Acquisition of Chinese Literacy by Ethnic Minority Children in Hong Kong Primary Schools

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Abstract

This study investigated acquisition of Chinese literacy by ethnic minority children in Hong Kong primary schools. Ninety-seven primary-four ethnic minority students from four schools participated in the study. Their Chinese orthographic awareness and knowledge, Chinese character recognition ability, Chinese listening comprehension and reading comprehension competence were assessed.

The results showed that the students' Chinese language ability is low, especially their literacy skills. There was significant discrepancy between the students' oral and written language competence. Further analyses were conducted in accordance with models derived from the simple view of reading (Gough & Tunmer, 1986), in which reading comprehension is assumed to be the product of decoding and linguistic comprehension. The analyses showed that the language-literacy discrepancy was related to the students' poor decoding ability. The students' reading comprehension performance was related more closely to Chinese character recognition ability than their linguistic comprehension competence. Moreover, the students' Chinese orthographic awareness and knowledge was found to be related to Chinese character recognition. The effect of the former on reading comprehension was mediated through the latter.

The study supports the relevance of the simple view model for understanding learning to read Chinese by second language learners. Studies of reading in alphabetic languages adopting the simple view have shown that the importance of decoding relative to linguistic comprehension depends on the developmental stage and proficiency of the readers, as well as orthographic transparency of the language.

These results are consistent with our finding that for the participants in this study who were in upper primary level learning a deep orthography (i.e., Chinese), decoding accounts for more variance in reading performance than linguistic comprehension. Furthermore, just like understanding of the alphabetic principle helps reading in alphabetic languages, awareness and knowledge of the structural properties of Chinese characters, that is, the componential structures of the orthography and their phonetic and semantic functions, have a facilitative effect on Chinese character recognition and reading performance. Educational implications for the Hong Kong ethnic minority students and for Chinese second language learning were discussed.

摘要

本研究探索香港少數族裔小學生的中文讀寫能力習得情況。研究以九十七名來自四所小學的小四級少數族裔學生爲對象，通過不同的測量工具，以評估他們的漢字文字系統認知能力、認字能力、聆聽能力及閱讀能力。

研究結果顯示，參與研究的少數族裔小學生中文能力偏低，特別是讀寫能力方面。學生的中文口語理解及書面認讀能力有顯著的差距。研究運用「閱讀能力簡易觀」（簡易觀；the simple view of reading）理論模型（Gough & Tunmer, 1986），即將閱讀能力分爲文字解碼與語言理解兩部份，來作進一步分析。分析結果顯示，學生口語理解與書面認讀能力差距，是與他們偏弱的中文認字能力有關。學生的閱讀理解表現與他們中文文字解碼能力（即認字能力）的相關程度，高於與他們語言理解的相關程度。而且，學生的漢字文字系統認知有助他們認讀漢字，並由此影響其閱讀表現。

本研究結果爲在中文作爲第二語言研究上運用簡易觀提供了證據。在拼音字母文字系統的研究中，簡易觀被廣泛運用並得出一個發展趨勢：文字解碼及語言理解能力兩者對於閱讀表現的影響大小，與閱讀能力發展階段、閱讀者的能力及文字系統的透明度有關。這個發展趨勢與本研究結果相吻合：在中文複雜的文字系統影響下，少數族裔學生的文字解碼能力對於閱讀的表現，到了高小階段仍維持頗大影響。除此之外，就像於字母文字系統語言中，讀者對拼音原則的理解有助閱讀一樣，參與研究的學生對漢字文字系統的認知，即對漢

字部件的結構及其辨義標音作用的理解，對他們的認字與閱讀甚有幫助。最後，本研究亦就本港少數族裔學生的中文教育及中文作爲第二語言教育提出建議。

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diagram with four boxes linked up by arrows. She asked me, "Is that your study all about?" I was not sure then. Gradually I realized that, "Yes, that's what it all about." Thanks also go to Prof Law Sam-po for her valuable comments.

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Thanks.

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Chapter 1: Overview and Introduction

1.1 Background

Literacy skill is important for success in schools. Learning in schools involves many literacy tasks, like reading various materials and expressing views and communicating with others through written language. Acquisition of literacy skills, in contrast to acquisition of oral language competence, is effortful and requires formal instruction. In view of this, much research has been conducted to improve reading instructions for children (e.g., National Reading Panel, 2000).

The need for deeper understanding of the literacy acquisition process is even more acute in the field of second language learning. Firstly, variations in the acquisition process and attainment levels of second language learners are much greater than that of native learners. This is partly due to differences in the learners themselves, for example, their native-language background, age at which they begin to learn the target language, and family support for learning. Differences in the learners' oral proficiency in the target language also influence literacy acquisition. The connection and discrepancy of oral language and literacy development has been one of the major research concerns of the field (Aarts & Verhoeven, 1999; Bialystok, 2007; Park, 1996; Verhoeven, 1987).

Secondly, second-language literacy skills are important for immigrant-learners living in an environment where the target language is dominant. The learners' dominant-language literacy competency may have major influences upon their social integration and advancement. In the US, where a rapid increase in the number of language-minority children has been observed since 1970s, it is found that those children's low levels of literacy attainment was related to high school dropout rates,

poor job prospects, and poverty (August & Shanahan, 2008). There is a need for deeper understanding of these learners' literacy skills development and attainment.

This is especially true for the ethnic minority children in Hong Kong who learn Chinese as a second language. Their attainment and proficiency in Chinese language are unsatisfactory, especially in literacy skills. Research on the students is scarce, and the findings showed that they were disappointed with the Chinese language education provided; and among the four skills of language (speaking, listening, reading, and writing), they found the two literacy skills the most difficult (Ku, Chan & Sandhu, 2005). More studies are needed to have a thorough assessment of these students' Chinese language proficiency, and to identify the factors affecting their Chinese literacy acquisition.

The difficulties the Hong Kong ethnic minority students encountered in acquiring Chinese literacy appeared to be related to the unique and complex Chinese writing system. Chinese writing system is morpho-syllabic, which is entirely different from the alphabetic system. The Chinese characters (in Chinese, 漢字), the basic units of the system, are sophistically structured and large in amount. Moreover, the characters' structure and representational relationship with the language are far from transparent. For these reasons, Chinese has long been deemed one of the most difficult foreign languages (Everson, 2002). Researchers have been calling for a more systematic description of the Chinese script, and to exploit this understanding for improving Chinese reading instruction (e.g. Guder, 2007; Kupfer, 2007).

1.2 Purpose of the Study

In view of this, this study sets out to explore the Chinese literacy acquisition of the Hong Kong ethnic minority students, with regard to their oral language

development and character recognition skill. This study addressed three broad research questions:

1. What is the Chinese language and literacy attainment of the students? Is there a discrepancy of Chinese language and literacy development of the primary ethnic minority students?
2. What role does character recognition skill play in the students' Chinese reading comprehension performance? What are the relative contributions of character recognition skill and oral language comprehension competence on reading comprehension performance?
3. What is the relationship between the students' Chinese orthographic awareness and knowledge and their character recognition performance? How do this awareness and knowledge relate to their performance in reading comprehension?

1.3 Overview of Research Questions

1.3.1 The Chinese language and literacy attainment of the ethnic minority students. In this study, the ethnic minority children were primary students of South and Southeast Asian ethnic minority groups, including Filipinos, Indians, Nepalese, and Pakistanis. According to the Hong Kong 2006 population by-census (Census and Statistics Department, 2007), a total of 342,198 ethnic minorities were living in Hong Kong, constituting 5% of the whole population. Among this population, there are about ten thousand children studying in Hong Kong public or subsided schools[1].

These ethnic minority students in Hong Kong found Chinese learning difficult and the acquisition of literacy skills especially challenging. According to a study by Ku et al. (2005), nearly 90% of the ethnic minority students claimed that they did not

[1] According to the 2008 school enrolment statistics, there were about 9,700 non-Chinese speaking students in Hong Kong (Hong Kong Curriculum Development Council, 2008).

know how to read Chinese or thought their reading skills are poor, while only 44.5% of them said that they did not understand the language orally or their listening skills were poor. This is in agreement with the survey results on the Chinese teachers of the ethnic minority students. While only 49% of the Chinese teachers agreed that the ethnic minority students' Chinese listening and speaking skills are poorer than those of the local students, 83% of them agreed that the ethnic minority students' Chinese reading and writing skills are poorer (香港融樂會、香港教育專業人員協會, 2007).

These studies employed either self-report tools (like questionnaire survey) or in-depth interview to assess the students' Chinese language and literacy proficiency. These measuring tools are subjective and lack an objective referencing norm. In order to evaluate the students' Chinese proficiency objectively, this study used standardized tests supported with a proper reference norm to access the students' Chinese abilities. The ethnic minority students' performance is compared to the norm of local students to determine their relative strengths and weaknesses, and to assess if their Chinese proficiency level would meet the demand of daily and school life.

1.3.2 The role of Chinese character recognition skill and oral language proficiency on Chinese literacy attainment. Slow and effortful development in literacy competence was also observed in learners of Chinese as a second language (CSL). Researchers have attributed the difficulty to the uniqueness and complexity of the Chinese writing system (Everson, 1998, 2002). The Chinese writing system, with the Chinese characters as the basic units, is morpho-syllabic (DeFrancis, 2002) and different entirely from the alphabetic systems. The complexity of the writing system has been such a hurdle for non-native learners that Chinese has long been considered

one of the most challenging foreign languages (Everson, 1998, 2002; Shen, 2005; Xing, 2006).

From the review of Kupfer (2007) on studies of CSL learning, it was showed that CSL learners could make hardly any progress in literacy skills even after having intensive language study in China and gaining substantial improvement in oral communication skills. For those who had achieved higher-level literacy proficiency, their attainment was only at best satisfactory. Their reading speed was only 54% to 68% as that of Chinese grades 5 or 6 students. Facing this difficulty , many CSL learners had simply stopped learning how to read and write in Chinese (李潤新、彭俊, 2006).

In order to explore the discrepancy in language and literacy development and to identify the role of character recognition in Chinese reading, this study employs the simple view of reading proposed by Gough and Tunmer (1986). The model divides the complexity of reading into two components: decoding and linguistic comprehension, and expresses reading as the product of the two components. Decoding[2] refers to efficient word recognition, which is the ability to access efficiently the appropriate entry in the mental lexicon through print. Linguistic comprehension is the ability to draw on the lexical information to derive interpretations for sentence and discourse, which is a unitary process involved in both reading and listening comprehension (see also Hoover & Gough, 1990).

This model has been widely adopted and supported by reading researches on primary-school children's reading development (Hoover & Gough, 1990; Joshi &

[2] Decoding is sometimes taken as "phonological decoding": the extraction of phonological information from the graphical display, for which the act of lexical access may happen at the same time or as a consequent event. Further deliberations about the terms will be given later. For the sake of clarity, this study will make a distinction of the two terms decoding and phonological decoding, with the former refers to word recognition and the later to the act of phonological information extraction only.

Aaron, 2000), on adolescent to adult readers (Bell & Perfetti, 1994; Braze, Tabor, Shankweiler & Mencl, 2007; Savage, 2001), on children with specific reading comprehension deficits (Adlof, Catts, & Little, 2006; Catts, Adlof & Weismer 2006; Catts & Hogan, 2003), on children with European languages other than English as first language (Aro & Wimmer, 2003; Goswami, Gombert & Berrera, 1998; Megherbi, Seigneuric & Ehrlich, 2006; Verhoeven & van Leeuwe, 2008), and on second-language young learners (Proctor, Carlo, August, & Snow, 2005; Gottardo & Mueller, 2009).

The model provides a parsimonious and useful framework for understanding reading development and identifying reading difficulties. By adopting the simple view, the reading proficiency of the ethnic minority students could be assessed from a componential perspective. This would help to identify the discrepancy of language and literacy development through comparison. Moreover, the contributions of character recognition and comprehension skill on reading performance would be evaluated. The students' Chinese ability would thus be evaluated more comprehensively.

1.3.3 The role of Chinese orthographic awareness and knowledge.

Decoding ability is related to orthographic awareness and knowledge of a particular writing system. This kind of knowledge helps to develop high-quality lexical representations required for efficient word recognition (Perfetti, 1986, 1991, 1992; Perfetti & Hart, 2001). In alphabetic languages like English, the readers' knowledge of the alphabetic principle (the "Grapheme-to-Phoneme Correspondence (GPC) rules) was found to be related to "self-teaching" – a process of orthographic learning that happens at each successful decoding (Jorn & Share, 1993; Share & Jorn, 1987). The

acquired orthographic knowledge or representation facilitates sight-word reading (e.g., Ehri, 1998) and is important for literacy acquisition in both first-language (e.g., McGuinness, 2004) and second-language (e.g., Koda, 2005) learners.

The orthographic awareness and knowledge required for efficient decoding in Chinese is different (Ho, Yau & Au, 2003; Shen, 2005; Shen & Ke, 2007; Li, 2007). Each Chinese character is a two-dimensional, visual-spatial unit that stands for a syllable and functions as a morpheme referring to some meanings (Cheung, McBride-Chang & Chow, 2006). Structural properties of character can be divided into outer and inner type (Li, 2007; 蘇培成, 2000). Outer structural properties (in Chinese: 外部結構) refer to the graphical-structural components and their spatial relationships. Inner structural properties (in Chinese: 內部結構) refer to the components' representational relationships with the pronunciations and meanings of the language.

These structural properties could be illustrated by an example of the compound character "晴" (cing4, sunny)[3]. "晴"consists of two components: "日" (jat6, sun) and "青" (cing1, green). The component "日" indicates the meaning of the character (i.e., sun – sunny) and the component "青" cues the sound (i.e., cing4 – cing1). The two components and their left-right structural relationship are outer structure properties. Their respective cueing functionalities for sound and meaning are inner structural properties. Studies have found that readers' awareness and knowledge of these structural properties of the Chinese characters were related to their Chinese reading performance (Cheung et al., 2006; Ho, Ng, & Ng, 2003; Liu,

[3] Unless otherwise stated, all the characters shown in this study are given their Cantonese pronunciation in Romanization and their English meaning in blanket. The Romanization and English meaning have made referenced to the *Lexical items with English explanations for fundamental Chinese learning in Hong Kong schools* issued by Chinese Language Education Section, Curriculum Development Institute, Educations (2008) issued on web: http://www.edbchinese.hk/lexlist_en.

Perfetti, & Wang, 2006; Perfetti, Liu, & Tan, 2005; Pine, Huang & Huang, 2003; Shen & Ke, 2007; Shu & Anderson, 1999).

This study assessed the ethnic minority primary students' Chinese orthographic awareness and knowledge and explored its relationship with the students' reading performance.

1.4 Significance and Contributions of the study

The findings of this study would make contributions to the understanding of literacy acquisition process in CSL learners, especially for the ethnic minority students in Hong Kong. First of all, the study would evaluate the Chinese proficiency of the ethnic minority students objectively by using standardized tests. The norm of Hong Kong primary students provided by the standardized tests supports an objective evaluation of the students' Chinese ability in the local context.

Moreover, as stated above, researchers are interested in the impact of the Chinese writing system on the literacy acquisition process. Studies have been conducted to investigate the literacy acquisition of the Chinese native-speaking children (e.g., Chen & Kao, 2002; Ho, Ng, & Ng, 2003; McBride-Chang, 2004) and that of the CSL adult learners (e.g., Wang, Liu & Perfetti, 2004; Shen & Ke, 2007). This study would make further contributions by studying the primary school ethnic minority students' Chinese literacy acquisition process. The language and literacy development of these students were compared, and the role of character recognition in literacy development was explored. Moreover, the importance of Chinese orthographic awareness and knowledge in these students' Chinese character recognition and reading performance was investigated. The findings of this study

would thus promote a deeper understanding of the Chinese literacy acquisition process.

Furthermore, the study explored the validity of the simple view for Chinese second language literacy development. The simple view model could provide a parsimonious framework for further studies in the field. The model would be adopted for developmental study to track the changing relative contributions of decoding and oral language proficiency on reading comprehension. Moreover, relevant constructs could be added to the model for a more thorough understanding of reading. For example, the role of linguistic awareness could be investigated at the decoding level, and that of vocabulary and syntactic knowledge could be investigated at the linguistic comprehension level.

From a practical point of view, the findings of this study would help to promote understanding of the Chinese learning process of the Hong Kong ethnic minority children and to develop proper Chinese instructional methods and materials for them. There has been a rising concern for the low Chinese language proficiency of these students and the educational and social implications of this problem. Language barrier may be one of the major problems for the students' social integration. By exploring the process of the students' Chinese language and literacy learning, the findings of this study would facilitate the development of instructional methods and materials.

Chapter 2: Review of Literature

2.1 Overview

In this chapter, studies on the Hong Kong ethnic minority students will first be reviewed to explore their Chinese language and literacy proficiency level. As the Chinese literacy development of the ethnic minority students is related to the Chinese writing system, a review of the system and studies about its specific structural properties will follow. Then, the studies on decoding and reading comprehension process will first be examined in order to identify the various sub-processes involved and the importance of decoding for reading. The simple view of reading that categorizes these sub-processes into two major components, namely decoding and linguistic comprehension, will then introduced as a framework for this study. Studies that adopted the simple view will be reviewed. These studies have suggested a developmental trend of reading and identified factors influencing this development.

Studies on the role of decoding in the simple view will then be examined with a view to explore the relationship between decoding and orthographic awareness and knowledge. This review will end with discussion on the studies about the Chinese character recognition process and its relationship with the readers' knowledge of the Chinese orthography.

2.2 The Chinese Language and Literacy Proficiency of the Hong Kong Minority Students

Researches on the ethnic minority students showed that their Chinese proficiency was low, especially in the area of reading and writing. Moreover, the low proficiency was related to the insufficiency and low quality of the Chinese classes

(Ku et al., 2005; Loper, 2004). The minority students in Loper's (2004) study pointed out that their Chinese level was too low to cope with learning in Chinese in the local mainstream schools. At the same time, they found that the Chinese classes provided were far from sufficient to raise their Chinese proficiency to an appropriate standard. These Chinese classes were too basic and ineffective, or provided at the wrong level of the students' skills and needs. The language taught in these classes was not useful for living in Hong Kong and the topics were overly simple and outdated. The researchers found the students' Chinese literacy skills severely underdeveloped: while some of the students could speak fluent Cantonese, none could read or write Chinese.

Ku et al. (2005)'s study also revealed that the senior secondary ethnic minority students faced difficulties in learning Chinese. The research completed 200 questionnaires and 20 in-depth interviews. From the survey results, there were 58.5% students who thought they were fair or poor in speaking Cantonese and 52% who thought their listening skills in Cantonese were fair or poor. As for their literacy skills, only 3% and 3.5% thought they were good or very good in reading and writing respectively. A majority of them (about 90%) claimed that they did not know how to read or write Chinese or thought that their literacy skills were poor. The interviewers were aware of the low Chinese ability of the students during interviews. While all the twenty interviewees managed to speak or understand spoken Chinese, only two of them could read and write Chinese.

The study also showed that the Chinese classes provided for the students were considered insufficient or inappropriate. While 78% of the students liked or would like to learn Chinese in school, the rest of them disliked it mainly because of the difficulty in learning the language. For those who had received Chinese language

education, a majority of them thought that was not enough. The student-interviewees also expressed that the Chinese classes in their schools were too simple and loose.

The low Chinese standard of the ethnic minority students and their problems in learning Chinese were also observed by their parents and teachers. 76.6% of the Nepalese parents stated that their children faced tremendous problems in learning the Chinese language. 27.7% of the respondents stated that they could not help their children with homework, and 21.2% reported that there was a lack of tutorial support (Society for Community Organization, 2004). In addition to this, a survey conducted on the Chinese teachers of the ethnic minority students found that the major deficiency of the Chinese abilities of the ethnic minority students was in the literacy area (香港融樂會、香港教育專業人員協會, 2007). While only 49% of the Chinese teachers agreed that the ethnic minority students' Chinese listening and speaking skills were poorer than that of the local students, 83% of them agreed that the ethnic minority students' Chinese reading and writing skills were poorer. The estimation of these teachers about the ethnic minority students' Chinese literacy skills was much lower than the students' oral skills.

In sum, the Chinese proficiency of the ethnic minority students was perceived low by themselves, their parents and teachers. Moreover, a discrepancy between Chinese language and literacy skills was observed with the latter developed in a slower rate. As stated previously, this language-and-literacy disparity in attainment and development was also observed among CSL learners and may be related to the Chinese writing system. The following section reviews studies on the Chinese writing system's structural properties.

2.3 The Chinese Writing System and its Structural Properties

The Chinese writing system is morpho-syllabic (DeFrancis, 2002). As the basic graphic units of the system, each Chinese characters is a two-dimensional, visual-spatial unit that stands for a syllable and functions as a morpheme referring to some meanings (Cheung et al., 2006). The Chinese text displays characters separated by equal spacing. Most of the characters are themselves words, but the majority kind of words in modern Chinese is made up of two characters (Perfetti & Tan, 1999). As the basic written unit in Chinese is the character, this study would take it as the object of decoding in Chinese reading comprehension.

The number of Chinese characters currently in use is around 7,000, while about half of them are frequently used in everyday and educational settings (蘇培成, 2001;張田若、陳良璜、李衛民, 2000). These 3,500 characters were presented in the *List of Frequently-Used Chinese Characters* (in Chinese: 現代漢語常用字表), which was issued jointly by the National Language and Literacy Working Committee of China and the National Education Committee of China in 1988 (蘇培成, 2001).

The structure of the Chinese character can be analysed according to the character formation perspective or the current structural-analytic perspective (張斌, 2002). The character formation perspective usually categorizes the characters into six types (in Chinese, it is called "Six Writings" 六書). Only four of the six types refer to the structural composition of the characters: (1) Pictograms (in Chinese: 象形) represent the objects' graphical depiction they denote; (2) Ideograms (in Chinese: 指事) represent meaning through self-standing abstract symbols or by adding the symbols on the Pictograms; (3) Ideogrammic compounds (in Chinese: 會意) form a new character by combining the existing Pictograms or Ideograms; (4) Ideo-phonetic

compounds (in Chinese: 形聲) form a new character by combining a semantic component to cue its meaning and a phonetic radical to cue its pronunciation (張斌, 2002).

This kind of etymological classifications may not be applicable to modern Chinese characters after development of thousands of years. Hence, the current-analytic perspective takes the modern characters as objects and divides the structural properties of the Chinese character into outer and inner type (Li, 2007; 蘇培成, 2000). The inner type refers to the graphical-structural components and their relationships, and the outer type refers to the representational relationships between these components with the pronunciations and meanings of the language.

2.3.1 The outer structure of Chinese character. According to Li (2007) and 蘇培成 (2000), the outer graphic structure of Chinese characters consists of two facets: the structural components and the spatial relationships of these components. The structural components include strokes and radicals. There are different types of strokes (according to Taylor and Taylor (1995), the number is estimated to be between 8 and 30) and the clusters of which form radicals, which acts as constituent units of Chinese characters. According to the number of constituting radicals, Chinese characters can be classified as simple characters (consists of only one radical; in Chinese: 獨體字) and compound characters (consists of more than one radicals; in Chinese: 合體字).

Among the 7,000 currently-used characters, about 4% are simple characters and the remaining 96% are compound (蘇培成, 2001). Radicals could be of character-type (radicals which could stand alone as characters) or non-character-type

(radicals which are not characters). According to one statistics, there are a total of 567 radicals for all Chinese characters (蘇培成, 2001).

