1	5.121212	0.42503	0.51799	4.07266
Within Groups	506.0606	42	12.04906			
Total	511.1818	43				

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
5A-202	33	197	5.969697	14.2178
5A-301	11	59	5.363636	19.85455

ANOVA

Source of Variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	3.030303	1	3.030303	0.194751	0.661255	4.072654
Within Groups	653.5152	42	15.55988			
Total	656.5455	43				

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
5B-202	33	116	3.515152	13.50758
5B-301	11	41	3.727273	13.01818

ANOVA

Source of Variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.371212	1	0.371212	0.027721	0.868566	4.072654
Within Groups	562.4242	42	13.39105			
Total	562.7955	43				

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
5C-202	33	250	7.575758	9.126894
5C301	11	64	5.818182	14.96364

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	25.48485	1	25.48485	2.423299	0.127047	4.072654
Within Groups	441.697	42	10.51659			
Total	467.1818	43				

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
5D-202	33	244	7.393939	11.80871
5D-301	11	88	8	8.6

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	3.030303	1	3.030303	0.274366	0.603171	4.072654
Within Groups	463.8788	42	11.04473			
Total	466.9091	43				

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
5E(202)	33	177	5.363636	15.11364
5E(301)	11	77	7	12.8

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	22.09091	1	22.09091	1.516944	0.224934	4.072654
Within Groups	611.6364	42	14.56277			
Total	633.7273	43				

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
5F-202	33	140	4.242424	13.62689
5F-301	11	55	5	13.6

ANOVA

Source of Variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	4.734848	1	4.734848	0.347627	0.558618	4.072654
Within Groups	572.0606	42	13.62049			
Total	576.7955	43				

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
5G-202	33	65	1.969697	9.030303
5G-301	11	19	1.727273	6.418182

ANOVA

Source of Variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.484848	1	0.484848	0.057663	0.811397	4.072654
Within Groups	353.1515	42	8.408369			
Total	353.6364	43				

Appendix G

The Statistics Output for the *Pearson Correlation* Analysis (Investigating the Effectiveness of the Strategies on Vocabulary Performance)

Character Recognition score and Strategy 4A	
Pearson Coefficient of Correlation	0.3401
t Stat	2.3439
df	42
P(T<=t) one tail	0.0119*
t Critical one tail	1.682
P(T<=t) two tail	0.0238
t Critical two tail	2.0181
Character Recognition score and Strategy 4B	
Pearson Coefficient of Correlation	-0.4436
t Stat	-3.2076
df	42
P(T<=t) one tail	0.0013**
t Critical one tail	1.682
P(T<=t) two tail	0.0026
t Critical two tail	2.0181
Character Recognition score and Strategy 4C	
Pearson Coefficient of Correlation	-0.0284
t Stat	-0.184
df	42
P(T<=t) one tail	0.4274
t Critical one tail	1.682
P(T<=t) two tail	0.8548
t Critical two tail	2.0181
Character Recognition score and Strategy 4D	
Pearson Coefficient of Correlation	0.0956
t Stat	0.6224
df	42
P(T<=t) one tail	0.2685
t Critical one tail	1.682
P(T<=t) two tail	0.537
t Critical two tail	2.0181

Character Recognition score and Strategy 4E	
Pearson Coefficient of Correlation	0.3511
t Stat	2.4301
df	42
P(T<=t) one tail	0.0097*
t Critical one tail	1.682
P(T<=t) two tail	0.0194
t Critical two tail	2.0181
Character Recognition score and Strategy 4F	
Pearson Coefficient of Correlation	0.0753
t Stat	0.4897
df	42
P(T<=t) one tail	0.3135
t Critical one tail	1.682
P(T<=t) two tail	0.627
t Critical two tail	2.0181
Character Recognition score and Strategy 4G	
Pearson Coefficient of Correlation	-0.1149
t Stat	-0.7496
df	42
P(T<=t) one tail	0.2288
t Critical one tail	1.682
P(T<=t) two tail	0.4576
t Critical two tail	2.0181
Character Recognition score and Strategy 5A	
Pearson Coefficient of Correlation	0.1662
t Stat	1.0921
df	42
P(T<=t) one tail	0.1405
t Critical one tail	1.682
P(T<=t) two tail	0.281
t Critical two tail	2.0181
Character Recognition score and Strategy 5B	
Pearson Coefficient of Correlation	-0.2007
t Stat	-1.3274
df	42
P(T<=t) one tail	0.0958
t Critical one tail	1.682
P(T<=t) two tail	0.1916
t Critical two tail	2.0181

Character Recognition Score and Strategy 5C	
Pearson Coefficient of Correlation	-0.2695
t Stat	-1.8135
df	42
P(T<=t) one tail	0.0384*
t Critical one tail	1.682
P(T<=t) two tail	0.0768
t Critical two tail	2.0181
Character Recognition Score and Strategy 5D	
Pearson Coefficient of Correlation	0.02
t Stat	0.1297
df	42
P(T<=t) one tail	0.4487
t Critical one tail	1.682
P(T<=t) two tail	0.8974
t Critical two tail	2.0181
Character Recognition Score and Strategy 5E	
Pearson Coefficient of Correlation	0.4057
t Stat	2.8763
df	42
P(T<=t) one tail	0.0031**
t Critical one tail	1.682
P(T<=t) two tail	0.0062
t Critical two tail	2.0181
Character Recognition Score and Strategy 5F	
Pearson Coefficient of Correlation	0.0389
t Stat	0.2524
df	42
P(T<=t) one tail	0.401
t Critical one tail	1.682
P(T<=t) two tail	0.802
t Critical two tail	2.0181
Character Recognition Score and Strategy 5G	
Pearson Coefficient of Correlation	0.0172
t Stat	0.1117
df	42
P(T<=t) one tail	0.4558
t Critical one tail	1.682
P(T<=t) two tail	0.9116
t Critical two tail	2.0181