As for the majority compound characters, different spatial-positional relationships among the radicals generate various structural types of characters. Generally speaking, the Chinese characters could be classified into three types: the left-right structure, the top-bottom structure, and the enclosure structure (which could be further divided into half-enclosure and full-enclosure). About 60% of compound characters are of left-right structure, while about 20% are of top-bottom structure (胡裕樹, 1992).

2.3.2 The inner structure of Chinese character. The inner structure of the Chinese characters refers to their representational relationships with the sounds and meanings of the language. For the simple characters, these structural properties refer to the syllables they represent and the meanings they stand for. For the majority compound characters, about 80% to 90% of them are ideo-phonetic compounds (形聲字) (Cheung et al., 2006; Tzeng, 2002; 李燕、康加深, 1993; 胡裕樹, 1992; 康加深, 1993). As stated above, the ideo-phonetic compounds compose of two components: a semantic radical cueing its meaning and a phonetic radical hinting at its pronunciation. These kinds of sound and meaning representations are the inner structural properties of the characters

Different statistics have different estimations for the amount of ideo-phonetic, and the number varies from about 80% to 90% of modern Chinese characters (Cheung et al., 2006; Tzeng, 2002; 胡裕樹, 1992). By etymological and orthographical analysis, 康加深 (1993) and 李燕、康加深 (1993) examined all the 7,000 currently-

used characters and classified 5,631 (80.5%) of them as ideo-phonetic. For these ideo-phonetic compounds, they have identified 246 semantic radicals and 1,325 phonetic radicals. Moreover, they also found that the positions of the semantic and phonetic radicals are quite stable: nearly 70% of the compounds are of left-semantic and right-phonetic structure (e.g., "晴").

However, it should be noted that both semantic and phonetic information conveyed in an ideo-phonetic compound are not very reliable. In other words, the validity of the semantic and phonetic radicals is not high. The semantic radicals only indicate the semantic category the compound characters belong to. For example, the characters "河" (ho4, river), "湖" (wu4, lake), and "海" (hoi2, sea) all share the same left-sided semantic radical " 氵 ", which is a variant radical-form of the character "水" (seoi2, water), indicating that the meaning of these characters are related to some aquatic natural phenomena.

The validity of the phonetic radicals is not very high either. Chinese is a language with mono-syllabic structure. Each syllable consists of onset (in Chinese: 聲母), rime (in Chinese: 韻母), and tone (in Chinese: 聲調). 康加深 (1993) and 李燕、康加深 (1993) reckoned that only 38% of ideo-phonetic compounds have phonetic radicals of identical sound (that is, the same onset, rime, and tone), 18% of them have phonetic radicals of similar sound (that is, the same onset and rime but different tone), and 13% of them have phonetic radicals of totally different sound (that is, different onset, rime, and tone). The sound-cuing function of most phonetic radicals is not reliable.

It should be noted that not all radicals of a compound character have either sound or meaning cueing functions. Some radicals serve as perceptual units for the characters and play a visual role only. Shen and Ke (2007) referred to this kind of

radicals as perceptual radicals. Moreover, many compound characters have a multi-layers composition. These compound characters can be decomposed into different layers consisting of radicals of different level of 'complexity'. These complex constituent radicals may be further analyzed into constituent radicals. For example, the character "照" (ziu3, to lighten) can be decomposed into three layers as shown in table 1 (王寧, 1996).

Table 1

Layers of Formations for Chinese Compound Characters

Layer	Compound Character	Radical
1	照 (ziu3, to lighten)	"昭" (clear) as phonetic radical; and "火" (fo2, fire) as semantic radical
2	昭 (clear)	"召" (ziu6, to convene) as phonetic radical; and "日" (jat6, sun) as semantic radical
3	召 (to summon)	"刀" (dou1, knife) as phonetic radical; and "口" (hau2, mouth) as semantic radical

Normally, the linguistic information of the characters is conveyed only by the immediate consistent radicals and not by the radicals of lower layers. For example, neither the meaning or pronunciation of the radicals "刀" or "口" at the third layer are related to the compound character "照".

Structural properties of a writing system have a determinable effect upon the reading process, especially at the stage of decoding whereas the linguistic information is extracted from the print for further processing and interpretations (Cook & Bassetti,

2005). The following sections review studies on the reading comprehension with regard to the role of decoding.

2.4 Decoding and Reading Comprehension

Reading is a complex cognitive activity involving the operations of various information-processing skills (Grabe, 1999; Kintsch, 1998; Koda, 2005; Perfetti, 1994; Sinatra & Royer, 1993). Text reading begins with recognition of individual words. Word recognition, or decoding, is followed by comprehension of sentence, and the extracted information is integrated gradually in the text-base level. Finally, the readers' prior knowledge is integrated with this text model to form a mental model of the what-about of the text. The major relevant sub-processes identified by research (Alderson, 2000; Grabe & Stoller, 2002; Koda, 2005) will be introduced in the following.

Decoding is the process of extracting lexical information, including semantic and phonological information, from the graphic displays of a language. In this perspective, decoding is equivalent to the term 'word recognition' and is not only for retrieving a phonological code, a sense adopted by some researchers. To be more specific, decoding is the cognitive activity in which all the constituent properties of an orthographic unit, including orthographic, phonological, and semantic information, are identified and made available during reading (Adams, 1994; Perfetti & Tan, 1998; Perfetti & Tan, 1999) In terms of cognitive processing, word identification begins with the graphic form, follows by activation and accumulation of all the corresponding mental representations in overlapping time courses, and ends with the identification of a corresponding word-object.

Efficient decoding is important for reading comprehension. Skilled readers are usually good decoders: they recognise words swiftly and accurately when reading through the text (Rayner & Pollatsek, 1987; Wagner, Torgesen & Rashotte, 1994). On the other hand, poor readers were found having difficulty in decoding the print and this deficiency is related to poor comprehension (Perfetti, 1985; Stanovich, 1988). The importance of word recognition could be accounted for by the following reasons. Firstly, the extracted information from each graphic unit is important building block for the establishment of a proper mental model for the overall text. Secondly, efficient decoding would help to free up mental resources for other cognitive activities involved in reading (Adam, 1994; Koda, 2005).

Syntactic parsing is the process by which the extracted lexical information is acuminated and integrated to reflect meaning of a given word strings and support clause-level meaning (Grabe & Stoller, 2002; Koda, 2005). The process includes identifying phrases structure, assigning case roles to the structure, and recognizing subordinate and super-ordinate relations among clauses. The word meanings and structural information are then combined into basic clause-level meaning units. Sentence by sentence, the extracted meanings are aggregated and supplemented by inferences to make the text coherent. Studies have found that readers of low decoding ability have bigger problems in understanding passages of complex grammatical structure, and this may be related to the excessive demands brought on working memory (Crain & Shankweiler, 1988; Mann, Shankweiler, & Smith, 1984).

Discourse processes for text model building are critical for the comprehension of the what-about of the passage. Mental model theories, like those proposed by Johnson-Laird (1983), Kintsch and others (Kintsch, 1998; van Dijk & Kintsch, 1983), and Zwaan (1993), maintain that comprehension is a process of mental model

building using both the text-based information and the readers' knowledge. Different levels of mental representation of the text would be established to make sense of the text.

van Dijk & Kintsch's (1983) distinction of three mental representation levels has been widely adopted by researchers (Graesser, Millis & Zwaan, 1997): the surface code, the text-base, and the situation model. The surface code representation is about the exact wording and syntactic arrangement of the text. The reader extracts proposition units (i.e., meaning of the text) from the surface code, and the text-base representation is formed by incorporating the propositional units into a network. The situation model is a mental representation of the state of affairs described in the text, which is formed by combining the text representation with knowledge-driven inferences provided by the reader (Kintsch, 1998).

Inference generation is the core cognitive activity for this mental model building process, and this is affected by the readers' working-memory capacity and background knowledge (Grabe & Stoller, 2002; Hannon & Daneman, 2001; Koda, 2005). Studies have found that differences in working-memory capacity were related with inference-generalization performance (Carpenter, Miyake & Just, 1994; Daneman & Carpenter, 1980). The readers' domain knowledge of the text's content, which helps interpreting and integrating the text information for mental model building, was also found to be related to comprehension performance (Kintsch, 1994, 1998).

Other than background knowledge, vocabulary knowledge is also heavily correlated with reading comprehension. The size and depth of vocabulary knowledge has been found consistently related to measures of reading comprehension. It is often the single best predictor of text comprehension (Alderson, 2000). However, though

the connection of vocabulary knowledge and reading has long been recognized, the relationship is highly reciprocal in nature that more research is needed to determine if vocabulary is the cause for reading performance (Koda, 2005).

Researchers have proposed different reading models and conducted studies to give an account of the contributions and interactions of the above-stated processes for reading. These models can be classified as bottom-up, top-down, or interactive (Grabe & Stoller, 2002; Rayner & Pollatsek, 1989). The bottom-up models suggest that reading is a serial process which depends heavily on efficient lower-level cognitive activities. The top-down models, on the other hand, emphasize the controlling effects directed by higher-level cognitive activities for meaning construction in reading. As the strong view of both models could not accurately account for empirical studies' findings, the interactive models assuming the importance of both levels of cognitive activities have grown in popularity. The interactive models proposed that cognitive processes at all levels are interactively activated for text comprehension (Grabe, 1988; Verhoeven, & Perfetti, 2008).

Although these models are different in their views on the activation sequences of and interactions among the sub-processes, they have all adopted a componential view of reading. Different models and frameworks of reading have still been proposed to account for the relative importance of the sub-processes (e.g., Cormley & Azevedo, 2007; Verhoeven & van Leeuwe, 2008). Taking a different perspective, Gough and Tunmer (1986) proposed that these processes could be classified into two major groups: one group is comprehension processes that are involved not only during comprehension of written language but also that of oral language. These processes include syntactic parsing, discourse processing, use of background knowledge for inference generation and so forth. The other is decoding, which is visual-code related

and thus is reading-specific. This simple view of reading is introduced in the following section.

2.5 The Simple View of Reading

2.5.1 The validity of the simple view. Gough and Tunmer (1986) proposed the simple view of reading with an aim to clarify the role of decoding in reading and reading disability. The simple view postulates that reading (R) equals the product of decoding (D) and linguistic comprehension (L)[4], or $R = D \times L$. Decoding refers to efficient word recognition, which in turn, depends fundamentally on knowledge of letter-sound correspondence. Linguistic comprehension refers to the interpretation process of sentence and discourse upon the lexical information extracted by decoding. This interpretation process includes all the above-mentioned cognitive processes involved in reading comprehension except decoding, for example, syntactic processing and inference processing. All these processes, as Gough and Tunmer stated, are also involved in comprehension of the spoken language. In contrast, decoding, the ability of extracting information from print, is a skill that belongs exclusively to reading.

The simple view was well supported by empirical evidences. In a reappraisal of the model, Kirby and Savage (2008) listed out four sources of evidence in support of the simple view. Firstly, the relationship between both decoding and linguistic comprehension with reading was supported by studies of individual differences in reading performance (e.g., Carr & Levy, 1990; Carver, 1997; Nation & Snowling, 1997, 1998). Secondly, the disjunction of the decoding and reading comprehension

[4] Gough and Tunmer (1986) originally denoted linguistic comprehension simply as C; however, this denotation was not kept in the following empirical studies conducted by Hoover and Gough (1990), whereas the linguistic comprehension term was denoted as L. Henceforth, following studies adopted or referenced to the simple view have used different denotations for the linguistic comprehension term. For the sake of clarity, this study keeps with the denotation L.

skills was supported by the existence of large amount of good decoders with poor comprehension on the one hand, and poor decoders with good comprehension on the other (e.g., Catts et al., 2006; Nation & Snowling, 1997, 1998). Thirdly, the simple view model could account for a substantial variance in reading performance (e.g., Catts et al., 2006; Johnston and Kirby, 2006; Tunmer and Hoover, 1992). Lastly, the distinctiveness of decoding and linguistic comprehension skills is gaining support from studies of distinct genetic and environmental influence on the two kinds of task (e.g., Keenan, Betjemann, Wadsworth, Defries, and Olson, 2006).

Theoretically, the simple view has provided a parsimonious framework for understanding the broad and complex landscape of reading and its development (Kirby & Savage, 2008). It is compatible with recent models proposed by researchers like Kintsch (1998), Just and Carpenter (1987), Stanovich (2000), and Plaut, McClelland, Seidenberg and Patterson (1996) (Grabe & Stoller, 2002; Verhoeven & Perfetti, 2008), and is referenced by other theoretical frameworks of reading (e.g., Perfetti, Landi & Okhill, 2005). The simple view has recently been adopted as the theoretical basis of national literacy initiatives in the UK (Rose, 2006). From an educational perspective, the simple view also proves to be a useful tool to identify reading difficulties (Roberts & Scott, 2006) and to direct the locus of these difficulties for educators (Catts & Hogan, 2003; Savage, 2001).

The simple view has long been adopted as a framework for research in reading. These studies had been conducted on different populations with different research foci. Though the core framework has been kept, the operationalizations of the model have undergone some modifications across studies both in terms of the assumed relationships among the components and the measuring tools. Some major studies that adopted the simple view model (hereafter referred to as "simple-view studies")

are selected and some of their findings are summarized in table 2. The studies are selected with an aim to illustrate the validity of the simple view for reading research and the differences of the studies over: (a) the selection of the participants; (b) the use of measuring tools for the components, and (c) the depiction of the relationship between decoding and linguistic comprehension with regard to reading. Only parts of the findings of these studies are reported in the table, and other simple-view studies will be discussed in the following sections.

Table 2

Summary of Selective Researches Adopted the Simple View of Reading

Research	Participants	Measuring Tools for *D*, *L*, and *R* [a]	Relationship between *D*, *L*, and *R* [b]	Variance of *R* explained by *D* and *L*	Strength of Relationship between *D* and *L* with *R* [c]
Hoover & Gough (1990)	English-Spanish bilingual children from grades 1 to 4	*D*: PWR *L*: SLCT *R*: SRCT	$R = D + L + D \times L$	Grade 1: 73.2% Grade 2: 74.8% Grade 3: 84.9% Grade 4: 89.9%	Grade 1: *D*: 0.84; *L*: 0.46 Grade 2: *D*: 0.80; *L*: 0.71 Grade 3: *D*: 0.75; *L*: 0.80 Grade 4: *D*: 0.84; *L*: 0.87 (zero-order correlation coefficients)
Johnston & Kirby (2006)	English-speaking children from grades 3 to 5	*D*: PWR & RWR *L*: SLCT *R*: SRCTt	$R = D \times L$	Grade 3: 66.4% / 72.7% Grade 4: 54.9% / 62.3% Grade 5: 59.3% / 66.9% (When *D* was measured by PWR / RWR)	Not specified
Dreyer & Katz (1992)	Monolingual English-speaking children from grade 3	*D*: RWR *L*: SLCT *R*: SRCT	$R = D + L$	Grade 3: 43.9% Grade 5: 46.9%	Grade 3: *D*: 0.62; *L*: 0.38 Grade 5: *D*: 0.62; *L*: 0.46 (zero-order correlation coefficients)
Catts, Hogan,	English-speaking	*D*: Combination	$R = D + L + D \times L$	Grade 2: 76.6%	Grade 2: *D*: 27%; *L*: 9%

& Adlof (2005)	children from grades 2, 4, and 8	of RWR & PWR *L*: SOVT & SLCT *R*: SRCT		Grade 4: 71.8% Grade 8: 72.8%	Grade 4: *D*: 13%; *L*: 21% Grade 8: *D*: 2%; *L*: 38% (unique contributions from *D* / *L* upon *R*)
Megherbi et al. (2006)	French-speaking children from grades 1 and 2	*D*: PWR *L*: SLCT *R*: SRCT	$R = D + L$	Grade 1: 56% Grade 2: 52%	Grade 1: *D*: 17%; *L*: 29% Grade 2: *D*: 8%; *L*: 36% (unique contributions from *D* / *L* upon *R*)

a. Measuring tools for decoding (*D*), listening comprehension (*L*), and reading (*R*): Pseudo-word Reading (PWR); Real-word Reading (RWR); Standardized Listening Comprehension Test (SLCT), Standardized Oral Vocabulary Test (SOVT), Standardized Reading Comprehension Test (SRCT)

b. Formula expressions shown in the column indicates the relationship between the dependant variable *R* with the independent variables *D* and *L*, and the relationship between the independent variables *D* and *L*. $R = D + L$ indicates *R* as predicted by the additive combinations of *D* and L; $R = D \times L$ indicates *R* as predicted by the multiplicative combinations of *D* and *L*; $R = D + L + D \times L$ indicates *R* as predicted by the additive combinations of *D* and *L*, plus their multiplicative combination.

c. The reported number would be zero-order correlations between *R* and *D* / *R* and *L*, or the unique *R* variance explained by *D* or *L*.

As shown in table 2, the simple view model did explain a substantial amount of reading performance variance, from 43.9% up to 89.9%, across a wide range of populations. However, there were still different views about how to depict the nature of interactions between decoding and linguistic comprehension abilities. Originally, Gough and Tunmer (1986) proposed a multiplicative relationship as they believed this model captures the relationship of necessity coupled with non-sufficiency: when either decoding ability or linguistic comprehension is zero, reading comprehension would be zero.

Nevertheless, empirical findings did not support this theoretical relationship unambiguously. For example, findings of Hoover and Gough's (1990) study, which was the first empirical attempt to validate the simple view, failed to support the superiority of the multiplicative notion. Although the multiplicative term of D and L (i.e., $D \times L$) was found to account for a significant additional variance over and beyond the effect of the additive term (i.e., $D + L$), the reverse was also found to be true (i.e., the additive term could obtain a significant additional variance over and beyond the effect of the multiplicative term). In view of this, Hoover and Gough conceded that the findings suggested a model including both notions as predictors, as shown in table 2 as $R = D + L + D \times L$, which accounted for the largest variance in R.

Moreover, Dreyer and Katz (1992) (as also shown in table 2), in an attempt to examine the applicability of the model on monolingual English-speaking children (as contrasted to the bilingual population as in Hoover and Gough (1990)), concluded that the additive model predicts reading comprehension as well as the multiplicative one. Their results showed that inclusion of the product term after the linear combinations of decoding and linguistic comprehension explained no significant additional variance in reading.

The findings of Chen and Velleutina (1997) were consistent with that of Dreyer and Kartz (1992). Their results showed that the additive combination of decoding and linguistic comprehension accounted for substantial variance in reading performance (58.8%, 60.7%, 65%, and 55.1% for grades 2, 3, 6, and 7 students, respectively). Inclusion of the product term $D \times L$ could not add significant unique variance.

Some simple-view studies found that the additive and the multiplicative model accounted for similar amount of variance in reading. For example, in Joshi and Aaron's (2000) study, the additive model accounted for 46% and the multiplicative model 48%. This similarity was also found in Georgiou, Das, and Hayward's (2009) study: the additive accounted for 47% and the multiplicative 45%. Neither model did account for unique variance in R once the effects of the other were controlled. Georgiou et al. conceded that the two models have equal explanatory power in reading comprehension. The nature of the interactions between decoding and linguistic comprehension has remained an area of concern for simple-view studies.

To the best knowledge of the author, the simple view has not been adopted in CSL studies. Hence, this study first validates the relevance of the model for reading research in this area. The issue of the nature of the interaction between decoding and linguistic comprehension with regard to reading was one of the foci. The explanatory power of the additive and multiplicative models would be explored.

2.5.2 Developmental changes implicated in the simple view. The findings from simple-view studies suggested that the relative importance of decoding and linguistic comprehension to reading changes across developmental stages. At the stage of learning to read, the readers' decoding ability has greater influence. Then,

the influence of linguistic comprehension increases gradually. By the time the readers attained fluent and automatic decoding ability, the variance of reading would mainly be accounted for by linguistic comprehension.

From a language development perspective, decoding is usually the more important factor for reading performance in the emergent literacy stage. Beginning readers are normally fluent language users who have already acquired a good knowledge of vocabulary and grammar structure to express themselves fluently through speaking (Hoff, 2005; McLaughlin, 1998). What the beginning readers have to learn is the way their language is encoded by the writing system (Perfetti & Dunlap, 2007). Hence, decoding skill determines dominantly the variation of their reading performance at this stage. By the time decoding ability has matured into an automatic state, a ceiling effect on its influence emerges and the variation of comprehension performance is mainly accounted for by linguistic comprehension abilities.

This developmental pattern predicted by the simple view was shown by Gough, Hoover, and Peterson's (1996) meta-analysis of 10 reading studies. These studies covered students from first-grade to college level. The pooled correlations between decoding and reading comprehension decreased across the grades, but that between listening and reading comprehension increased over the time span. The relationship between language and literacy comprehension competency had become closer across grade levels.

The developmental trend was also supported by findings of simple-view studies. Chen and Vellutino (1997) observed that the correlations between *R* and *D* decreased with increase in grade level while that between *R* and *LC* increased. They pointed out that participants of higher grades level (grades six and eight) had acquired a high degree of fluency in decoding; Hence the primary determinant of reading

comprehension shifted to linguistic comprehension. Catts et al. (2005) (as shown in table 2) also found that the amount of unique variance in reading accounted for by decoding and linguistic respectively changed across grade levels. That of linguistic comprehension increased from 9% at grade 2, to 21% at grade 3, and to 36% at grade 8; while that of decoding decreased from 27% at grade 2, to 13% at grade 3, and to only 2% at grade 8.

These findings suggested that grade-three, which is the transition from junior to senior primary, may mark the stage at which the influence of decoding decreases relatively to linguistic comprehension. Results of other simple-view studies also seem to suggest this course of change. For example, in Neuhaus, Roldan, Boulware-Gooden, and Swank's (2006) study, the grade-three students' linguistic comprehension accounted for more variance in reading than decoding. The *F*-value yield by decoding was 6.38 ($F(1,85)$, $p=.013$) and that by linguistic comprehension was 33.68 ($F(1,85)$, $p=.001$).

In sum, simple-view studies depicted a developmental trend of reading comprehension, in which the contribution of decoding decreases and that of linguistic comprehension increases with increase of grade. Though it is hard to set a 'cut-off' grade based on the findings of these studies, it seems that the transition from junior primary (grades one to three) to senior primary (grades four to six) may mark the shift of primary contributions from decoding to linguistic comprehension. However, this shift of contributions seems to be under the influence of two factors, the orthographic characteristics of the writing system and the readers' ability, as will be shown in the following sections.

2.5.3 Influence of the orthographic characteristics on the developmental changes implicated in the simple view. The simple view has also been successfully adopted by studies on European languages other than English. Decoding and linguistic comprehension were found to account for significant reading variance in French children (56% and 52% of variance in grade-one and grade-two respectively as reported by Megherbi et al. (2006)), in Dutch children (30% in grade-one, 24% in grade-two, and 12% at grade-three as reported by Bast & Reitsma (1998)), and in Spanish children (74% in grade-six as reported by Nakamoto, Lindsey, & Manis (2008)). The validity of the simple view for studies on languages other than English was well supported by research findings.

However, the studies showed that the developmental change of the relative importance of decoding and linguistic comprehension to reading emerges in a rate different from that shown in studies on English language. Megherbi et al.'s (2006) study found that, at as early as grades one and two, French children's linguistic comprehension accounted for a much higher variance in reading than that of decoding: at grade one was 29% against 17%; at grade two was 36% against 8%. Bast and Reitsma's (1998) study also showed that the influence of linguistic comprehension had been larger than that of decoding in Dutch children reading performance from grade two onwards. Verhoeven and van Leeuwe (2008) also found that, in Dutch children, linguistic comprehension at grade one had already strongly influenced reading at grade two. In subsequent grades, the influence of linguistic comprehension on reading comprehension was so great that reciprocal relations between the two constructs were observed.

The findings of these studies showed that the influence of decoding on reading performance in these languages decreased in a faster rate than that in English.

Megherbi et al. (2006) attributed this to the differences of the languages' orthographic characteristics. French, Dutch, and Spanish all have a higher level of orthographic transparency (the degree of consistency of the grapheme-phoneme correspondence) than English. Hence, the native-speaking children of these languages achieve fluent and automatic state of decoding in a faster rate[5]. As mentioned above, when decoding ability reaches automatic state, a ceiling effect on its influence emerges and its contribution to reading variance decreases.

In sum, the studies across different alphabetic languages have supported the simple view of reading. However, the orthographic characteristics of the languages would influence the rate of the changing relative importance of the two skills. For languages with a high-transparent alphabetic script, the relative importance of decoding decreases faster than those with a low-transparent script.

2.5.4 Influence of the readers' ability on the developmental changes implicated in the simple view. The developmental implications of the simple view as depicted above were affected by not only orthographic but also reader differences. Simple-view studies on students with reading problems showed that decoding remained a major contributing factor in senior grades. Shankweiler et al. (1999) found that, in primary children of 7.5 to 9.5 years old with reading difficulties, the partial correlation of decoding with reading (after partialing out the influence of linguistic comprehension) is .65 and that of linguistic comprehension with reading (after partialing out the influence of decoding) is only .37. In the young adults aged 16 to 24 years in Braze et al.'s (2007) study, the partial correlations between their

[5] Goswami et al. (1998) found that Spanish and French 7-year old children's word reading accuracy level is higher than that of the English children (90%, 63%, and 22% respectively). Aro and Wimmer (2003) have found that all the first graders of above-mentioned languages achieved a word reading accuracy of around 85%, as compared to the 50% of English.

decoding skill and reading comprehension remained at a high value of .42 compared to the value of .62 of linguistic comprehension

The simple view has not only been adopted by researches on students with reading problems but also on bilingual and second language learners. For example, Proctor et al.'s (2005) study had Spanish-speaking English language learners of grade four as participants, and found that 65% of the variance in these students' reading comprehension could be accounted for by decoding and linguistic comprehension. Gottardo and Mueller (2009) studied the English reading comprehension acquisition of grade two Spanish-speaking English language learners, and found that 80% of the variance in reading could be explained by the combination of the students' linguistic comprehension and decoding.

It may be supposed that these young second language learners of English may develop their literacy skills slower than their native-speaking counterparts. Hence, their decoding ability would affect their reading performance significantly for a longer period of time, just like the students with reading problems as cited above. However, the developmental trend depicted by these studies was consistent with that by the studies on native-speakers in English: the shift of primary contribution from decoding to linguistic happened at about the transition between junior and senior primary grades.

Both Proctor et al.'s (2005) and Gottardo and Mueller's (2009) studies employed structural equation modelling as analysis method and reported the predictive power of independent variables in terms of standardized regression output. In Gottardo and Mueller's study on grade two students, the regression output of decoding was .81 and that of linguistic comprehension was .21. As for the grade four students in Proctor et al.'s study, the regression output of linguistic comprehension

was .44 and that of decoding was only .18. Compared the results of the two studies, it was observed that the primary influence had shifted from decoding in the elementary grades to linguistic comprehension in the senior grades. This developmental change in the second language learners was similar to that in the first language speakers.

Verhoeven's (2000) and Droop and Verhoeven's (2003) studies on the minority junior elementary students learning Dutch as a second language also showed a similar developmental trend. They found that the minority students had achieved even better decoding skills than the native students, but their reading comprehension and oral language proficiency were found to lag behind the Dutch children. The children's reading comprehension and oral language proficiency were closely related, after they had attained a fluent decoding level. It seems that these Dutch L2 young learners could also achieve higher level of decoding skill due to the high transparency of the Dutch orthography.

For CSL learners, the situation may be different. As stated above, orthographic transparency has a major influence on the rate of achieving automatic word identification. The complex Chinese orthographic structure may have a major influence on the role of decoding and linguistic comprehension skills in CSL learners' literacy development. The discrepancy between oral and written language comprehension in CSL learners may be larger and remain longer because of the slow progress of decoding skills.

Other than the developmental changes and the influences of orthographic and readers' differences, the operationalization and measures of decoding, linguistic comprehension, and reading comprehension were also concerns of simple-view studies. The following sections will review studies related to the issue.

2.5.5 Operational measures of decoding, linguistic comprehension, and reading comprehension. Hoover and Gough (1990) stated that measures for linguistic and reading comprehension should assess the ability to comprehend spoken and written language respectively. They proposed that proper measures of listening and reading comprehension should assess understanding of the content. They further noted that, to test the simple view adequately, linguistic and reading comprehension tests should use parallel materials, that is, materials matched in content and genre (e.g., narrative to narrative and expository to expository).

Most simple-view studies used standardized listening and reading comprehension test as measures. For example, the *Oral Comprehension* and *Passage Comprehension* subtests of *Woodcock-Johnson Tests of Achievement* (Georgiou et al., 2009); the *Listening Comprehension* and *Reading Comprehension* subtests of *Woodcock Language Proficiency Battery (Revised)* and *Woodcock Reading Mastery Tests Revised)* (Johnson & Kirby, 2006); the *Neale Comprehension Test* (adapted into French by Megherbi et al., 2006); and standardized listening and reading comprehension tests developed by local educational bureau (Dreyer & Katz, 1992). The advice of Hoover and Gough (1990) on using parallel materials was especially adhered by Bast and Reitsma (1998), whose study used equivalent forms of Dutch listening and reading comprehension standardized tests called *BELL*.

As for decoding skill, Gough and Tunmer (1986) stated that it refers to efficient word recognition based on knowledge of grapheme-phoneme correspondence rules. Hoover and Gough (1990) adopted this definition of decoding and conceded that both real-word and pseudo-word reading[6] are adequate measures of

[6] Most simple-view studies used word reading subtests of standardized tests as measures. For example, the Word Attack task (on pseudo-word reading) of Woodcock-Johnson Tests of Achievement (Georgiou et al., 2009); the Word Attack (on pseudo-word reading) and Word Identification (on real-word reading) tests of Woodcock Reading Mastery Tests Revised) (Johnson & Kirby, 2006); a pseudo-

decoding. However, for beginning readers, a pseudo-word reading measure would be necessary for assessing their skill in deriving appropriate phonologically-based representations from novel letter strings. The results of their study yielded support for the use of pseudo-word reading. On the other hand, Dreyer and Katz (1992) found that real-word reading measure assessed decoding ability as well.

Other simple-view studies found that the two measures yielded similar results. Shankweiler et al. (1999) found a high correlation value, $r = .91$, between real- and pseudo- word measures. They suggested that the two measures were almost inseparable from each other. Chen and Vellutino (1997) found that the two measures served as well in assessing decoding ability. The explained variance in reading was slightly higher when using real-word than pseudo-word measure.

This issue of measurement is related to the nature of decoding ability in alphabetic languages. Pseudo-word reading assesses the ability in using grapheme-phoneme correspondence knowledge to pronounce a word. Joshi and Aaron (2000) proposed a more thorough concept for decoding which they referred as "sight-word reading". Sight-word reading is a speeded up decoding process and was denoted as "*D* + *S*" (*D* stands for phonological decoding and *S* stands for speed of processing). Pseudo-word reading measure taps *D* and letter-naming speed taps *S*. The results showed that "*(D + S) x LC*" could account for a significant additional 10% variance in reading on top of the predictive term "*D x LC*" used in the original simple view model.

Based on Joshi and Aaron's (2000) study, Johnston and Kirby (2006) further explored the relationship among processing-speed, real-word reading, and pseudo-word reading measures. They proposed that real-word reading measure assesses the

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word subtest taken from a French standardized test of a battery (called the MIM test in the BELEC battery, as used by Megherbi et al. (2006)). Self-developed experimental decoding ability test was also used as in Dreyer and Katz's (1992) study.

"full" decoding process including grapheme-phoneme converting (which is assessed by pseudo-word measure) and other related skills involved in efficient word recognition like processing speed (which is measured by letter-naming speed test). It is predicted that real-word reading would be a better measure of decoding for the simple view model.

They assessed the subjects' real- and pseudo- word reading, and naming speed as well in their study of grade three students' reading comprehension. They found that: (1) more variance of reading comprehension was accounted for by the simple view model that using real-word reading measure than that using the pseudo-word measure across grade levels; (2) processing speed had a small but significant effect on reading comprehension after accounting for the pseudo-word reading and listening comprehension product (2-3%), but little effect after accounting for the real-word and listening comprehension product (0-2%) across grade levels. They concluded that real-word reading was a better measure of decoding for its higher predictive power (the contributions of naming speed were included in the measure), but pseudo-word measure provided a clearer indicator for the aspect of phonological decoding (i.e., the process of using the grapheme-phoneme correspondence knowledge to convert print to sound).

The findings were consistent with that of Neuhaus et al. (2006). Neuhaus et al. proposed that word recognition process consists of three aspects: phonological awareness, phonological decoding, and processing rate. The real-word reading measure was used for assessing word recognition, the phoneme elision task for phonological awareness, the pseudo-word reading measure for phonological decoding, and rapid word reading for processing rate. The results showed that while

each of the three measures accounted for significant variance in word recognition, phonological decoding alone accounted for most of the variance.

In sum, these studies showed that real-word measure had a higher predictive power than pseudo-word measure for decoding in the simple view model. The latter actually assessed a significant aspect of word recognition, that is, the ability of using the grapheme-phoneme correspondence knowledge to convert print to sound. Grapheme-phoneme correspondence knowledge, in alphabetic languages, is related to lexical representations that facilitate the decoding processes. The relationship between decoding and orthographic knowledge is reviewed in the following section.

2.6 Decoding and Orthographic Awareness and Knowledge

Efficient decoding is related to readers' orthographic knowledge of a particular writing system. This orthographic knowledge refers to one's understanding of how the writing system encodes the language, which can also be in the form of implicit awareness (as contrasted to explicit knowledge). For alphabetic languages, this knowledge is the understanding of the alphabetic principle: the writing system encodes the language by linking graphemes to phonemes. This grapheme-phoneme correspondence knowledge was found to be a significant supporting factor for efficient word reading development, as shown by the following studies.

Erhi's studies (1991, 1992, 1995, 1998, 2005) on sight word reading showed that alphabetic knowledge is essential for literacy acquisition and development. Erhi proposed that sight word reading, which is automatic and accurate recognition of written words, develops as a connection-forming process between grapheme and phoneme. This process is facilitated by phonemic awareness and by knowledge of the alphabetic system. The alphabetic knowledge serves as a powerful mnemonic system

to secure sight word in mind. Four phases of sight word development were distinguished according to the type of alphabetic knowledge used to form connections: pre-alphabetic, partial, full, and consolidated alphabetic phases.

The findings of Erhi and Wilce (1985, 1987) showed that children in different phases of sight word development used different orthographic cues in learning to read new words. While the pre-alphabetic phase children relied more on visual cues in learning new words, those in partial alphabetic phase made better use of the letter-sound cues. In turn, the partial alphabetic phase children performed worse than the full alphabetic phase children in learning to distinguishing new words with similar spellings (e.g., *stamp, stand*). With limited alphabetic knowledge, the children in partial alphabetic phase found the learning tasks difficult and easily confused the pair of similarly spelled words

The process of orthographic learning for efficient word reading was also demonstrated by Share and others' (de Jong & Share, 2007; Jorn & Share, 1983; Share, 1999; Share & Jorn, 1987) studies on the "self-teaching" hypothesis for orthographic representations acquisition. Jorn and Share (1983; Share & Jorn, 1987) proposed that, for alphabetic languages, word-specific orthographic representations were acquired primarily as a result of the self-teaching opportunities provided by phonological recoding happened in the process of word reading. Through decoding, readers were made aware of the connections between a word's graphic and phonemic forms. These connections were accumulated as orthographic representations for later identifications.

Share (1999) asked a group of grade-two children to read short texts embedded with pseudo-word targets that can be spelled in two ways (e.g., "yate" and "yait"). In all post-test measures of orthographic learning, these children were able to

name more quickly, identify more successfully, and reproduce more accurately the orthographic forms of the targets that they had seen. Moreover, de Jong and Share's (2007) found that this orthographic learning was evident in both oral and silent reading, with fairly better results in the oral condition. The orthographic representations acquired through the decoding process in earlier contacts facilitated identifications of the written words in later period.

The incremental acquisition of lexical representations in reading development was also illustrated in Perfetti and others' (Booth, Perfetti, & MacWhinney, 1999; Perfetti, 1991, 1992; Perfetti & Hart, 2001, 2002) studies. Perfetti (1991, 1992) proposed that high-quality lexical representation is an essential component of automatic and efficient visual word recognition processes. Representational quality is characterized by precision and redundancy of orthographic and phonemic connections. For alphabetic languages, precision refers to accuracy in the mapping between a word's orthographic (the letter) and phonological (the sound) representations. Redundancy refers to the degree to which there are lexical (the word pronunciation) and sub-lexical (blending of phonemes in a word) connections between orthographic and phonemic form. The ability of efficiently using these redundantly interconnected representations for word recognition was assumed to be the hallmark of skilled reading.

The facilitation of high-quality lexical representations for efficient word recognition was supported by the experimental study of Booth, Perfetti, and MacWhinney (1999). By using priming tasks, they found that good readers (as indicated by a high naming accuracy level) benefited from both orthographic and pseudo-homophone priming more than poor readers. The findings suggested that

skilled readers activate graphic and phonemic information more efficiently than poor readers.

Perfetti and Hart (2001, 2002) proposed that high-quality lexical representations are indicated by a tightly bonded set of word constituents: the orthographic, phonological, and semantic specifications of the words. They performed factor analysis upon the performances of college students on tasks that tap mixes of orthographic, phonological, and semantic knowledge. The results suggested that orthographic and phonological structures are strongly connected with each other for the skilled readers, and less so for the less skilled readers. The findings further supported that skilled readers had acquired a more coherent lexical knowledge structure than less skilled readers.

In view of the importance of the alphabetic knowledge for reading development, researchers have suggested that phonic instructions should be provided for children in learning to read (MuGinness, 2004, 2005). Phonic instructions teach the alphabetic code and how to use this knowledge to read words. Stanovich (1992) suggested that the effectiveness of phonics instruction may be related in part to the attention it directs to the interior details of words and hence facilitates the establishment of accurate orthographic representations to support fluent reading. The meta-analysis of Ehri, Nunes, Stahl, and Willows (2001) found a moderate effect size, $d = .41$, in comparing the effects of systematic phonic instructions to unsystematic or no-phonics instructions. They suggested that systematic phonic instruction should be implemented as part of the literacy programmes for children or struggling readers.

In sum, these studies showed that efficient decoding is supported by awareness and knowledge of the particular orthographic system. In alphabetic languages, this knowledge is about the grapheme-phoneme correspondences rules which make up

strong lexical representations for efficient sight-word reading. This explains why simple-view studies found that both real- and pseudo- word measures could be used in assessing decoding ability: real-word measure is for efficient sight word reading, and pseudo-word measure for ability to convert print to sound through the grapheme-phoneme correspondence knowledge. As pseudo-word reading measure assesses only an aspect of the decoding skill, its effect upon reading is substantially included in the real-word reading.

Owing to differences of the Chinese writing system from the alphabetic languages, the orthographic awareness and knowledge required for efficient Chinese reading are bound to be different. In the following sections, studies on Chinese character recognition and the related orthographic knowledge is introduced.

2.7 The Chinese Character Recognition and Orthographic Awareness and Knowledge

In contrast to the alphabetical system of English, Chinese writing system maps characters onto morpheme-syllables of the spoken languages through a totally different semiotic system.

A number of researchers showed that componential radicals were important processing units in recognition of Chinese characters (Hanley, 2005). Shu and Anderson (1999) found that the basic configuration of the compound character was understood by most Chinese grades one and two students. In a character decision task (i.e., to decide whether an item is a Chinese character), only a few of them misidentified the pseudo-characters of ill-formed structure (formed by putting radicals in illegal positions) as real characters. By grade four, most of the students would identify those of ill-formed components (formed by putting an illegal radical in a

compound character) as pseudo-characters. Peng, Li, and Yang (1997) also found that their subjects of grades three, six, and college students could easily reject the pseudo-characters with radicals in illegal positions, and there was no significant difference in decision latencies between the grade six and college students. In short, Chinese readers were sensitive to component radicals and their positional information in processing Chinese characters.

This kind of visual-orthographic sensitivity in processing Chinese characters was also found in CSL learners. Wang et al. (2003) and Wang et al. (2004) found that even beginning Chinese learners were faster in rejecting pseudo-characters with either illegal radical forms or illegal radical positions than those with legal forms in legal positions. The adult CSL learners in Shen and Ke's (2007) study attained a high accuracy rate in decomposing compound characters into proper radical units early in their learning: a mean of 73% by the end of their first year of studying Chinese language. These studies showed that CSL learners, like the Chinese-speaking readers, were aware of the internal structural complexity and compositional relationship of the radicals within a character.

Visual segmentation of a compound character was also found to be a strategy used frequently by both Chinese children and CSL adult learners. The Chinese junior primary school children in Pine et al. (2003) studies were found to use decoding strategies that divide the characters into structural components. Everson (2002) also found that the most common learning strategy employed by CSL learners was decomposition of compound characters. These studies show that structural knowledge of the configurations of Chinese characters facilitates the processing and learning of character reading.

As for the inner structural properties of the characters, it was found that knowledge of the representational functions of semantic and phonological radials, and the skills in applying this knowledge, were relevant in Chinese character reading and learning. Studies on Chinese children's literacy acquisition found that, at around six years old, Chinese children were already sensitive to the cueing functions of both semantic and phonetic radicals in compound characters. This kind of orthographic knowledge developed steadily through the primary years and set the stage for their subsequent reading development (Cheung et al., 2006).

Studies showed that knowledge of the functions of semantic and phonetic radicals is related to Chinese reading development and performance. Shu and Anderson (1999) found that most Chinese children were aware of the meaning-cueing function of the semantic radical by grade three and their awareness of the pronunciation-cueing function of the phonetic radical developed gradually over the elementary grades. Moreover, radical awareness was found to develop in association with reading ability. Feldman and Siok (1999) found that semantic radical was a unit of processing in Chinese character recognition. The frequency and transparency of semantic radicals affected significantly characters decision latencies. Wang et al. (2004) also found that adult CSL learners were quick to acquire the functionality of the semantic radials for accessing meanings of novel characters after only short explicit instruction.

Studies on Chinese children's meta-linguistic awareness have also found that grapho-morphological awareness, which refers to the awareness and knowledge of the character-to-morpheme structural correspondence, was significantly related to reading performance (Li, Anderson, Nagy, & Zhang, 2002) and character learning (Nagy, Kuo-Kealoha, Wu, Li, Anderson, & Chen, 2002). Similar strategies were found to be

adopted by CSL learners in reading and learning Chinese Characters (Jackson, Everson & Ke, 2003; Shen & Ke, 2007).

Zhou and Marslen-Wilson (1999) also found evidence of automatic decomposition of semantic and phonetic radicals and access to their semantic and phonological information in character reading. Priming effects at the sublexical level of complex characters in identifying the targets were observed. The findings were consistent with the lexical representation and processing model proposed by Zhou, Shu, Bi and Shi (1999). Their model assumed that there were interconnected orthographic, phonological, and semantic representations for each word in the lexicon. Orthography is predominant in initial lexical access. Upon activations of the orthographic representation, the connected phonological and semantic representations were automatically activated.

Models of orthographic knowledge development have been proposed to depict the sequences of literacy acquisition in Chinese. Ho, Ng, et al. (2003) explored the development of radical knowledge in Chinese children. They found that the children acqufred some rudimentary knowledge of character structure quite early. Most of their grade-one children could judge non-characters as illegal. They also acquired some knowledge of the position and functions of the phonetic and semantic radicals. It was also shown that they could make use of the sound value of the phonetic radical to assess the pronunciations. However, it was not until grade three that they understood they can rely on the semantic radicals for meaning cues. Apart from this developmental trend, the study also found that the children's orthographic knowledge was related to their performance in word reading.

Ho, Yau and Au (2003) further proposed a developmental model based on findings from Chinese children's performance in several orthographic knowledge

measures, including an invented pseudo-character spelling task. It was proposed that children develop first configuration and structural knowledge of character to identify the constituent components for learning and processing. Then, they begin to have some knowledge about the linguistic value (i.e., the meaning values of semantic radicals and the sound values of the phonetic radicals) and positional regularity of radicals. They later develop functional knowledge of the radicals for assessing information of meanings and pronunciations. These kinds of knowledge are rule-based in nature: the radicals conveyed linguistic information following some orthography-phonology and orthography-semantic correspondence rules. Then, the children amalgamate all these various types of orthographic knowledge and finally attain a complete orthographic knowledge for efficient recognition.

Ke (as cited in Jackson, Everson, & Ke, 2003) proposed a similar model of orthographic awareness development for CSL learners. The model consists of three stages. In the first "precomponent-processing stage", readers primarily learn characters as wholes and are unable to decompose characters. In the second "component-processing stage", readers habitually apply component knowledge for character learning. They can guess the meaning and sound of novel compound characters with high transparent radicals. In the last "automatic component-processing stage", the learners have acquired a native-like awareness and can process characters from the perspective of recurring radicals.

The model could account for the findings of Jackson et al.'s (2003) study on a group of American college students having completed a full academic year of Chinese instruction. Although the students had acquired a fair knowledge of characters and functionality of radicals, they had difficulty in using the knowledge to access the linguistic information of novel compound characters containing familiar radicals.

Jackson et al. concluded that the students were still in the precomponent stage, with a few of them at the high-end.

The findings from Shen and Ke's (2007) study also suggested a similar developmental trend of radical awareness in adult CSL learners. The learners' skills in decomposing compound characters emerged at the beginning stage and advanced rapidly during the first year of study. Their radical knowledge, referring to that of the meaning- and sound- values of semantic radicals, progressed continually across all learning levels. However, the learners' ability in using this radical knowledge in learning characters was not developed synchronously. For this radical knowledge application ability, a development trend of two linear trends in two learning periods (i.e., the beginning and the end), linked by a plateau state, was observed. Shen and Ke suggested that the plateau phenomenon emerged because the learners need some time to restructure the cognitive structure and to use efficiently various types of knowledge.