Character Recognition Score and Strategy 6A	
Pearson Coefficient of Correlation	0.3039
t Stat	2.0672
df	42
P(T<=t) one tail	0.0225*
t Critical one tail	1.682
P(T<=t) two tail	0.045
t Critical two tail	2.0181
Character Recognition Score and Strategy 6B	
Pearson Coefficient of Correlation	-0.274
t Stat	-1.8464
df	42
P(T<=t) one tail	0.0359*
t Critical one tail	1.682
P(T<=t) two tail	0.0718
t Critical two tail	2.0181
Character Recognition Score and Strategy 6C	
Pearson Coefficient of Correlation	-0.0464
t Stat	-0.301
df	42
P(T<=t) one tail	0.3825
t Critical one tail	1.682
P(T<=t) two tail	0.765
t Critical two tail	2.0181
Character Recognition Score and Strategy 6D	
Pearson Coefficient of Correlation	0.3014
t Stat	2.0486
df	42
P(T<=t) one tail	0.0234*
t Critical one tail	1.682
P(T<=t) two tail	0.0468
t Critical two tail	2.0181
Character Recognition Score and Strategy 6E	
Pearson Coefficient of Correlation	0.0751
t Stat	0.4879
df	42
P(T<=t) one tail	0.3141
t Critical one tail	1.682
P(T<=t) two tail	0.6282
t Critical two tail	2.0181

Character Recognition Score and Strategy 6F	
Pearson Coefficient of Correlation	-0.08
t Stat	-0.5198
df	42
P(T<=t) one tail	0.303
t Critical one tail	1.682
P(T<=t) two tail	0.606
t Critical two tail	2.0181
Character Production Score and Strategy 4A	
Pearson Coefficient of Correlation	0.4587
t Stat	3.345
df	42
P(T<=t) one tail	0.0009**
t Critical one tail	1.682
P(T<=t) two tail	0.0018
t Critical two tail	2.0181
Character Production Score and Strategy 4B	
Pearson Coefficient of Correlation	-0.1358
t Stat	-0.8881
df	42
P(T<=t) one tail	0.1898
t Critical one tail	1.682
P(T<=t) two tail	0.3796
t Critical two tail	2.0181
Character Production Score and Strategy 4C	
Pearson Coefficient of Correlation	-0.0663
t Stat	-0.4309
df	42
P(T<=t) one tail	0.3344
t Critical one tail	1.682
P(T<=t) two tail	0.6688
t Critical two tail	2.0181
Character Production Score and Strategy 4D	
Pearson Coefficient of Correlation	0.1897
t Stat	1.2519
df	42
P(T<=t) one tail	0.1088
t Critical one tail	1.682
P(T<=t) two tail	0.2176
t Critical two tail	2.0181

Character Production Score and Strategy 4E	
Pearson Coefficient of Correlation	0.116
t Stat	0.7571
df	42
P(T<=t) one tail	0.2266
t Critical one tail	1.682
P(T<=t) two tail	0.4532
t Critical two tail	2.0181

Character Production Score and Strategy 5A	
Pearson Coefficient of Correlation	0.1551
t Stat	1.0175
df	42
P(T<=t) one tail	0.1574
t Critical one tail	1.682
P(T<=t) two tail	0.3148
t Critical two tail	2.0181

Character Production Score and Strategy 5B	
Pearson Coefficient of Correlation	-0.1345
t Stat	-0.8799
df	42
P(T<=t) one tail	0.192
t Critical one tail	1.682
P(T<=t) two tail	0.384
t Critical two tail	2.0181

Character Production Score and Strategy 5C	
Pearson Coefficient of Correlation	-0.0588
t Stat	-0.3816
df	42
P(T<=t) one tail	0.3523
t Critical one tail	1.682
P(T<=t) two tail	0.7046
t Critical two tail	2.0181

Character Production Score and Strategy 5D	
Pearson Coefficient of Correlation	-0.0976
t Stat	-0.6355
df	42
P(T<=t) one tail	0.2643
t Critical one tail	1.682
P(T<=t) two tail	0.5286
t Critical two tail	2.0181

Character Production Score and Strategy 5E	
Pearson Coefficient of Correlation	0.0785
t Stat	0.5105
df	42
P(T<=t) one tail	0.3062
t Critical one tail	1.682
P(T<=t) two tail	0.6124
t Critical two tail	2.0181
Character Production Score and Strategy 6A	
Pearson Coefficient of Correlation	0.2976
t Stat	2.0199
df	42
P(T<=t) one tail	0.0249*
t Critical one tail	1.682
P(T<=t) two tail	0.0498
t Critical two tail	2.0181
Character Production Score and Strategy 6B	
Pearson Coefficient of Correlation	-0.0347
t Stat	-0.2251
df	42
P(T<=t) one tail	0.4115
t Critical one tail	1.682
P(T<=t) two tail	0.823
t Critical two tail	2.0181
Character Production Score and Strategy 6C	
Pearson Coefficient of Correlation	-0.1189
t Stat	-0.7758
df	42
P(T<=t) one tail	0.2211
t Critical one tail	1.682
P(T<=t) two tail	0.4422
t Critical two tail	2.0181
Character Production Score and Strategy 6D	
Pearson Coefficient of Correlation	0.1558
t Stat	1.0224
df	42
P(T<=t) one tail	0.1562
t Critical one tail	1.682
P(T<=t) two tail	0.3124
t Critical two tail	2.0181

*p-value< 0.05, **p-value<0.005