These studies have developed various measures for assessment of Chinese orthographic knowledge. Some of these were priming tasks and character decision tasks using real characters or pseudo-characters (e.g., Shu & Anderson, 1999; Wang et al., 2003, 2004; Zhou & Marslen-Wilson, 1999), while others employed some kinds of knowledge tests. These knowledge tests consist of tasks requiring subjects to decompose characters into different components (e.g., Shen & Ke, 2007), to identify the proper position of radicals (e.g., Ho, Ng, et al., 2003), to identify semantic and phonetic radicals' meaning or sound (e.g., Jackson et al., 2003; Shen & Ke, 2007), to identify the linguistic values of semantic and phonetic radicals in novel characters or pseudo-characters (e.g., Ho, Ng, et al., 2003), to use semantic and phonetic radicals to access the linguistic information of novel characters or pseudo-characters (e.g.,

Jackson et al., 2003; Shen & Ke, 2007), and to invent pseudo-character by using radical knowledge (e.g., Ho, Yau, et al., 2003). This study makes reference to these measures in developing assessment tools for orthographic knowledge.

In sum, studies have shown that Chinese orthographic knowledge is related to character reading and learning. This study investigates the ethnic minority primary students' Chinese orthographic awareness and knowledge, which includes the graphic-componential structure and the cuing functions of the radicals. The relationship between the students' orthographic awareness and knowledge with their character recognition and reading performance are explored.

Chapter 3: Research Method

3.1 Participants

Participants of the study were 97 primary-four ethnic minority students in Hong Kong. They come from four schools with high concentration of ethnic minority students. In response to the students' limited Chinese proficiency, all four schools have developed school-based Chinese curriculum and adopted Chinese learning materials that were much easier than those for the local Chinese students. The medium of instruction of the four schools, other than the Chinese lessons, is English.

Among the 97 students, 55 are boys and 42 girls. The average age of the students is 10.55 years old. The distributions of the students' ethnicity are shown in table 3.

Table 3

Distributions of the Participating Students' Ethnicity

Ethnicity	Frequency	Percentage
Indian	17	17.52
Pakistani	28	28.87
Nepalese	37	38.14
Filipino	12	12.37
Thai	1	1.03
Indonesian	1	1.03
Others	1	1.03

The distribution of the students' native languages is shown in table 4.

Table 4

Distribution of the Participating Students' Native Language

Native Language	Frequency	Percentage
Hindi	5	5.15
Punjabi	11	11.34
Urdu	28	28.87
Nepali	37	38.14
Filipino	12	12.37
Thai	1	1.03
Indonesian	1	1.03
Others	2	2.06

79 students (81.44%) were born in Hong Kong and 67 (69.07%) of them had received pre-primary education in Hong Kong. On average, the students have lived in Hong Kong for 9.37 years, and have studied in their respective primary schools for 2.67 years.

3.2 Pilot Study

A pilot study was conducted on 6 primary-four students from one of the target schools during summer holidays (August, 2009) when these students went to school to join some summer activities. The pilot study was performed to evaluate the effectiveness of the assessment tools and data collection procedures with students of similar background with the target participants.

The results of the pilot study are shown in table 5:

Table 5

Descriptive Statistics for All Measures Used in Pilot Study (N=6)

Measures [a b]	Minimum	Maximum	Mean	SD
CRT (50)	4.00	19.00	10.50	5.58
COAKT (30)	14.00	20.00	16.33	2.73
ST_LC (10)	2.00	5.00	3.17	1.17
ST_RC (40)	0.00	12.00	4.33	4.80
DCT_LC (7)	1.00	5.00	3.17	1.33
DCT_RC (7)	3.00	6.00	4.50	1.22

a. The number in the blanket is the full mark of the measure.

b. CRT: Chinese Character Recognition Test; COAKT: Chinese Orthographic Awareness and Knowledge Test; ST_LC: Standardized Listening Comprehension Test; ST_RC: Standardized Reading Comprehension Test; DCT_LC: Discourse Comprehension Test: Listening Comprehension; DCT_RC: Discourse Comprehension Test: Reading Comprehension

The average percentile rank (explanation for this converted score is given below) attained by the students in the ST_LC was 11.28, and the average percentile rank attained in the ST_RC was by 5.48. The results provided information for assessment measures and procedures revisions. Details are given below.

3.3 Measures

3.3.1 Reading and Listening Comprehension Measures

The Standardized Reading and Listening Comprehension Tests

The study used two types of measures for Chinese reading and listening comprehension competence. One type is standardized tests for evaluation of the students' Chinese proficiency with reference to the local Hong Kong students' norm.

The other is discourse comprehension tests in parallel forms of oral and written version.

The standardized tests include a reading comprehension test and a listening comprehension test. Both are adapted from the Hong Kong Attainment Test papers (Primary One) (1999) (香港教育署教育研究組, 1999). The standardized tests provide an objective evaluation of the ethnic minority students' Chinese proficiency with a validated tool and a local norm (from the samples of the 1999/2000 academic years) for score interpretations. The tests were originally developed by the Hong Kong education authority to assess local students' Chinese abilities and have six levels (from primary one to primary six). The tests were validated with a sample size of about two thousands local students. The reliability coefficients were higher than .80[7].

Primary one level was selected because: (1) the Chinese teachers of the four participant schools all conceded that the test of this level was preferable to other levels. The tests of higher level are too difficult for the students; (2) the ethnic minority students were CSL learners and their Chinese proficiency was lower than the local students. Given this observed proficiency gap, the author conceded that local primary one students would be a more proper criterion for performance comparison; and (3) the appropriateness of this level was supported by the pilot study. The tests of higher level were too difficult for the students.

The reading comprehension test is composed of three sections. The assessment focuses include: (1) understanding the meaning of character, word, and

[7] The Hong Kong Attainment Tests were developed in different years as different series. The tests used in this study are from series five. The tests are accompanied by a handbook that contains the assessment aims, procedures, and the sampling details. However, from series five onwards, details of sampling procedures are not provided. The author acquired the handbook for series four of primary two and three levels. The sampling details reported were: for primary two level: sample size: 2303, reliability coefficient: .81; for primary three level: sample size: 2306, reliability coefficient: .86 (香港教育署教育研究組, 1993).

sentence (assessed by multiple choice test items and cloze items); (2) understanding of the meaning of passage (assessed by multiple choice test items and short questions); and (3) understanding the meaning of word and sentence in a passage (assessed by matching items). All of the instructions (but not the test items) were read out to the students. There is a total of 16 items. The test was conducted in group and took about 25-30 minutes. Selected items of the test are attached as Appendix A [8].

The listening comprehension test consists of three pieces of listening materials -- a story, a dialogue between classmates, and an instructional speech made by a teacher to her students in a school context. Students are required to answer multiple-choice questions on the main points of the materials' content. All of the instructions and test items were read out to the students to ensure that the students' performance was not affected by their reading ability. There is a total of 10 items. The test was conducted in group and took about 10-15 minutes. Selected items of the test are attached as Appendix B [9].

The Discourse Comprehension Test

As one of the concerns of this study is comparison of the language and literacy proficiency of the ethnic minority students, the measures for the listening and reading comprehension competences should be matched. The use of parallel materials for listening and reading comprehension tests was also observed in some simple-view studies (e.g., Bast & Reitsma, 1998; Hoover & Gough, 1990). Accordingly, the *Discourse Comprehension Test* was developed with an oral and a written version equivalent in form and content.

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[8] Appendix A is detached in final submission of the thesis for the confidential requirement of the Hong Kong Attainment Test.

[9] Appendix B is detached in final submission of the thesis for the confidential requirement of the Hong Kong Attainment Test.

The test consists of eight sets of comprehension questions: each set requires the students to read or listen to a narrative passage accompanied with test items on the content of the passage. The passages were taken from a training pack on Chinese speaking skills developed by the Speech Therapy Section of the Hong Kong Education and Manpower Bureau (香港教育統籌局言言治療服務組, 2003) for junior primary students with speech deficits or low language proficiency. To ensure the tests are of level matched with the standardized tests, opinions of the Chinese teachers of the target schools were sought. They agreed that the passages and the accompanied tasks (see details for below) were within the local primary-one level.

The trial version of the test was conducted in the pilot study and the appropriateness of the passages was supported. However, it was found that the multiple-choice items were not suitable. The differences of the items heavily affected performance of the student (e.g., whether the item required for locating factual information or for making inference from the text). Therefore, the task was replaced with one that required the students to arrange four pictorial illustrations of the story in the right order.

In the final version, each of the four sets of comprehension question has a passage accompanied with a pictorial illustration task. Each set has an oral and written version (i.e., there is a total of eight question sets): the former required the students to listen to the passage and the latter required them to read the passage. Each student was required to do four sets of questions: two in oral version and the other two in written version. To avoid carry-over effect, no student was given the oral and written version of the same question set. Hence, two forms of the test, namely *Form A* and *Form B*, were developed. Students of two target schools were given Form A

and those of the other two schools were given Form B. Details of the Discourse Comprehension Test's constructions and conduction are shown in table 6.

Table 6

Construction and Conduction of the Discourse Comprehension Test

	Discourse Comprehension Test [a]							
	Form A				Form B			
School [b]	QS1 (O)	QS2 (O)	QS3 (W)	QS4 (W)	QS1 (W)	QS2 (W)	QS3 (O)	QS4 (O)
A (27)	X	X	X	X				
B (28)	X	X	X	X				
C (13)					X	X	X	X
D (29)					X	X	X	X

a. QS: Question Set; O: Oral Version; W: Written Version

b. Number of students in blanket.

The test was conducted in group and took about 30 minutes. As the students were unfamiliar with the test formats, a trial item (in the oral version) was developed for practices before the test. The tests are attached as *Arrange the Story Sequence Right: Form A* and *Arrange the Story Sequence Right: Form B* as Appendix C and Appendix D respectively. The two tasks in oral version of each test form is the listening comprehension test. The two tasks in written version of each test form is the reading comprehension test. The reliability coefficients of the tests are given in table 7.

Table 7

Reliability Coefficients of the Discourse Comprehension Test

Discourse Comprehension Test (DCT) [a]	Sampling Size	Item Number	Alpha
DCT Form A: Listening Comprehension	55	8	.67
DCT Form A: Reading Comprehension	55	8	.75
DCT Form B: Listening Comprehension	42	8	.76
DCT Form B: Reading Comprehension	42	8	.74

a. Listening Comprehension comprises of two items in oral version and the Reading Comprehension comprises of two items in written version.

The coefficient values were all very close to or over the .70 level, which was an acceptable reliability level for test used in research (Guilford & Fruchter, 1978).

3.3.2 The Chinese Character Recognition Test

This test was developed for this study to assess the Chinese decoding ability of the students. This test used real Chinese characters as test items. The students were required to read aloud each of the characters listed in the test.

Chinese characters of local primary-one level were selected as test items. The selection was based on Pan and Kang's study (潘慧如、康寶文, 2003) on the use of Chinese character in Hong Kong primary schools. The study developed a list of characters use frequency with reference to statistics issued in mainland China, Taiwan, and Hong Kong. From this list of characters, the researchers chose 3,000 frequently-used characters based on literature review and a survey conducted among local primary Chinese teachers. These 3,000 characters were then categorized into six levels, from the local primary one to primary six, according to: (1) the difficulty level

of the characters, (2) the expert judgement of the Hong Kong Chinese teachers collected by a second survey, and (3) a survey on the use of characters in primary school Chinese textbooks. Among the 3,000 characters, 508 were categorized as primary one level. The author arranged the characters according to their use frequency and selected every tenth characters as test items. A total of 50 Chinese characters (about 10%) were then selected. The reliability coefficient, Cronbach alpha, was .95. The test is attached as Appendix E.

The test is an individual test. The students were required to read out the characters one by one following the pointing of a research assistant. Each correct pronunciation was awarded one mark. Guidelines for marking were given to the assistants (details about assistants training were given below). The test took about 5 minutes.

3.3.3 The Chinese Orthographic Awareness and Knowledge Test

This test was developed for this study to assess the students' orthographic awareness and knowledge of Chinese characters. This test is similar to the pseudo-word reading measures which assess the use of grapheme-phoneme correspondence knowledge in decoding alphabetic scripts. The format of the items was developed with reference to the Chinese orthographic knowledge tests developed by Ho, Ng and Ng (2003), Jackson et al. (2003), Li et al. (2002), and Shen and Ke (2007).

Although the test items are not some kind of 'pseudo-character', they are all novel ones to the target ethnic minority students. The characters were selected with reference to studies by 潘慧如、康寶文 (2003), 康加深 (1993), 李燕、康加深 (1993). All of the characters are of primary 6 levels according to Pan and Kang's study (潘慧如、康寶文, 2003), and are supposed to be unknown to the students. The

Chinese teachers of the students said the characters were not covered so far in their Chinese lessons. Moreover, all the participating students in the pilot study said they do not know the characters.

The test consists of three parts. Part (a) is a radical perception test which requires the students to decide if a given Chinese character is an integral or compound character. For compound characters, the students are further required to divide the character into two parts. All characters are ideo-phonetic compounds with high-frequency semantic radicals like "口" (hau2, mouth) or "艹" (a variant radical form of the character "草" (cou2, grass)). The test was to assess how well the students could decompose compound characters into two component radicals. No further decomposition is required as, for all test items, only the two immediate constituent radicals provide linguistic information for the compound characters[10]. An example is given below.

Figure 1 Example of test items of the radical perception sub-part of the Chinese Orthographic Awareness and Knowledge Test

Part (b) is to assess the students' semantic radical knowledge and skill in using this kind of knowledge to decode a new character. Part (b.1) requires the students to identify the meaning of the semantic radical of an unknown character. For example, the semantic radical "氵" (a variant radical form of the character "水" (seoi2,

[10] According to 王寧（主編）（1996）, most of the Chinese compound characters consist of two immediate constituting radicals that provide relevant linguistic information. For example, for the character 照 (ziu3, to lighten), the phonetic radical "昭" (ziu1, clear) indicates its pronunciation and semantic radical "灬" (a variant radical form of the character "火" (fo2, fire) indicates its meaning. Neither the components "刀" (dou1, knife) or "口" provide relevant information for the pronunciation or meaning of the character "照".

water)of "涯" (ngaai4, water margin)) indicates water-related meaning. This part is mainly for semantic radical knowledge. The radical is either in free standing form (like "口" in "哮" (haau1, to roar)) or in variant form (like "艹" in "苗" (zyut3, to sprout)). Am example is given below.

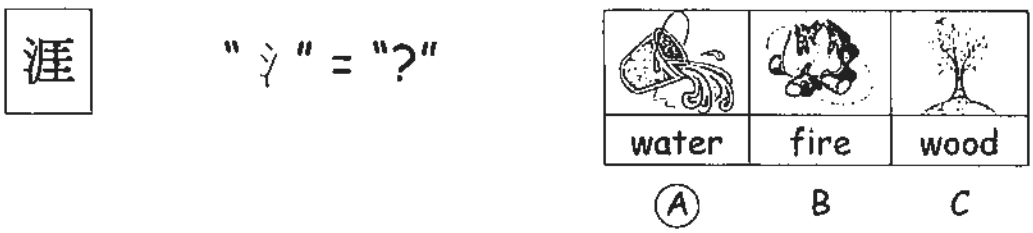

Figure 2 Example of test items of the semantic radical sub-part of the Chinese Orthographic Awareness and Knowledge Test (1)

Part (b.II) assesses students' skill in using information provided by the semantic radical to decode a novel character. The students were required to choose among three novel characters the one whose meaning best matches a picture (provided with English illustration). This task is for assessing students' skill in using information provided by the semantic radical to decode a new character. An example is given below.

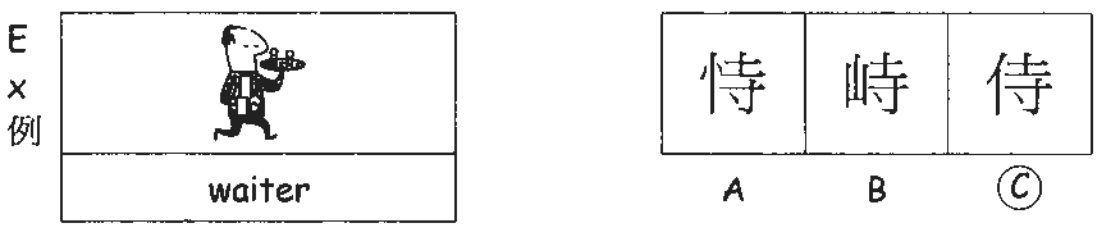

Figure 3 Example of test items of the semantic radical sub-part of the Chinese Orthographic Awareness and Knowledge Test (2)

Part (c) is to assess the students' ability in using the information provided by a phonetic radical to phonologically decode a novel character. The test items are similar to those in Part (b. II). The task requires the students to choose among three pieces of

sound record the one that best matches with the pronunciation of a given character. The instruction indicates that the students could guess the sound of the character by identifying any component of the character. For example, the character "酮" (tong4, a chemical substance) has the same sound as the component "同" (tong4, same). The students could make use of this information to choose the correct answer.

As the test item formats were new to the participating students, an example item and two trial items were developed for each part of the test. The reliability coefficient, Cronbach alpha, was .76 (N = 97). It showed that the measure is reliable. The test is attached as Appendix F.

3.4 Procedures and data collection

Data collection was conducted within a month (September 2009) by a research team. The research team consisted of the author and several undergraduates or graduates who had research experiences. Before the data collection, invitation letters were sent to the principals of the four target schools, and the parents of the target students through the class teachers. Attached with consent letters to parents was a questionnaire to collect background information and linguistic experiences about the students. The consent letters and the questionnaire are attached as Appendix G and Appendix H respectively. The questionnaires were collected on the first day of on-site data collections.

The whole data collection procedure took about two to three hours for each school, and was divided into two days of visits. On the first day, the Chinese orthographic awareness and knowledge test (called *Chinese Character: Break the Code!*) was conducted first in group, and then the research assistants (two to three) conducted the Chinese character recognition test (called *Read Out the Chinese*

Characters) on a one-to-one basis under the supervision of the author. On day two, the two reading and listening comprehension measures were conducted in group. The discourse comprehension test (called *Arrange the Story Sequence Right (Form A/B)* was conducted first, followed by the standardized tests (called *Chinese Language Proficiency Test*). All the group tests were conducted in English by the author with help from the assistants.

As it is important that the data were collected with standardized procedure, a handbook was provided to all test administers (including the author and the assistants). The handbook contains descriptions of the assessment tools, the sampling procedures, and guidelines for test conduction. Details of proper instructions and sequences of procedures are listed to reduce differences in test administrations. All the assistants received the handbook beforehand and were required to conduct the test accordingly. The handbook is attached as Appendix 1.

3.5 Data analysis

The students' performance on the Chinese reading and listening comprehension measures (including the Standardized Listening Comprehension Test (ST_LC), the Standardized Reading Comprehension Test (ST_RC), the Listening Comprehension Test of the Discourse Comprehension Test (DCT_LC), and the Reading Comprehension Test of the Discourse Comprehension Test (DCT_RC)) , the Character Recognition Test (CRT), and the Chinese Orthographic Awareness and Knowledge Test (COAKT) were reported and analyzed. Moreover, two composite scores, namely LC and RC were derived from the comprehension measures to index the competence in listening and reading comprehension respectively (details for which is given below). Descriptive statistics of the six measures and the two

composite scores were presented. The measures and analysis methods involved for each research question are shown in table 8. Explanations were given in the following.

Table 8

Measures/Index Used and Analysis Methods for Each of the Research Questions

Research Question	Measures / Index [a]	Analysis Methods
1 Chinese language and literacy proficiency of the ethnic minority students	1. ST_LC 2. ST_RC 3. CRT	1. Percentage Score obtained in the CRT 2. Percentile Scores obtained in the ST_LC and ST_RC 3. ANOVA analysis for group comparisons by ethnicity, gender, and school
Language-literacy discrepancy	1. ST_LC 2. ST_RC 3. DCT_LC 4. DCT_RC 5. LC 6. RC	1. Within-person comparison: *t*-test for score comparisons of: a. ST_LC against ST_RC b. DCT_LC against DCT_RC c. LC against RC 2. Within-passage comparison: average scores comparison of the oral version and written version of the DCT
2 The validity of the simple view model	1. CRT 2. LC	Multiple regression analysis with RC as dependant variable and CRT & LC as independent variables
Contributions of character recognition and linguistic comprehension on reading comprehension	3. RC	Comparison of the β-values and the squared semi-partial correlation coefficients of CRT and LC through multiple regression with RC as dependant variable

3	Development of Chinese Orthographic Awareness and Knowledge (COAK)	COAKT	Average scores obtained in the three sub-parts of the COAKT
	Relationships among COAK, character recognition, and reading comprehension	1. COAKT 2. CRT 3. RC	1. Correlational analyses between: (a) COAKT and CRT; (b) COAKT and RC 2. Regression analyses on: (a) the effect of COAKT on CRT; (b) the effect of COAKT on RC
	Role of COAK on character recognition and reading comprehension		Comparisons between: 1. the effect of CRT & LC and that of COAKT & LC on RC through regression analyses 2. the effect of CRT & LC and that of COAKT & CRT & LC on RC through regression analyses 3. the effect of CRT and COAKT on RC through regression analyses

a. CRT: Chinese Character Recognition Test; COAKT: Chinese Orthographic Awareness and Knowledge Test; ST_LC: Standardized Listening Comprehension Test; ST_RC: Standardized Reading Comprehension Test; DCT_LC: Discourse Comprehension Test: Listening Comprehension; DCT_RC: Discourse Comprehension Test: Reading Comprehension; LC: composite score for Listening Competence; RC: composite score for Reading Competence

Firstly, the Chinese language and literacy proficiency of the ethnic minority students was evaluated through analysis of the standardized tests and the Chinese character recognition test. Their performances on the standardized tests of reading comprehension and listening comprehension were interpreted with reference to the norm of the local primary-one student. The raw scores were converted into percentile ranks of the norm. For the Chinese character recognition test, the percentage scores obtained by the students was reported as an estimate for their attainment. ANOVA analyses were also conducted to investigate if there was sub-group variance and performance difference by gender, ethnicity, and school.

Secondly, to identify the discrepancy of the oral and written language comprehension attainment of the students, the following analyses were conducted. Firstly, the student's performance on the reading comprehension and listening comprehension measures were compared. Comparisons were conducted in both types of comprehension tests: the standardized tests, the discourse comprehension tests, and the composite scores derived from these tests. *T*-test analyses were conducted to examine the statistical significance of the discrepancy. Secondly, comparison was also conducted between the oral and written versions of the same question sets in the Discourse Comprehension Test. As the two versions were matched in both content and form, the comparison would reveal difference attributable to the differences in mode of presentation (i.e., listening and reading).

Thirdly, the relative importance of character recognition and linguistic comprehension skills on reading comprehension was explored through adoption of the simple view model. First of all, as the simple view model has not been used in CSL reading study, the relevance of the model in explaining individual differences in the students' reading performance was explored through multiple regression analysis, a

method commonly used in studies adopted the simple view (e.g., Braze et al., 2007; Georgious et al., 2009; Hoover & Gough, 1990; Megaherbi et al., 2006; Savage, 2001). The strength of the predictive power of the multiplicative (i.e., $R = D \times L$) and addictive (i.e., $R = D + L$) relationship of character recognition and linguistic comprehension on reading comprehension were evaluated by adopting the hierarchical regression method as used in literature (e.g., Bast & Reitsma, 1998; Hoover & Gough, 1990; Georgiou et al, 2009). The relative importance of decoding ability and linguistic comprehension was then explored by comparing their β-value and squared semi-partial correlation coefficients in predicting reading comprehension performance.

Then, the students' performance on the Chinese Orthographical Awareness and Knowledge Test (COAKT) was analyzed to explore its importance for their reading performance at both character recognition and reading comprehension level. In the first place, the ethnic minority students' performance in the three sub-parts of the test was analysed to assess the development of their knowledge of the structural properties of the Chinese orthography. Then, the relationship of COAK with Chinese character recognition and reading comprehension was explored through correlational and regression methods as used in simple-view studies.

Lastly, the role of orthographic knowledge in Chinese character recognition and reading comprehension was explored with reference to the simple view model. Regression analyses were conducted with reading comprehension as the dependant variable predicted by (1) the product of COAKT and Listening Comprehension and; (2) the product of the combination of the COAK and Character Recognition Test and the Listening Comprehension; and (3) the COAKT and CRT as independent variables simultaneously. The results were compared to that produced by the products of CRT

and Listening Comprehension to examine whether the COAKT makes independent contributions to reading comprehension other than those shared with Chinese character recognition ability.

Chapter 4: Results and Findings 1: Chinese Literacy Attainment and Its Relations with Character Recognition Skills and Oral Language Competence

In chapter four and five, findings related to the three research questions, restated below, are summarized and presented:

1. What is the Chinese language and literacy attainment of the students? Is there a discrepancy of Chinese language and literacy development of the primary ethnic minority students?
2. What role does character recognition skill play in the students' Chinese reading comprehension performance? What are the relative contributions of character recognition skill and oral language comprehension competence on reading comprehension performance?
3. What is the relationship between the students' Chinese orthographic awareness and knowledge with their character recognition performance? How do this awareness and knowledge relate to their performance in reading comprehension?

Findings related to the first two questions are presented in this chapter. Those related to the last question are presented in the next chapter. Descriptive statistics for all the measures are first given in the following section.

4.1 Descriptive Statistics and Correlations among the Assessments Tools

Six measures were used in this study: (1) the Chinese Character Recognition Test (CRT), (2) the Chinese Orthographic Awareness and Knowledge Test (COAKT), (3) the Standardized Listening Comprehension Test (ST_LC), (4) the Standardized Reading Comprehension Test (ST_RC), (5) the Discourse Comprehension Test: Listening Comprehension (DCT_LC), and (6) the Discourse Comprehension Test:

Reading Comprehension (DCT_RC). Several students scored zero in some measures but no one scored all zero in all measures. The descriptive statistics of the measures is in table 9.

Table 9

Descriptive Statistics for All Measures (N=97)

Measures [a b]	Min	Max	Mean	SD	Skewness	Kurtosis
CRT (50)	0.00	45.00	13.02	10.61	1.34	1.46
COAKT (18)	2.00	18.00	12.36	3.30	-.80	.53
ST_LC (10)	0.00	9.00	4.14	2.32	.45	-.51
ST_RC (40)	0.00	35.00	7.90	7.10	1.72	3.11
DCT_LC (8)	0.00	8.00	5.11	2.04	-.29	-.35
DCT_RC (8)	0.00	8.00	3.48	2.45	.47	.79

a. The number in the blanket is the full mark of the measure.

b. CRT: Chinese Character Recognition Test; COAKT: Chinese Orthographic Awareness and Knowledge Test; ST_LC: Standardized Listening Comprehension Test; ST_RC: Standardized Reading Comprehension Test; DCT_LC: Discourse Comprehension Test: Listening Comprehension; DCT_RC: Discourse Comprehension Test: Reading Comprehension

Result of normality tests indicated that the measures' distributions were not normal and data transformations failed to normalize them. The results of the tests and transformations are attached as Appendix J. As the normality assumption was not met, non-parametric statistical analyses were performed in parallel with the parametric ones wherever available, and the interpretations on the results of the latter analyses should be reviewed with cautions.

The correlations among the measures are shown in table 10 and table 11.

Table 10

Pearson's Correlations among All Measures (N=97)

Measures[a]	CRT	COAKT	ST_LC	ST_RC	DCT_LC	DCT_RC
CRT	---	.54**	.64**	.70**	.28**	.44**
COAKT		---	.49**	.39**	.43**	.30**
ST_LC			---	.62**	.29**	.47**
ST_RC				---	.26**	.37**
DCT_LC					---	.29**
DCT_RC						---

** $p < .01$, *one-tailed*

a. CRT: Chinese Character Recognition Test; COAKT: Chinese Orthographic Awareness and Knowledge Test; ST_LC: Standardized Listening Comprehension Test; ST_RC: Standardized Reading Comprehension Test; DCT_LC: Discourse Comprehension Test: Listening Comprehension; DCT_RC: Discourse Comprehension Test: Reading Comprehension

Table 11

Spearman's Rho Correlations among All Measures (N=97)

Measures[a]	CRT	COAKT	ST_LC	ST_RC	DCT_LC	DCT_RC
CRT	---	.55**	.51**	.33**	.27**	.42**
COAKT		---	.48**	.33**	.43**	.30**
ST_LC			---	.51**	.28**	.48**
ST_RC				---	.21**	.33**
DCT_LC					---	.31**
DCT_RC						---

** $p < .01$, *one-tailed*

a. CRT: Chinese Character Recognition Test; COAKT: Chinese Orthographic Awareness and Knowledge Test; ST_LC: Standardized Listening Comprehension Test; ST_RC: Standardized Reading Comprehension Test; DCT_LC: Discourse Comprehension Test: Listening Comprehension; DCT_RC: Discourse Comprehension Test: Reading Comprehension

All measures were significantly correlated at the .01 level as shown from the parametric and non-parametric analyses. The two measures for Chinese character knowledge and reading skill, the CRT and the COAKT, were significantly correlated with each other at *Pearson's r* = .54 / *Spearman's r* = .55. The two measures for listening comprehension, the ST_LC and the DCT_LC, were significantly correlated with each other at *Pearson's r* = .29 / *Spearman's r* = .28. The two measures for reading comprehension, the ST_RC and the DCT_RC, were significantly correlated with each other at *Pearson's r* = .37 / *Spearman's r* = .33.

4.2 Research Question 1: The Chinese Language and Literacy Proficiency of the students and the Discrepancy between the Language and Literacy Attainment

4.2.1. The Chinese language and literacy proficiency of the ethnic minority student. The Chinese language and literacy proficiency of the ethnic minority students in this study was explored in three aspects: their Chinese decoding ability, their Chinese listening and reading comprehension abilities. The students' performances in the three respective measures, the CRT, the ST_LC and the ST_RC, were evaluated through referencing to the local primary-one students' Chinese standard.

For Chinese decoding ability, the ethnic minority students could recognize on average 13.02 Chinese characters from a list of 50 characters of primary-one level, equivalent to a percentage rate of 26%. The distribution of the percentage score was shown in figure 1. The scores were concentrated at the lower end of the scale.

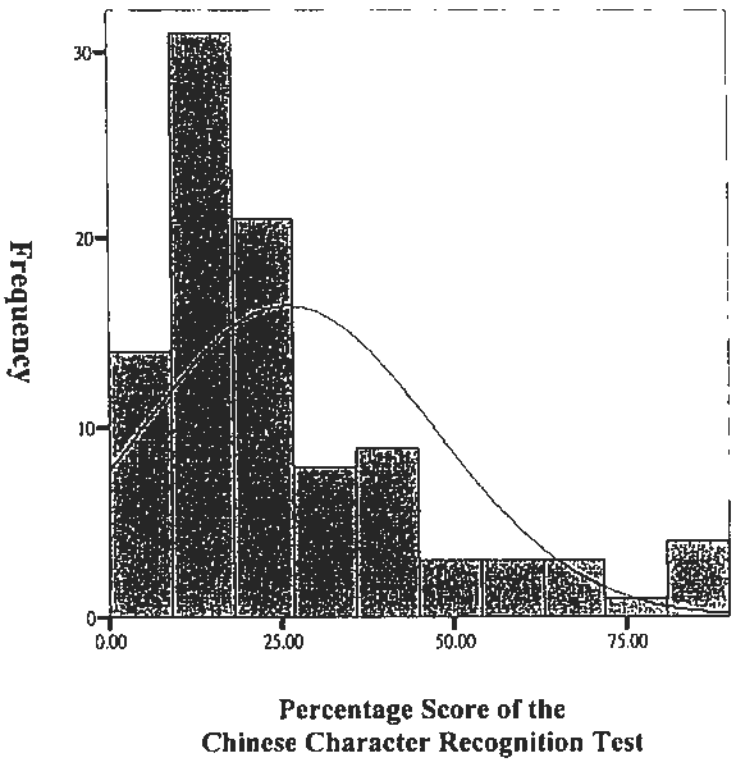

Figure 4. Distribution of the percentage score of the Chinese character recognition test

For Chinese listening and reading comprehension competences, the standardized tests have a norm of local primary-one students (from the sample of 1999/2000 academic year) for score interpretation. The raw scores were converted to percentile ranks. After conversion, the average percentile rank of the ethnic minority student in the listening measure was 27.04, and that of the reading measure was 11.65. That means, the ethnic minority students on average scored lower than 72.96% of the norm-group students in listening comprehension, and scored lower than 88.35% of the norm-group students in reading comprehension. The percentage score distributions of the two measures are shown in figure 2 and 3 respectively.

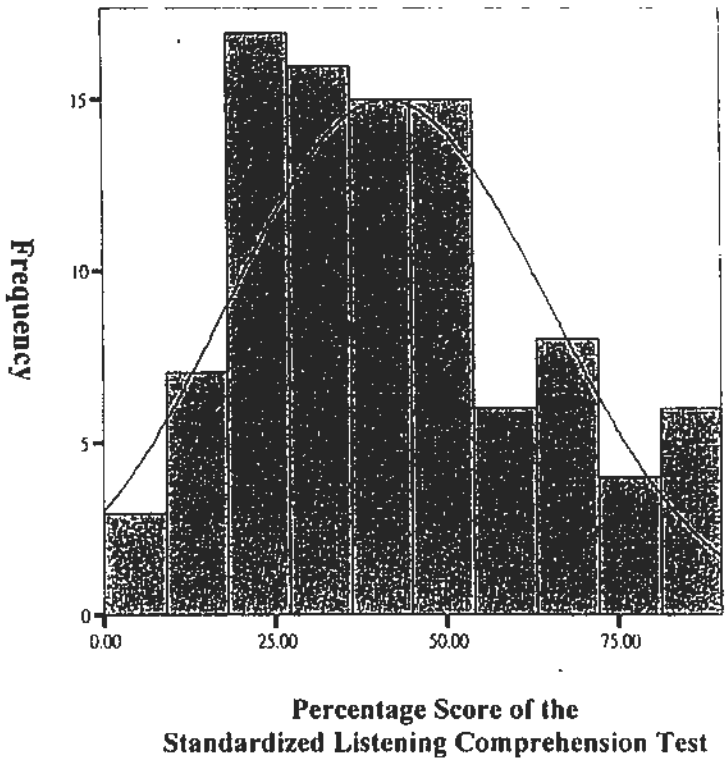

Figure 5. Distribution of the percentage score of the Standardized Listening Comprehension Test

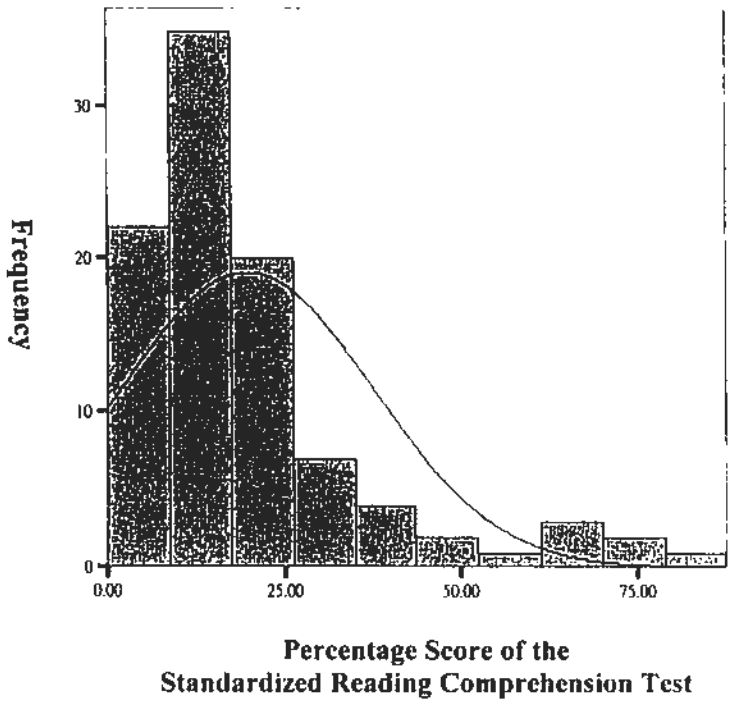

Figure 6. Distribution of the percentage score of the Standardized Reading Comprehension Test

The distribution of the percentage score of the reading comprehension measure was just like that of the Chinese character recognition test. The scores were concentrated on the lower end of the distribution. For the listening comprehension measure, the scores were much more evenly distributed. A substantial proportion of students scored around the median.

Comparisons were conducted among the students by different grouping methods, namely, by gender, school, and ethnicity (as there was only one student each of Thai, Indonesian, and others, they were excluded from the comparisons). No significant effect of gender or ethnicity was found in all three measures through either the parametric or the non-parametric methods. A significant difference was found in comparison by schools in all three measures. The results are shown in table 12.

Table 12

ANOVA and Kruskal-Wallis Test of the Three Measures (CRT, ST_LC, & ST_RC) by School

Measures [a]	Parametric ANOVA		Non-Parametric Kruskal-Wallis Test	
	$F(3, 93)$	p	$\chi^2(3)$	p
CRT	12.29	.00	28.43	.00
ST_LC	8.79	.00	19.79	.00
ST_RC	6.58	.00	9.37	.05

a. CRT: Chinese Character Recognition Test; COAKT: Chinese Orthographic Awareness and Knowledge Test; ST_LC: Standardized Listening Comprehension Test; ST_RC: Standardized Reading Comprehension Test; DCT_LC: Discourse Comprehension Test: Listening Comprehension; DCT_RC: Discourse Comprehension Test: Reading Comprehension

A post hoc Tucky HSD test showed that students from one school significantly outperformed those from the other three schools in all three measures. The results are shown in table 13.

Table 13

Post hoc Analysis (Tucky HSD) of the Mean Differences in the Three Measures (CRT, ST_LC, & ST_RC) by School

Test [a]	School (I)	School (J)	Mean Difference (I-J) [b]	Sig.
CRT	A	B	28.18	.00
		C	19.17	.01
		D	21.12	.00
ST_LC	A	B	22.75	.00
		C	21.00	.02
		D	25.43	.00
ST_RC	A	B	12.46	.03
		C	16.76	.02
		D	17.84	.00

a. CRT: Chinese Character Recognition Test; COAKT: Chinese Orthographic Awareness and Knowledge Test; ST_LC: Standardized Listening Comprehension Test; ST_RC: Standardized Reading Comprehension Test; DCT_LC: Discourse Comprehension Test: Listening Comprehension; DCT_RC: Discourse Comprehension Test: Reading Comprehension

b. Means of the three measures were computed upon the percentage scores.

4.2.2. Comparison between the ethnic minority students' Chinese oral language and literacy proficiency

First of all, in view of the significant interrelationships between the two listening and the two reading comprehension measures, each pair of measures is combined into one composite score to index the competence in listening and reading comprehension respectively (i.e., LC for listening comprehension and RC for reading comprehension). Descriptive statistics for the two composite scores (after converted into percentage scores) are shown in table 14.

Table 14

Descriptive Statistics for the Composite Score Listening Competence (LC) and Reading Competence (RC) (N=97)

Composite Score	Minimum	Maximum	Mean	SD
LC	11.11	94.44	51.43	19.47
RC	0.00	85.42	23.71	17.34

Note: the score is converted into percentage score.

Then, three pairs of score representing the students' language and literacy proficiency were compared: (1) the percentile-rank score of the standardized listening comprehension test against that of the standardized reading comprehension test; (2) the score of the Listening Comprehension test against that of the Reading Comprehension test in the Discourse Comprehension Test; and (3) the listening composite score and the reading composite score. The significance of the differences was verified through parametric t-test and non-parametric Wilcoxon Signed Ranks Test. The results are in table 15 and table 16 respectively.

Table 15

t-test Results for the Comparison of the Listening and Reading Comprehension Measures

Score Comparison of Measures [a]		Mean	Mean Difference (I-J)	*t*	*df*	Sig.(2-tailed)
ST	ST_LC (I)	27.03 [b]	15.38	6.82	96	.00
	ST_RC (J)	11.65 [b]				
DCT	DCT_LC (I)	5.11 [c]	1.63	5.96	96	.00
	DCT_RC (J)	3.48 [c]				
CS	LC (I)	51.43 [d]	27.72	16.89	96	.00
	RC (J)	23.71 [d]				

a. ST: Standardized Test; ST_LC: Standardized Listening Comprehension Test; ST_RC: Standardized Reading Comprehension Test; DCT: Discourse Comprehension Test; DCT_LC: Discourse Comprehension Test: Listening Comprehension; DCT_RC: Discourse Comprehension Test: Reading Comprehension; CS: Composite Score derived from ST & DCT; LC: composite score for Listening Competence; RC: composite score for Reading Competence

b. Percentile Rank Score c. Raw Score with a Full Mark of Eight d. Percentage Score

Table 16

Wilcoxon Signed Ranks Test Results for the Comparison of the Listening and Reading Comprehension Measures

Score Comparison of Measures [a]		Median	*Z*	Sig.(2-tailed)
ST	ST_LC (I)	16.1 [b]	6.34	.00
	ST_RC (J)	5.9 [b]		
DCT	DCT_LC (I)	5 [c]	5.13	.00
	DCT_RC (J)	3 [c]		
CS	LC (I)	50 [d]	8.42	.00
	RC (J)	18.75 [d]		

a. ST: Standardized Test; ST_LC: Standardized Listening Comprehension Test; ST_RC: Standardized Reading Comprehension Test; DCT: Discourse Comprehension Test; DCT_LC: Discourse Comprehension Test: Listening Comprehension; DCT_RC: Discourse Comprehension Test: Reading Comprehension; CS: Composite Score derived from ST & DCT; LC: composite score for Listening Competence; RC: composite score for Reading Competence

b. Percentile Rank Score c. Raw Score with a Full Mark of Eight d. Percentage Score

As shown in the above tables, there was a significant difference between the students' Chinese listening comprehension and reading comprehension skill. The differences revealed unambiguously the superiority of the student's listening competence.

The above comparisons of listening and reading competences were all made within person, that is, each student's performance on the listening comprehension measures was compared with his or her performance on the reading comprehension measures. However, as the measures of reading and listening comprehension contain different content and items, the accuracy of these comparisons may be affected. In view of this, comparisons were also conducted between passages of the oral and written version. Each set of comprehension questions of the *Discourse Comprehension Test* has oral and written version, but for avoidance of repeated testing, different students took different versions of the same passage. The average scores of the oral and written versions of the four sets of questions are shown in table 17.

Table 17

Means of the Oral and Written Version of the Discourse Comprehension Test

Question Set	Oral Version	Written Version
1	2.04 (n = 55; SD = 1.28)	2.17 (n = 42; SD = 1.56)
2	2.82 (n = 55; SD = 1.44)	2.64 (n = 42; SD = 1.45)
3	3.55 (n = 42; SD = 1.17)	1.65 (n = 55; SD = 1.34)
4	1.90 (n = 42; SD = 1.56)	0.82 (n = 55; SD = 1.16)

As shown in table 17, in all four sets of questions, except set 1, the student's performance in the oral version is better than that in the written version

In sum, all comparisons between the listening and reading measures show that

their Chinese listening competence is better than their Chinese reading competence. The discrepancy of the students' Chinese oral language and literacy skills was shown.

4.3 Research Question 2: The contributions of character recognition skill and oral language comprehension competence on reading comprehension performance

4.3.1. The validity of the simple view. The simple view model states that reading comprehension (*R*) is a product of decoding (*D*) and linguistic comprehension (*LC*). The model is expressed as "*R = D x LC*". In the following analyses, decoding was tapped by the CRT; linguistic comprehension was indicated by the composite scores LC (derived from scores of the ST_LC and DCT_LC); and the reading comprehension component was indicated by the composite score RC (derived from scores of the ST_RC and DCT_RC) as introduced previously.

As stated above, there are two perspectives on the relationship between decoding and linguistic comprehension. One is multiplicative as in the formula: "*R = D x LC*"; the other is additive as in the formula: "*R = D + LC*". The multiple regression methods adopted by Hoover and Gough (1990), Dreyer and Katz (1992), Chen and Velleutina (1997) were adopted to evaluate the relevance of the two models. First, the additive combination of *D* and *LC* was entered into the regression equation followed by the multiplicative combination to see if the product term could account for additional variance in *R*. Then, the order is reversed: the multiplicative combination was entered first and followed by the additive combination too see if the additive term could account for additional variance in *R*. The results are summarized in table 18.

Table 18

Summary of Regression Analyses for the Simple View Model [a]

Independent Variable	Multiple *R*	R^2 Change	*F* Change (*df1*, *df2*)	*P*
Additive Combination followed by Multiplicative Combination [b]				
1. Additive	.77	.59	67.90 (2, 94)	.00
2. Multiplicative	.80	.05	13.25 (1,93)	.00
Multiplicative Combination followed by Additive Combination				
1. Multiplicative	.80	.64	168.06 (1, 95)	.00
2. Additive	.80	.00	.40 (2, 93)	.67

a. Dependant variable: Reading Comprehension

b. Additive is the sum of decoding and linguistic comprehension. Multiplicative is the product of decoding and linguistic comprehension.

Either the additive or the multiplicative model alone made a substantial account of the variance of reading comprehension: the former model was 59% and the latter was 64%. Referencing to the findings of previous simple-view studies, whereas the range of reading variance explained was from 43.9% to 89.9%, the validity and relevance of the simple view for CSL reading research was supported.

Moreover, the findings showed that the multiplicative model is superior to the additive one in explaining the reading comprehension variance. Not only could the multiplicative term explain a greater amount of variance, but it could also account for an additional significant proportion of variance on top of the additive term. In reverse, all the predictive power of the additive term was included in the multiplicative term. In sum, the validity of the simple view and the superiority of the multiplicative model for CSL reading comprehension were supported by the findings.

4.3.2. The contributions of decoding and linguistic comprehension in reading comprehension. To investigate the relative importance of decoding and linguistic comprehension in reading comprehension, the multiple regression analysis used in Shankweiler et al. (1999) and Braze et al. (2007) was adopted. These studies predicted reading comprehension performance by entering decoding and linguistic comprehension as the independent variables simultaneously. The relative importance of the two variables was evaluated then by comparing their standardized Beta value (β). For this regression analysis, the dependant variable reading comprehension was indicated by the composite score *RC*, the independent variables decoding and linguistic comprehension were indicated by the score of the CRT and the composite score *LC* respectively. As shown above, the two predictors accounted for 59% of RC variance (F (2, 94) = 67.90, $p < .00$), and their β-values are shown in table 19.

Table 19

Summary of Regression Analyses for the contributions of Decoding and Linguistic Comprehension on Reading Comprehension [a]

Independent Variable	β	t	P	Semi-partial Correlation
Decoding	.56	6.90	.00	.46
Linguistic Comprehension	.29	3.56	.00	.24

a. Dependant variable: Reading Comprehension

The β-values show that both decoding and linguistic comprehension were significant predictors for Chinese reading comprehension. By comparison, decoding was a more important factor as its β-value was about twofold than that of linguistic comprehension. The semi-partial correlation coefficients indicated that 21% and 6% variance in reading comprehension was associated uniquely with Chinese character

recognition and listening comprehension respectively. The importance of decoding in accounting for the reading variance was greater than that of linguistic comprehension in these primary-four ethnic minority students.

Chapter 5: Results and Findings 2: Chinese Orthographic Awareness and Knowledge and Its Relations with Character Recognition Skills and Reading Performance

In this chapter, findings related to the third research question: "What is the relationship between the students' Chinese orthographic awareness and knowledge (COAK) with their character recognition performance? How do this awareness and knowledge relate to their performance in reading comprehension?" are reported. Descriptive statistics for different parts of the measure *Chinese Orthographic Awareness and Knowledge Test* (COAKT) is given first.

5.1 Descriptive Statistics for the measure COAKT

The COAKT consists of three sub-parts with a total of 18 items. The three sub-parts of the test are developed to assess student's awareness and knowledge of the outer and inner structure of the Chinese character, as stated earlier. Part One is a radical perception task for the outer structure, in which six items require the student to decompose several characters. The other two parts assess the student's awareness of the inner structure. One is a semantic radical test for the awareness of the radicals' meaning-cueing function. The other is a phonetic radical test for the awareness of the pronunciation-cueing function. Each of the two sub-parts has six items. All items are assigned one mark and the full mark of the measure is 18.

As given earlier, the average score of the students on the measure is 12.36 (SD = 3.3). The average scores of each of the three sub-parts are in table 20.

Table 20

Descriptive Statistics for the Three Sub-parts of the Chinese Orthographic Awareness and Knowledge Test (N=97)

Parts	Minimum	Maximum	Mean	SD
Radical Perception Items (6)	.00	6.00	4.82	1.55
Semantic Radical Items (6)	1.00	6.00	4.94	1.23
Phonetic Radical Items (6)	.00	6.00	2.59	1.48

 # The number in the blanket is the full mark of the measure.

The students performed better on the radical perception and semantic radical items than on the phonetic radical items. The inter-correlations of the three sub-parts are in table 21.

Table 21

Inter-Correlations Among the Three Sub-parts of the Chinese Orthographic Awareness and Knowledge Test (N=97)

Measures	(1)	(2)	(3)
(1) Radical Perception Items	---	.68**	.24**
(2) Semantic Radical Items		---	.28**
(3) Phonetic Radical Items			---

*** P < 0.01 (1-tailed)*

The three sub-parts were significantly correlated.

5.2 Research Question 3: Relationship between COAK and Chinese character recognition and reading comprehension

Overall speaking, the student's performance on the *Chinese Character Recognition Test* (CRT) and the COAKT were significantly correlated, with a

coefficient value of .54 at the .01 level. The correlations of the three sub-parts of the COAKT with the CRT are reported in table 22.

Table 22

Correlations between the Chinese Character Recognition Test and the Three Sub-parts of the Chinese Orthographic Awareness and Knowledge Test

Measure / Parts of Measure	Chinese Recognition Test
Chinese Orthographic Awareness and Knowledge Test	
(1) Radical Perception Items	.46**
(2) Semantic Radical Items	.44**
(3) Phonetic Radical Items	.37**

** *P < .01 (1-tailed)*

All three sub-parts were significantly correlated with the Chinese Recognition Test at.01 level.

In order to investigate the relationship between the COAK and reading comprehension, correlational analysis was conducted between the students' COAKT performance and their reading comprehension composite score (RC). The two measures had a correlation coefficient of .42, which was significant at the .01 level.

Based on the results of these correlational analyses, regression method was adopted to explore the relationship between the COAK with Chinese character recognition and reading comprehension. The results of the two regression analyses are summarized in table 23.

Table 23

Summary of Regression Analyses with the COAKT as the Independent Variable to Predict the CRT and RC

Dependent Variable	Multiple *R*	R^2	*F (df1, df2)*	*P*
CRT	.54	.29	39.52 (1, 95)	.00
RC	.42	.17	19.98 (1, 95)	.00

a. COAKT: Chinese Orthographic Awareness and Knowledge .Test

b. CRT: Chinese Character Recognition Test; RC: Composite Score for Reading Competence

The COAK accounted for significant amount of variance in both Chinese character recognition and reading comprehension: 29% for the former and 17% for the latter. As for the relationship between COAK and Chinese character recognition, the regression result of this study was similar to that found between phonological decoding (measured by pseudo-word reading measure) and word recognition (measured by real-word reading measure) in English-speaking children by Neuhaus et al. (2006). Neuhaus et al. reported a *F*-value of 38.38, which was close to the *F*-value 39.52 as is reported in table 20.

5.3 Research Question 3: The Role of COAK in Chinese Character Recognition and Reading Comprehension

Several multiple regression analyses were conducted to assess the role of COAK in Chinese reading performance of the students. First, the COAKT replaced the CRT as measure of decoding ability (*D*). Multiple regression analysis of the simple view model (i.e., $R = D \times LC$) was then conducted. The results of the two regression analyses using different measures for *D* are shown in table 24.

Table 24

Summary of Regression Analyses with Reading Comprehension as the Dependant Variable to be Predicted by "CRT x LC" and "COAKT x LC"

Independent Variable	Multiple *R*	R^2	*F* (*df1*, *df2*)	*P*
CRT x LC	.80	.64	168.06 (1, 95)	.00
COAKT x LC	.66	.44	73.86 (1, 95)	.00

Note: CRT = Chinese Character Recognition Test; LC = the composite score for Linguistic Competence; COAKT = the Chinese Orthographic Awareness and Knowledge Test

Though the COAKT and LC could account for a significant variance of 44% of RC, the amount of explained variance was less in comparison with that of the CRT and LC (64%).

Secondly, to investigate whether the COAKT taps on aspect of Chinese decoding ability not covered by the CRT, the scores of the two measures were combined to derive a composite score (indicated as CRT+COAKT). Analysis was conducted to examine whether this composite score is a better index for decoding ability than the CRT alone. The results of the two regression analyses using different measures for *D* are shown in table 25.

Table 25

Summary of Regression Analyses with Reading Comprehension as the Dependant Variable to be Predicted by "CRT x LC" and "(CRT + COAKT) x LC"

Independent Variable	Multiple *R*	R^2	*F* (*df1*, *df2*)	*P*
CRT x LC	.80	.64	168.06 (1, 95)	.00
(CRT + COAKT) x LC	.79	.63	159.52 (1, 95)	.00

Note: CRT = Chinese Character Recognition Test; LC = the composite score for Linguistic Competence; COAKT = the Chinese Orthographic Awareness and Knowledge Test

The combination of the COAK and Chinese character decoding ability did not account for significantly more variance in reading than the Chinese decoding ability alone.

Lastly, to avoid the potential confounding effect brought with the combination with linguistic comprehension, multiple regression was conducted using only the literacy skill measures. In this analysis, RC was the dependent score, and CRT and COAKT were entered simultaneously as the independent variables to assess their individual contribution. This regression model produced a multiple R of .73 (R^2 = .54), with a F-value of 54.38 which was significant at .00 level. The β-value of the CRT and the COAKT are in table 26.

Table 26

Multiple Regression Analysis with Reading Comprehension as the Dependent Variable to be Predicted by the CRT and the COAKT

Independent Variable	β	t	P
CRT	.72	8.58	.00
COAKT	.03	.34	0.73

Note: CRT = The Chinese Character Recognition Test, COAKT = the Chinese Orthographic Awareness and Knowledge Test

The COAKT had no significant contribution to reading comprehension once the CRT was taken into account.

In sum, the results of multiple regression analyses showed that COAK constituted just an aspect of Chinese decoding skill. The effect of its measure, the COAKT, was included in the CRT. The CRT was a more thorough measure for

Chinese decoding skill for prediction of reading performance in the simple view framework.

Chapter 6: Summary and Discussion

This study extends our knowledge about acquisition of Chinese literacy by ethnic minority students in Hong Kong primary schools. Their Chinese proficiency in terms of character recognition, listening comprehension, and reading comprehension were evaluated against the local standards. Further analyses were conducted in accordance with the simple view of reading, in which the importance of decoding and linguistic comprehension abilities on reading comprehension was compared. The role of decoding in reading was explored with respect to the influence of awareness and knowledge of the structural properties of the Chinese writing system. The study shed light on the literacy acquisition process in Chinese as second language (CSL) learners. The following sections summarize the findings of the study and discuss their implications according to the research questions.

6.1 Chinese Proficiency of the Ethnic Minority Students in Hong Kong

The Chinese language and literacy proficiency level of the participating primary-four ethnic minority students is low. The students on average could recognise only 26% of the fifty sampled Chinese characters of primary-one level. They attained an average percentile rank 27.04 in the standardized listening test and an average percentile rank 11.65 in the standardized reading test. Compared to local students, the average performance of the students in this study was only at the lower-end of primary-one students.

Moreover, a discrepancy between oral language and written language competence was observed. The students' listening ability was significantly higher than their literacy skill. Compared to their listening comprehension skill, the ethnic

minority students' literacy skills, both in terms of character recognition rate and reading comprehension skills, developed much slower than and lagged far behind the local students' standard. Moreover, while the students' listening comprehension ability was evenly distributed around the median score, their reading abilities distribution was severely skewed to the right, indicating a high concentration of under-achievers.

These findings of low proficiency level and language-literacy disparity were also observed in previous studies of Hong Kong secondary school ethnic minority students (Ku et al., 2005; Loper, 2004). However, these precedent studies employed self-report questionnaires or one-to-one interview techniques to address the issue. The results were difficult to interpret without an objective criterion. This study is, as far as the author knows, the first one that employed achievement-testing instruments with a standardized norm to assess ethnic minority students' proficiency. Comparing the students' performance to the local norm, the results revealed their low Chinese proficiency level objectively.

Furthermore, these previous studies were on secondary school students. The reported problems and tardy development in their Chinese acquisition may have long-term underlying cause in primary grades as shown in this study. With a weak foundation in Chinese language and literacy skills, the primary students sampled in this study would probably have problems in enhancing their Chinese language proficiency in secondary school. Compared to oral language development, the need for formal instructions in literacy skills development is more acute. Hence, in order to facilitate these students' Chinese literacy acquisition and development, proper instructions tailoring to their needs should be provided. Details of the educational implications of the findings are discussed in the following sections.

Other than these, the results also showed that there is no difference in performance among different ethnic groups. These ethnic groups are of different native languages, namely, Hindi, Punjabi, Urdu, Nepali, Thai, Filipino, and Indonesian. However, the differences of the mother tongues or the native cultural backgrounds have no observable effect on their Chinese attainment. Influence and transfer (for both positive and negative) of the first language upon CSL acquisition in the ethnic minority students are not revealed in the results of this study.

On the other hand, students from one school outperformed their counterparts from the other three schools in all the measures of the study. As school effect is not a focus of the study, information about curricula design and instruction methods employed in different schools was not collected. The available information shows that the most distinctive difference of the outperforming school is its long history of admitting ethnic minority students in Hong Kong. The experiences and readiness of the school and teachers are certainly much better than those of the other three schools.

However, it should be cautioned that the group comparisons were conducted mainly for identifying if there is significant sub-group variance. As relevant information like the students' daily use of language and exposure to Chinese language had not been collected, no conclusions can be made on the results. The results only suggested that further investigations might be conducted on the effects of contextual and environmental factors like instructions on the students' Chinese attainment.

In sum, the results have shown that the students' Chinese language and literacy attainment were low and their reading competence was worse than listening competence. Influence of gender or mother tongue was not found while that of the schooling and instructions was observed. The relationship between the Chinese

character recognition and reading performance was further explored by adopting the simple view model.

6.2 Relationship among Linguistic Comprehension, Chinese Character Recognition and Reading Comprehension

To explore the relationship among linguistic comprehension, Chinese character and reading comprehension, this study adopted the simple view of reading proposed by Gough and Tunmer (1986). As the simple view model has not been undertaken as a research framework for CSL study before, this study first investigated the relevancy of the model. The results supported the validity of the model for CSL research. Through multiple regression analysis, it was shown that the combination of Chinese character recognition and listening comprehension accounted for a significant amount of variance in reading comprehension. The results further indicated that, in explaining the variance of the students' reading comprehension performance, the multiplicative combination of the character recognition and listening comprehension was better than their additive combination. The former accounts for 64% while the latter 59%.

The simple view was proposed with an aim to clarify the role of decoding[11] in reading. Linguistic comprehension is presumed as another necessary and significant factor for reading comprehension achievement and development. Simple-view studies in alphabetic languages suggested a developmental change of the two variables' contributions on reading as a function of the readers' decoding competence development (Catts et al., 2005; Chen & Vellutino, 1997; Neuhaus et al., 2006). The

[11] For this study, decoding is taken not only as phonological decoding as some studies adopted. It refers to word recognition in alphabetic languages and character recognition in Chinese. It is the act of lexical access from which linguistic information (not only phonological ones) are extracted from the graphical display.

greater influence of decoding in the initial stage will be gradually taken by linguistic comprehension as most of the readers have attained fluent decoding ability.

With reference to this developmental trend and by specifying the contributions of character recognition and listening comprehension, the results help to clarify the role played by character recognition in Chinese reading performance. Both character recognition and listening competence were significant factors in explaining the variance in reading, but the influence of the former was far greater than that of the latter. With reading comprehension as the dependant variable, the β-value of character recognition was .56 and that of listening competence was .29. The semi-partial correlation coefficients indicated that 21% and 6% variance in reading comprehension was associated uniquely with Chinese character recognition and listening comprehension respectively. The contributions on reading performance of the character recognition were significantly greater than listening competence in the participating primary-four students at this stage of their reading development.

The primary-four students were still at the beginning stage of their Chinese literacy acquisition and their under-developed literacy skills have contributed to the dominant influence of character recognition on reading . Findings from some simple-view studies showed that, even at senior grade levels, word recognition could still account for more variance in reading if the language has a deep orthography (e.g., Megherbi et al., 2006), or if the students have reading problems (e.g., Braze et al., 2007). In either case, the readers attain fluent word recognition at a slower rate and thus ceiling effect in word recognition appears later. The contributions of linguistic comprehension, though still remaining significant, are relatively lesser comparing to that of word recognition.

For the ethnic minority students in this study, their Chinese character recognition skill was severely under-developed. The amount of characters they could recognize is very limited. The slow development of decoding ability contributes to its influence on reading comprehension. Comparing to linguistic comprehension, character recognition had a greater contributions on reading performance. The students' under-developed literacy skill is further aggravated by the complicated and opaque Chinese orthography.

The complexity and opaqueness of Chinese orthography could be discerned by comparison with the alphabetic writing systems. An alphabetic orthography is a sound-based system following the alphabetic principle that represents phoneme by grapheme. In contrast, Chinese orthography not only maps characters onto sounds (i.e., the syllable) but also onto meanings (i.e., the morpheme). This "dual" representation of the Chinese orthography was further complicated by the high graphic density (as compared with the Latin alphabets) of Chinese characters.

Moreover, the transparency of Chinese orthography is rather low. In alphabetic systems, orthography transparency is determined by the degree of grapheme-phoneme correspondence consistency. Deep orthographies are those having opaque spelling-sound relation. For example, English is a deep orthography as a sound can be spelled differently and a spelling can stand for different sounds. From this perspective, the Chinese writing system is even "deeper," as the validity of the semantic and phonetic radicals is rather low (康加深, 1993; 李燕、康加深, 1993). The meaning- and sound- cueing functions of the radicals are inaccurate and unreliable. Moreover, these functional radicals may be blended with perceptual radicals, which serve merely as visual features in a compound character (Shen & Ke,

2007). The opaqueness of the Chinese character causes difficulties in literacy acquisition and development.

The complexity and opaqueness of the Chinese system has long been considered a major hurdle for CSL learners (e.g., Everson, 1998, 2002; Shen, 2005; Xing, 2006). This study provided empirical support for this assumption by examining the students' performance with reference to the simple view model. It is found that reading performance was heavily related to character recognition ability even with control of the effect of linguistic comprehension. Moreover, character recognition accounted for a greater variance in reading than linguistic comprehension. The relationship between the students' orthographic knowledge and their reading performance was further analyzed in the following.

6.3 Relationship between Chinese Orthographic Awareness and Knowledge with Character Recognition and Reading Performance

This study investigated the students' Chinese orthographic awareness and knowledge with respect to the outer and inner structural properties of Chinese character. Generally speaking, the students performed fairly well on the measure. They obtained an average score of 12.36 out of a full mark of 18, equivalent to about a 70% correct rate. The students performed better at the radical perception items (80% correct rate) and semantic radical items (82% correct rate) than at the phonetic radical items (43% correct rate).

With reference to the Chinese orthographic development models (Ho, Ng, & Ng, 2003; Ho, Yau, & Au, 2003; Jackson et al., 2003), these students have developed a fair knowledge and understanding of the structural properties of the Chinese character. The students have acquired enough knowledge about the basic structure of

Chinese characters to identify the component radicals. They had also attained a good knowledge of the high-frequency semantic radicals and could use this knowledge to access meanings of novel characters. However, their functional knowledge of the phonetic radical and skills in using this knowledge to access the pronunciation of the character were not developed as well. This may be related to the highly unreliable nature of the phonetic radicals (Shen & Ke, 2007).

The students' Chinese orthographic awareness and knowledge was significantly related to Chinese character recognition. All three sub-parts of the Chinese Orthographic Awareness and Knowledge Test (COAKT) were significantly correlated with the Chinese Recognition Test (CRT). The students' orthographic knowledge accounted for a substantial amount of variance (29%) in their character recognition performance. This is consistent with previous research findings on the relationship between Chinese orthographic knowledge and character reading in native Chinese children (e.g., Cheung et al., 2006; Ho, Ng, et al., 2003; Li et al., 2002) and in CSL adult learners (e.g., Pine et al., 2003; Shen & Ke, 2007). The findings in this study provided support for this relationship in the literacy development of CSL young learners.

On the other hand, the effect of orthographic knowledge on reading is mediated through character recognition. As shown in the results of multiple regression analyses, the COAKT failed to account for more variance in reading comprehension either by replacing the CRT or by combining with the CRT as independent variable. Furthermore, the COAKT had no significant contribution in reading comprehension once the effect of CRT was taken into account. These findings suggested that orthographic knowledge and reading comprehension was indirectly related through the mediation of character recognition.

The relationship between orthographic knowledge and character recognition can be further clarified by referencing to the role of alphabetic knowledge in literacy development. In alphabetic languages, it was found that knowledge of grapheme-phoneme correspondences (GPC) helps to build up strong lexical representations for efficient sight-word reading (e.g., Ehri, 2005; Perfetti, 1992; Perfetti & Hart, 2002; Share & Jorn, 1987). Similarly, in Chinese, knowledge of the structural configuration and the radical functionality of character also provide high-quality representations for efficient character recognition.

The GPC knowledge serves as a mnemonic system to secure sight word in mind (Ehri, 1991), and to strengthen the connections between a word's graphic and phonemic form (de Jong & Share, 2007) by making them more accurate and redundant (Perfetti, 1991). These connections were accumulated as high quality representations for efficient word recognition. Similarly, in Chinese, the knowledge of characters' structural properties and functionalities helps to build up accurate representations consisted of strong connections with linguistic information. These high quality representations facilitate efficient character recognition.

From a measurement perspective, the COAKT assesses the orthographic knowledge contributing to the lexical representation quality. The quality of the representations affects the efficiency of character recognition which, in turn, is assessed by the CRT. In other words, the CRT is a measure that evaluates the 'full' Chinese character recognition ability and the COAKT is a measure evaluating the foundational orthographic knowledge base for efficient recognition.

In sum, it was shown that, although the students could only recognise a limited amount of character, they have developed fair understanding of the structural properties of the Chinese orthography. Their Chinese orthographic knowledge is

significantly related to character recognition ability and its effect on reading performance was mediated by the latter.

6.4 Educational Implications

The findings of this study have some educational implications for both Hong Kong ethnic minority students and CSL learners in general.

This study found that the Hong Kong ethnic minority students' Chinese proficiency is far below their grade level. It appears that the mainstream grade-equivalent instructions and learning materials in Chinese are not suitable for them. Intensive tutorial support and adapted materials tailored to their needs need to be provided to enable them to integrate into the mainstream classrooms. Without proper support, these students' Chinese proficiency may suffer tardy development and lead to serious problems later, as shown in studies on secondary school ethnic minority students (Ku et al., 2005; Loper, 2004)

The adapted curricula and materials provided to these students should be developed at a level appropriate to the students' ability. Students of Ku et al.'s (2005) and Loper's (2004) studies found the Chinese classes provided for them too simple and ineffective for raising their Chinese ability to an acceptable standard. This study also showed that the primary students have achieved a certain level of Chinese competence in oral language skills. They also have fair knowledge of the Chinese orthography. These competence and knowledge of the language should be utilized as a platform for further development.

The findings of the study suggest that Chinese classes provided for CSL learners should make literacy training one of the foci at the early stage. This suggestion has no intention of underrating the importance of oral language

competence in CSL learning and teaching. In contrast, oral language competence is crucial for literacy acquisition and a significant variable in predicting reading competence as indicated by the simple-view studies. Hence, literacy training, in the sense of explicit and systematic teaching of the structural properties of the Chinese character, is suggested to implement intensively in the early stage of 'learning to read' along with other learning contents. At this stage, character acquisition and development of knowledge about the Chinese orthographic characteristics could be the core of learning.

This suggestion is in agreement with an approach of Chinese character instructions for native Chinese children called "Focused and Intensive Character Acquisition" (in Chinese, 集中識字) (Ho, Ng, et al., 2003; 郭林、張田若, 1991; 張田若等人, 2000). This instruction approach advocates providing a period of focused and intensive instructions on character acquisition for beginning readers. This priority for character acquisition is called "character acquisition precedes reading" (in Chinese, 先識字後讀書). At this stage, the education objective is character acquisition and hundreds of Chinese characters are assembled as learning content.

This approach emphasizes raising the effectiveness of character learning by a systematic categorization of characters according to the structural properties of ideo-phonetic compounds. First of all, some elementary characters, like "人" (jan4, human being), "手" (sau2, hand), "明" (ming4, bright), which are mostly pictograms, ideograms or simple ideogrammic compounds, should first be taught by pictorial illustrations or direct instructions. Secondly, this approach advocates using a method called "basic characters networking" (in Chinese, 基本字帶字, a literally translation would be "basic characters taking on characters") for learning the ideo-phonetic compounds,.

In "basic character networking", compound characters with the same radical component are introduced to students as a group. For example, the five characters "疤" (baa1, scar), "把" (baa2, to handle), "爸" (baa1, father), "吧" (baa6, sentence final particle), and "肥" (fei4, fat) all share the same phonetic radical "巴" (baa1, to hope) (but with different degree of relevance in sound) and thus are taught as a group. While the shared component "巴", which is called the basic character (in Chinese, 基本字), facilitates memorization of the five characters, the different semantic radicals (i.e., "疒", "扌", "父", "口", and "月") help to make fine distinctions of each character by indicating different meaning. In short, this approach capitalizes on the structural properties of Chinese characters, and thus makes explicit use of orthographic knowledge to enhance students' character acquisition.

This approach was initially experimented in a school located in Liao Ning province (遼寧省) in the 1950s. After gaining success, it was gradually promoted to more schools across the country (郭林、張田若, 1991). In line with this approach, many other instruction methods have also been proposed to enhance character acquisition effectiveness by capitalizing on the structural properties of the Chinese orthography. For example, the "Componential Approach for Character Acquisition" (in Chinese, 部件識字) makes use of the componential radical as the key for character learning. Another approach, the "Principles of Character Formation for Acquisition" (in Chinese, 字理識字), makes use characters' etymological properties and association to help learning (張田若等人, 2000). All these different approaches emphasize on an analysis of the characters' orthographic properties as a means to acquisition.

This kind of focused and intensive training on Chinese character acquisition may be provided for CSL learners as well. However, in view of their relatively weak oral language foundations compared to native-speaking children, the details and procedures of these approaches may need adaption in order to maximize its effect for facilitating the CSL learners' literacy learning. Moreover, literacy training can be implemented in numerous ways and these approaches of character teaching are just some suggestions.

6.5 Contributions and Implications of the Study

This study evaluated objectively the Chinese language and literacy proficiency of the primary ethnic minority students in Hong Kong. The students' Chinese attainment was low and their literacy performance was especially poor. Their attainment of Chinese was at the lower-end of the norm of local primary-one students. This finding helps to explain the problems of the secondary school ethnic minority students in learning Chinese as reported in previous studies. These students' difficulties may have a long-term underlying cause in primary grades. The weak foundations may be responsible for the students' tardy development in Chinese proficiency.

Moreover, the study broadens the understanding of literacy acquisition process in Chinese. The findings provided support for the presumption that the Chinese writing system has a bearing upon the attainment and development of reading competence. With reference to the simple view model, it is found that reading performance was heavily affected by character recognition ability even with control of the effect of linguistic comprehension. This dominant influence of the character recognition may be related to the complexity and opaqueness of the writing system

which have an effect on its development. The limited character recognition ability and under-developed literacy competence of the students were also related to their Chinese language-literacy discrepancy, as it is observed in CSL learners worldwide.

Furthermore, this study showed that the students' Chinese orthographic awareness and knowledge is significantly related to their reading performance. This finding is consistent with those studies in alphabetic languages, in native Chinese children, and in adult CSL learners. This study further illuminates that the effect of Chinese orthographic knowledge on reading comprehension is mediated through character recognition

The findings of the study have some educational implications for CSL learners. In view of the importance of character recognition ability in literacy development, it is suggested to provide a period of focused and intensive instructions on character acquisition for beginning learners. Instructional priority at this stage should be given to character learning. To enhance the learning effectiveness, structural properties of the characters should be explicitly taught to students and used as guiding principles for learning materials and activities development. As for the ethnic minority students in Hong Kong, it is important to provide them with early intervention on Chinese character learning in order to secure a good foundation for their Chinese language and literacy development.

Other than these findings, this study also has contributions to CSL research development. First of all, the findings provide support for the validity of the simple view model for CSL studies. The simple view is a parsimonious framework widely adopted by reading research in alphabetic languages. It could be adopted for future CSL studies on locating reading problems or reading development. Moreover, the measures developed in this study for Chinese language and literacy proficiency

(including those on Chinese orthographic knowledge, character recognition, listening and reading comprehension skills) could be referenced by further studies. Details about the theoretical model and measurement development are discussed in the following section.

6.6 Limitations of the Study and Further Studies

Some limitations of the study should be acknowledged. Firstly, the study serves to explore the CSL learning of the primary ethnic minority students in Hong Kong. Generalizability of the findings to other CSL learner populations and contexts should be made with caution. For example, bilingual children who have already acquired a native-like Chinese language competence may be different in literacy acquisition. Moreover, in Hong Kong, the Chinese oral language in use and acquired by the CSL learners is the dialect Cantonese. Use of a different Chinese oral language, like Mandarin (i.e., Putonghua), that has a closer correspondence with the written script may have influence on literacy development. These diversities in learners and linguistic environments and their influence on literacy acquisition can be explored by further studies.

Furthermore, this study simplified the complexity of reading in order to focus on the relationship among reading comprehension, listening competence, and character recognition in CSL learners. Some important constructs like vocabulary knowledge, fluency, and metalinguistic awareness are submerged into two major components, decoding and listening competence. As the validity of the simple view model was supported in this study, further studies on the contributions of these constructs could be taken by adopting the framework. For example, phonological awareness and character-reading fluency variables could be added at the decoding

level, and the vocabulary and syntactic knowledge variables could be added at the listening competence level.

Especially, the development of the character recognition competence in both native Chinese and CSL learners could be further explored. As the findings of this study show, orthographic awareness and knowledge predicted unique variance in character recognition, which is consistent with findings of previous studies on native Chinese children (e.g., Ho, Yau, et al., 2003) and CSL adult learners (e.g., Shen & Ke, 2007). Other relevant constructs that were studied in relation with character recognition included phonological awareness (e.g., Taylor, 2002), morphological awareness (e.g., McBride-Chang, 2004), and visual skills (e.g., Chen, 2003). However, the findings of these studies have yet come to a comprehensive understanding of character recognition competence development.

In addition, reading was taken as a cognitive activity in this study. All the constructs that were assumed to influence reading performance and development are related to information processing, including orthographic knowledge, character recognition and linguistic comprehension. Further studies could explore the influence of motivational and social factors in reading development. These factors have been found to be influential in acquisition of second language (Ellis, 1994; Gardner, 1985; Gardner, Tremblay, & Hayward, 1997).

Last but not least, from a methodological point of view, better instrument tools should be developed to assess Chinese character recognition ability and orthographic knowledge. The measures adopted by this study were developed with reference to previous studies and were validated only with the participating students. However, the score distributions of the measures are not normal. The interpretations on the results of the parametric analyses should be reviewed with cautions. Moreover, in

order to have more objective and thorough measures, standardization for these measures in the local context is needed. The standardized measures would provide a proper norm for objective evaluation of the students' proficiency.

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Appendices

Appendix A [1]
Selected Items for the Standardized Reading Comprehension Test

DETACHED

[1] Appendix A is detached in final submission of the thesis for the confidential requirement of the Hong Kong Attainment Test.

Appendix B [2]
Selected Items for the Standardized Listening Comprehension Test

DETACHED

[2] Appendix B is detached in final submission of the thesis for the confidential requirement of the Hong Kong Attainment Test.

Appendix C
Discourse Comprehension Test: Form A

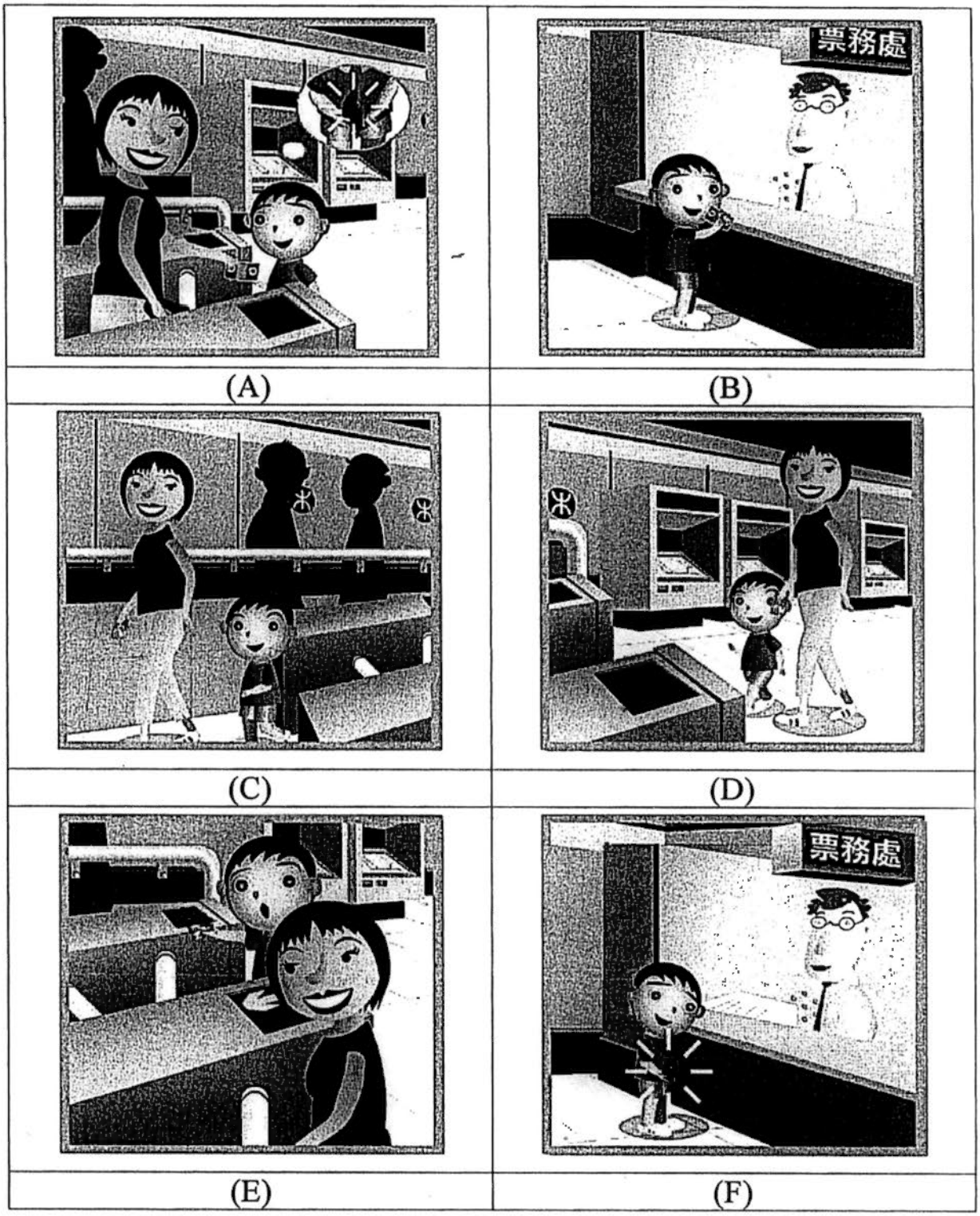
Arrange the Story Sequence Right (Form A)
故事排順序 (A 本)

School 學校：_____

Name 姓名: _____ Class 班別: _____ ( )

☺聆聽理解
細心聆聽以下的故事。聽完故事之後，將背後有關故事內容的圖片，按故事發生的順序排列。把圖片的代號（A – F）按順序寫於 1 – 6 的位置上。第 1 個及第 6 個位置的代號已經寫上。

請順序寫上代號。

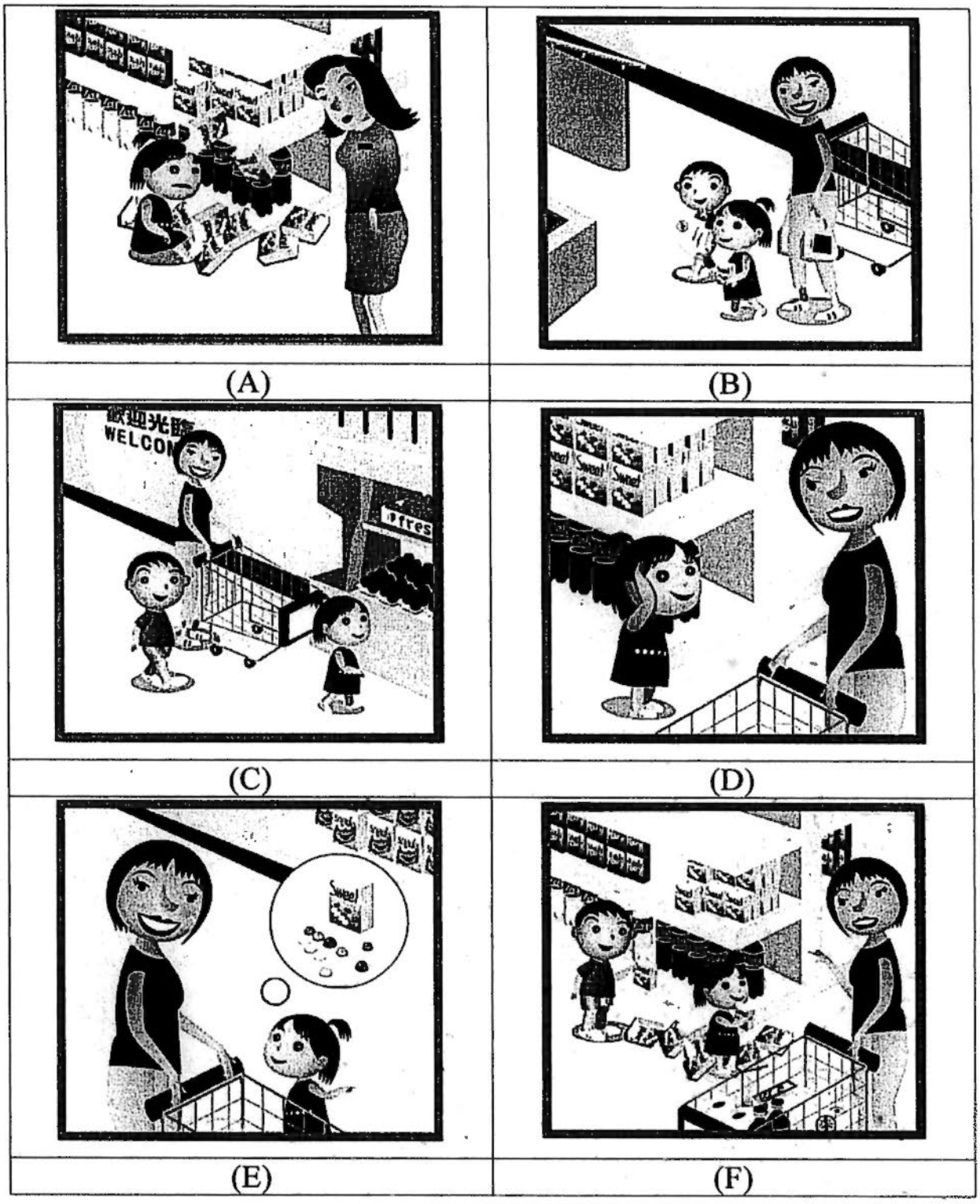


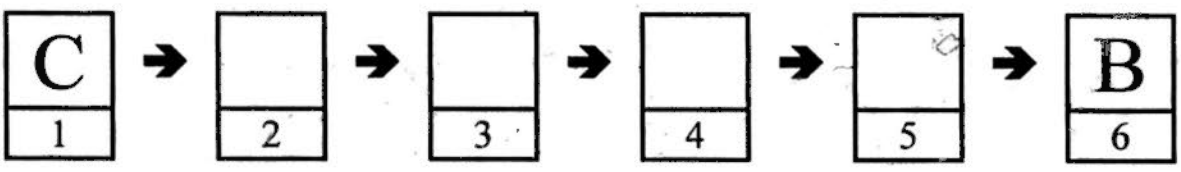
D	→		→		→		→		→	C
1		2		3		4		5		6

聆聽理解

（一）細心聆聽以下的故事。聽完故事之後，將背後有關故事內容的圖片，按故事發生的順序排列。把圖片的代號（A - F）按順序寫於 1 - 6 的位置上。第 1 個及第 6 個位置的代號已經寫上。

請順序寫上代號。

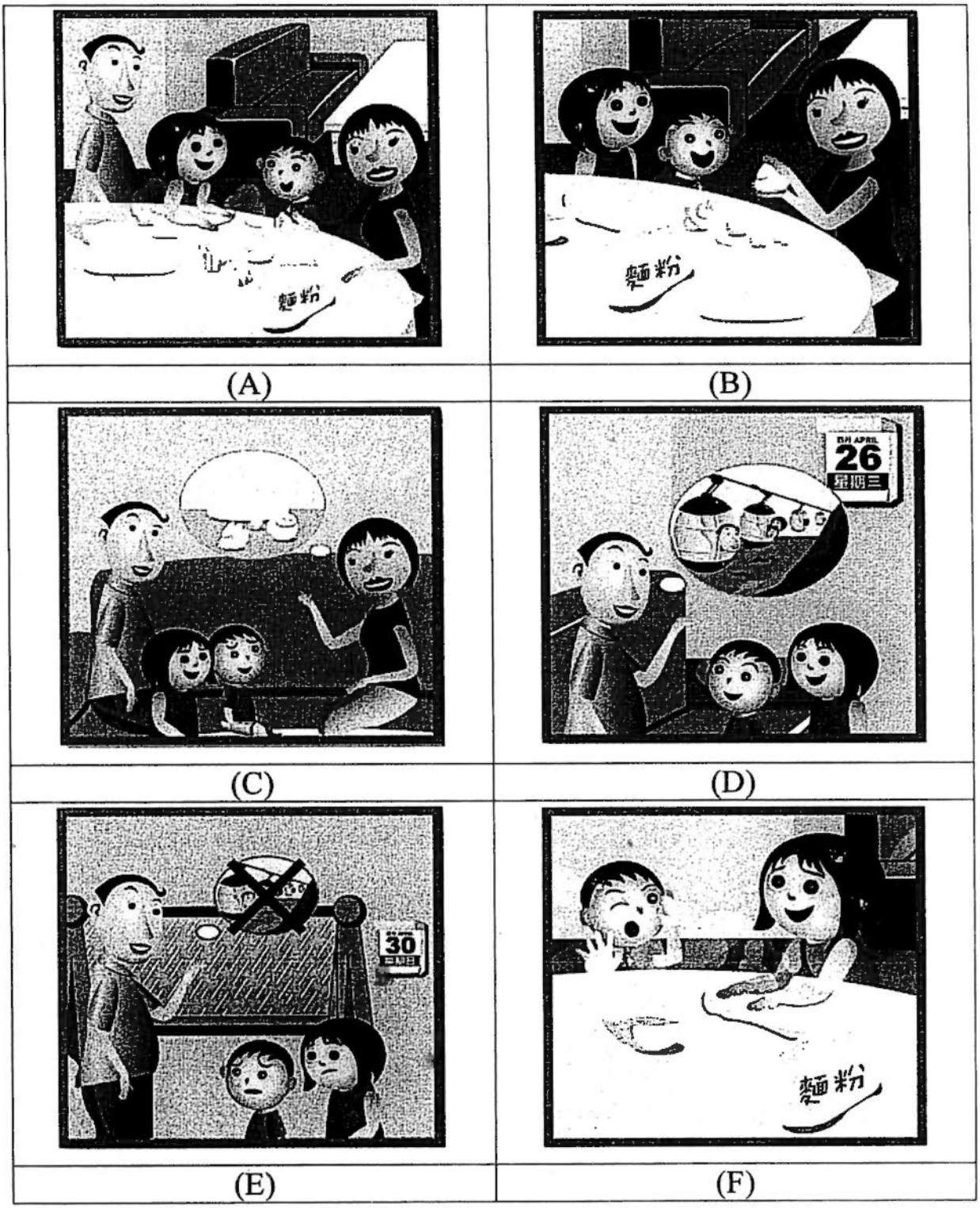




聆聽理解

（二）細心聆聽以下的故事。聽完故事之後，將背後有關故事內容的圖片，按故事發生的順序排列。把圖片的代號（A - F）按順序寫於 1 - 6 的位置上。第 1 個及第 6 個位置的代號已經寫上。

請順序寫上代號。



D	→		→		→		→		→	A
1		2		3		4		5		6

閱讀理解

（三）細心閱讀以下的故事。讀完故事之後，將背後有關故事內容的圖片，按故事發生的順序排列。把圖片的代號（A - F）按順序寫於 1 - 6 的位置上。第 1 個及第 6 個位置的代號已經寫上。

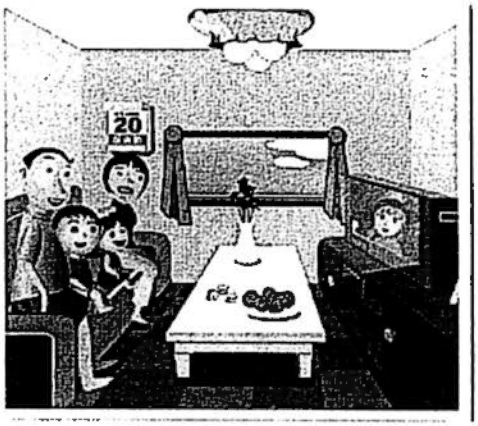
復活節假期的早上，哥哥和妹妹在客廳看電視。哥哥想看鐵甲超人卡通片，妹妹卻想看魔法仙子卡通片。大家都搶著遙控器要選台，互不相讓。

二人爭來搶去，哥哥終於搶到遙控器，開心地看鐵甲超人。妹妹看不到魔法仙子卡通片，於是大哭起來，甚至打哥哥。爸爸媽媽聽到他們吵架的聲音，便出來看個究竟。當爸爸媽媽看到他們吵架，爸爸首先把電視關掉，然後問哥哥發生了什麼事。爸爸向哥哥說，兄妹要互相禮讓，不可以吵架。如果二人都想看電視，就只好輪流看！媽媽亦教訓妹妹不可以打哥哥。

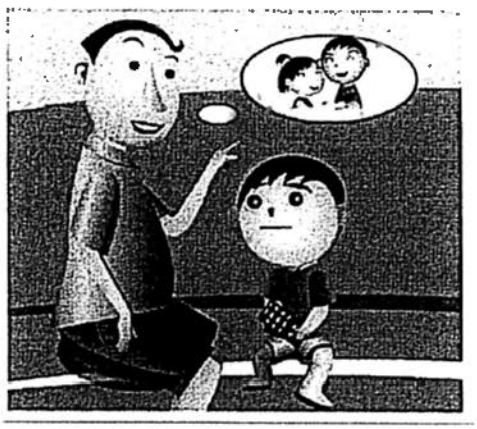
最後，妹妹向哥哥說對不起，而哥哥決定今次先讓妹妹看，下次才看他喜歡的鐵甲超人卡通片。妹妹十分開心！

（272 字）

請順序寫上代號。

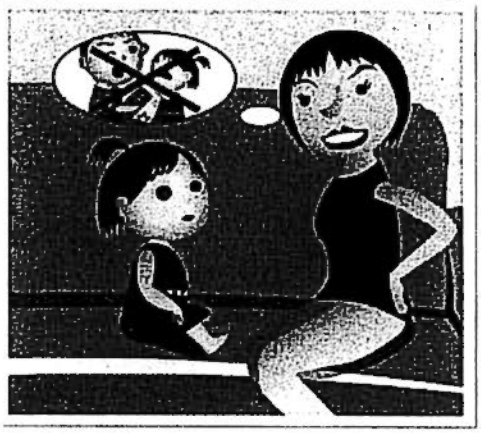


(A)

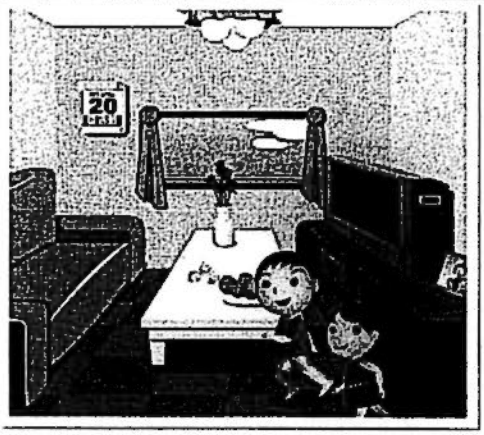


(B)

(C)

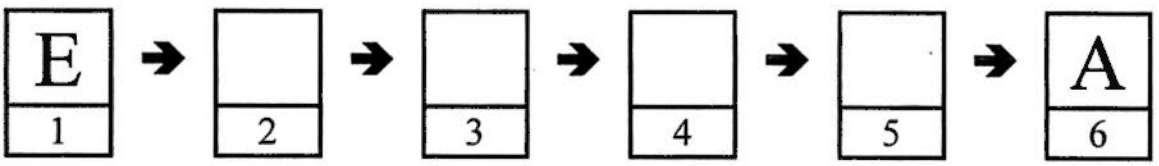


(D)



(E)

(F)



閱讀理解

（四）細心閱讀以下的故事。讀完故事之後，將背後有關故事內容的圖片，按故事發生的順序排列。把圖片的代號（A - F）按順序寫於 1 - 6 的位置上。第 1 個及第 6 個位置的代號已經寫上。

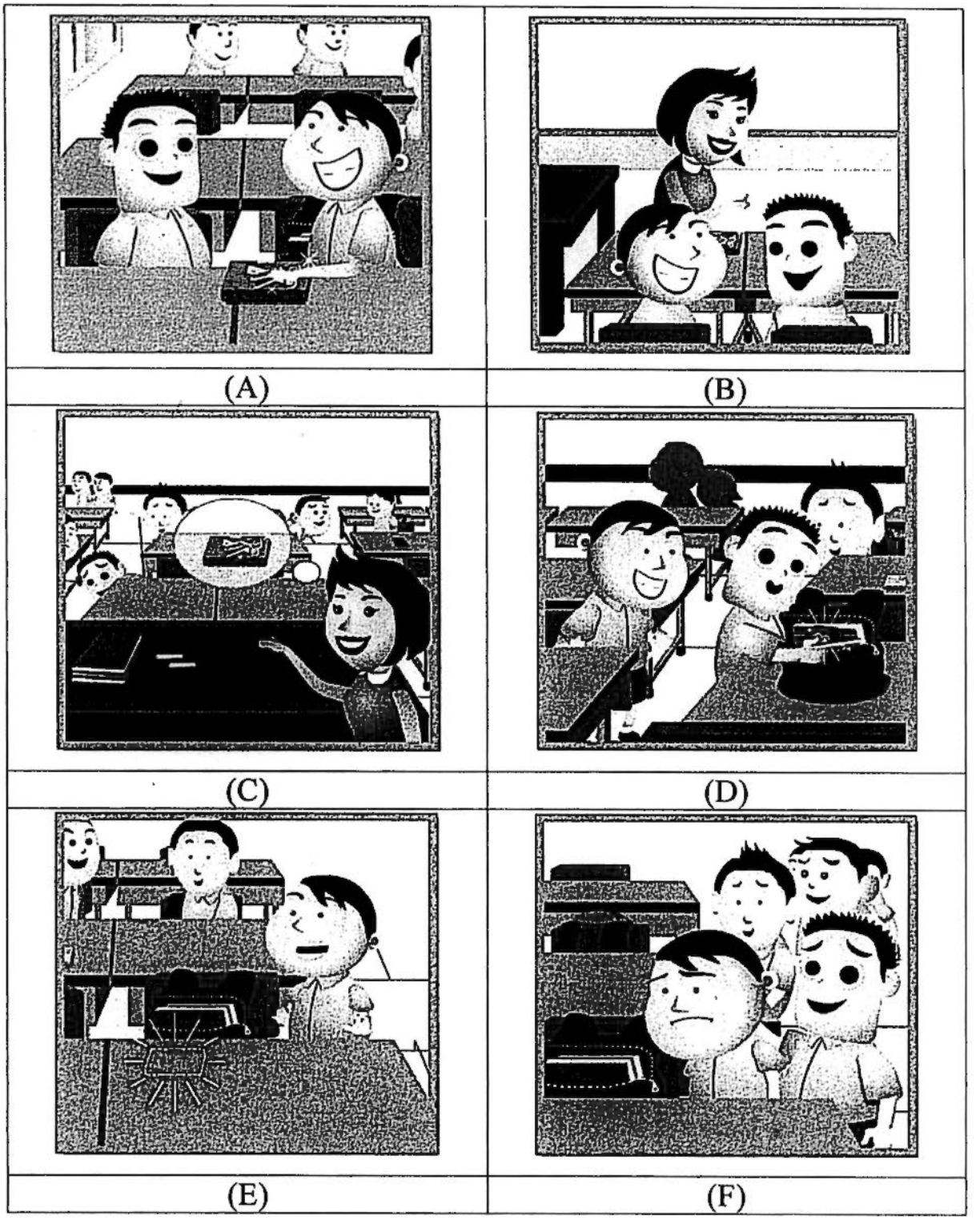
小強和小明是三年級 A 班的同學。兩人感情十分要好，就是在班上，兩人亦坐在隔鄰。

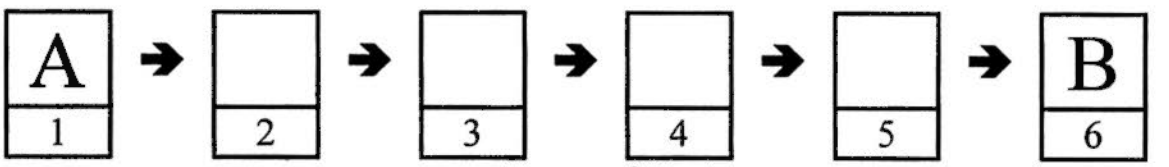
今天上數學堂時，小明從書包裏拿出一個新的筆盒，很高興的告訴小強，因為他默書得到了一百分，所以他的媽媽買了一個又新又漂亮的筆盒給他。小強連聲稱讚，十分羨慕。小息過後，小明發覺在書桌上的新筆盒不見了，心裏十分難過，跟著他更誤會是別的同學偷了他的新筆盒。小強和其他同學不斷地安慰他。後來，老師便叫小強和其他同學幫小明四處尋找筆盒。小強和其他同學小心地找尋班房內每處地方，發現筆盒原來放在小明的書包內。

小明十分高興，而老師亦稱讚小強及其他同學的互助精神。

（260 字）

請順序寫上代號。





End 完

Appendix D
Discourse Comprehension Test: Form B

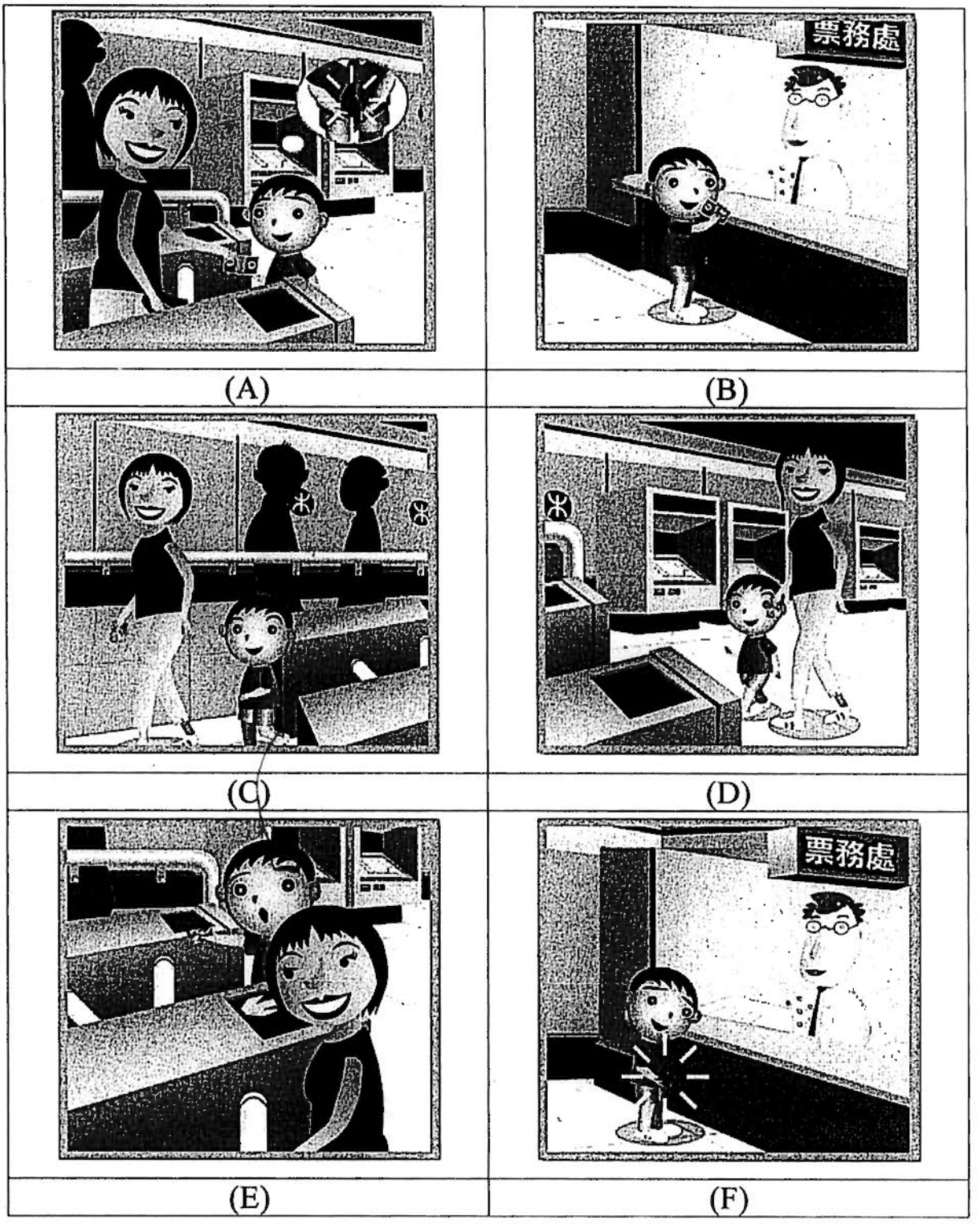
Arrange the Story Sequence Right (Form B)
故事排順序 (B 本)

School 學校：_____

Name 姓名: _____ Class 班別: _____ ( )

☺聆聽理解
細心聆聽以下的故事。聽完故事之後，將背後有關故事內容的圖片，按故事發生的順序排列。把圖片的代號（A - F）按順序寫於 1 - 6 的位置上。第 1 個及第 6 個位置的代號已經寫上。

請順序寫上代號。

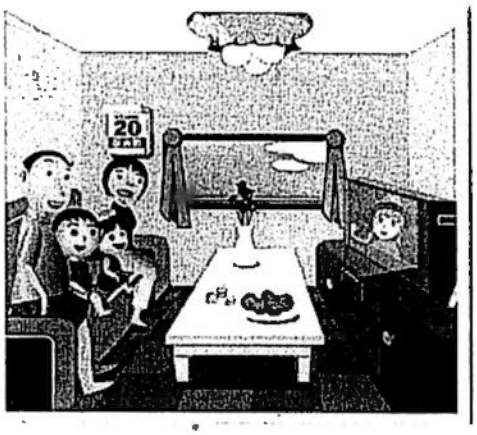


D	→		→		→		→		→	C
1		2		3		4		5		6

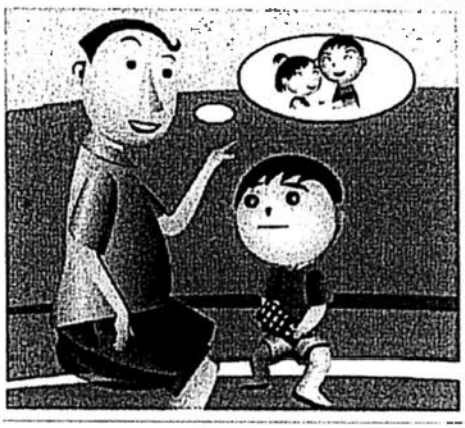
聆聽理解

（一）細心聆聽以下的故事。聽完故事之後，將背後有關故事內容的圖片，按故事發生的順序排列。把圖片的代號（A – F）按順序寫於 1 – 6 的位置上。第 1 個及第 6 個位置的代號已經寫上。

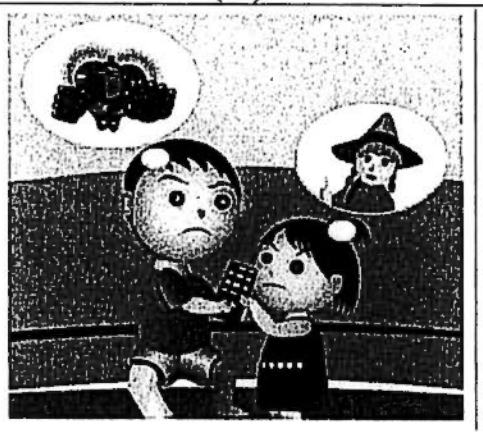
請順序寫上代號。



(A)

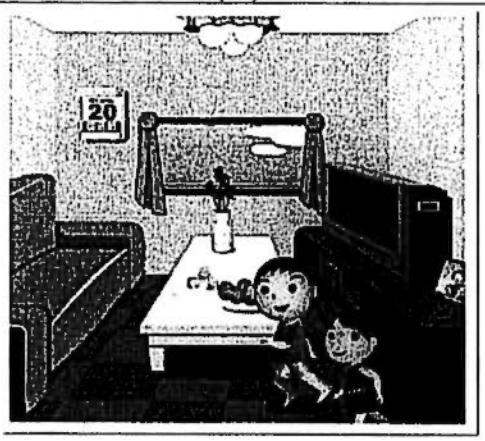


(B)



(C)

(D)



(E)

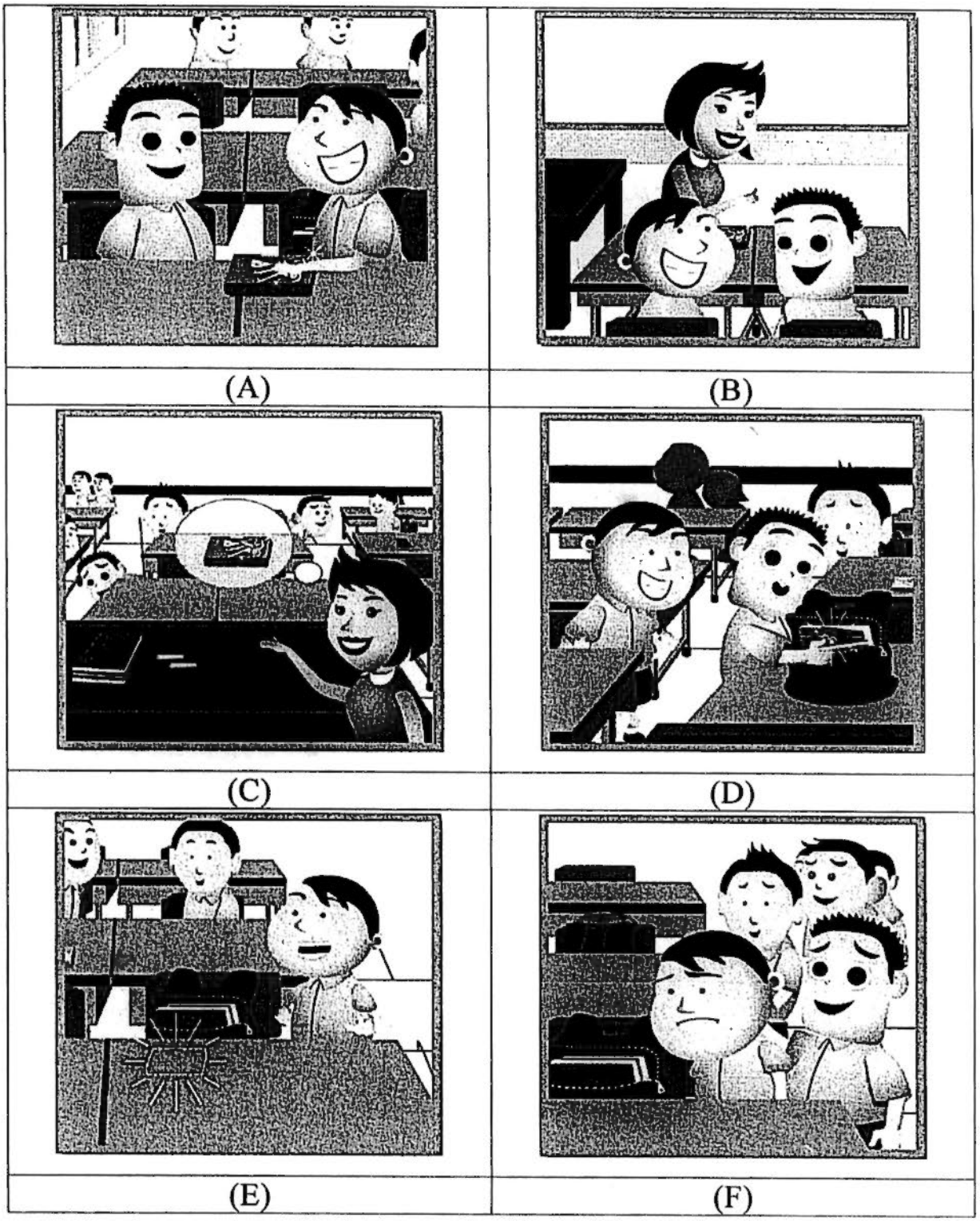
(F)

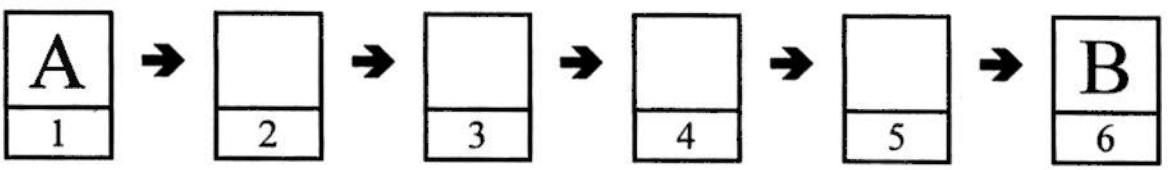
E	→		→		→		→		→	A
1		2		3		4		5		6

聆聽理解

（二）細心聆聽以下的故事。聽完故事之後，將背後有關故事內容的圖片，按故事發生的順序排列。把圖片的代號（A - F）按順序寫於 1 - 6 的位置上。第 1 個及第 6 個位置的代號已經寫上。

請順序寫上代號。





閱讀理解

（三）細心閱讀以下的故事。讀完故事之後，將背後有關故事內容的圖片，按故事發生的順序排列。把圖片的代號（A - F）按順序寫於 1 - 6 的位置上。第 1 個及第 6 個位置的代號已經寫上。

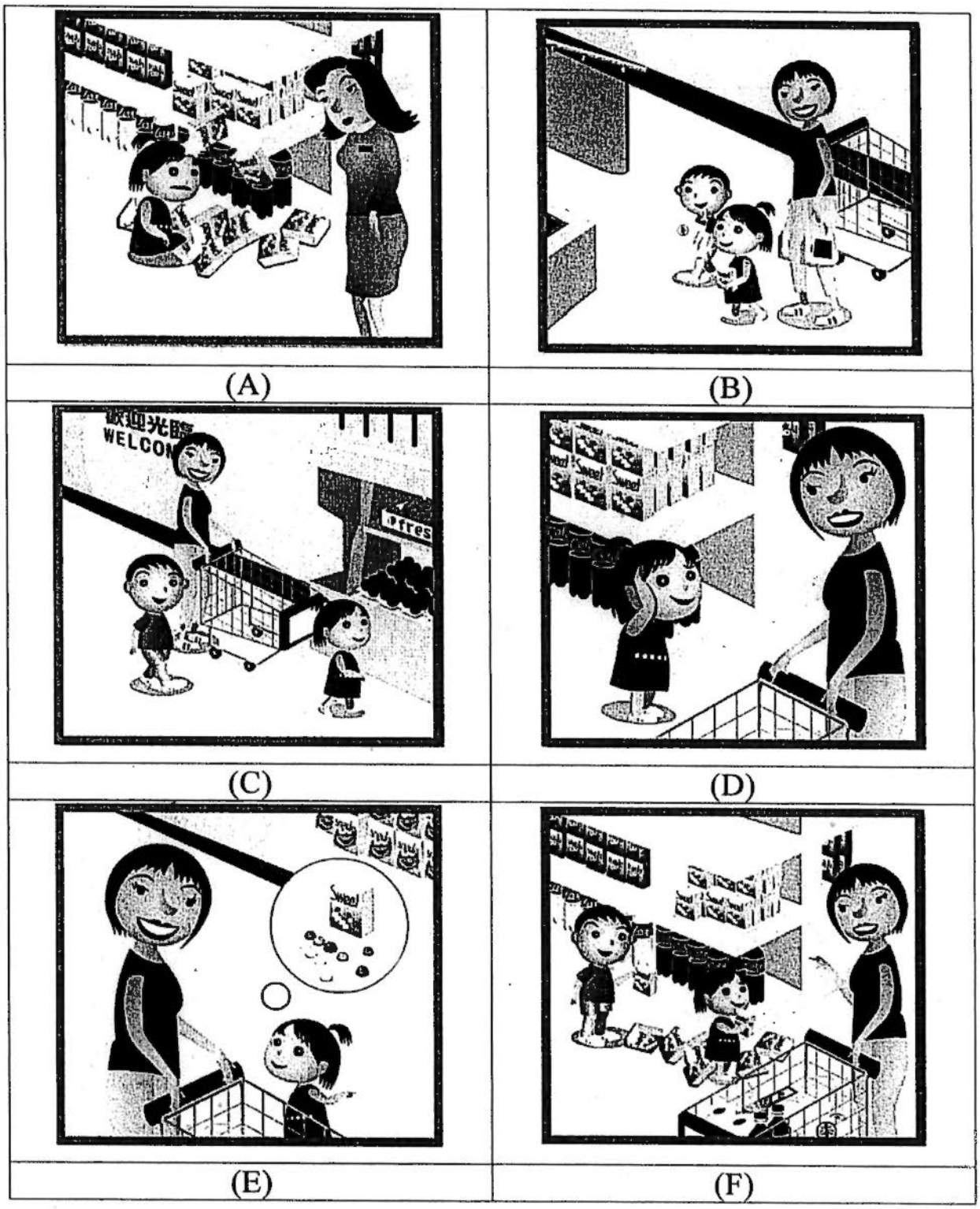
昨天，媽媽帶我和妹妹到超級市場去。

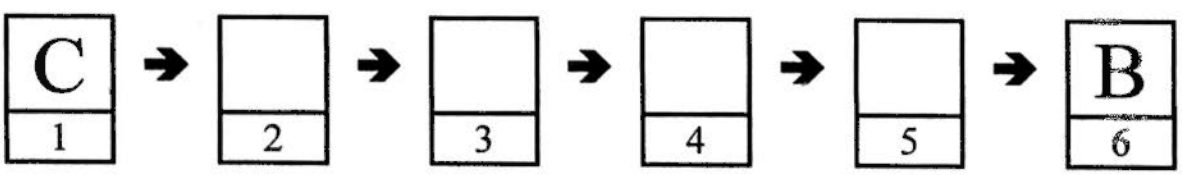
我們到了超級市場後，拿了一部手推車購物。我們揀了一些食物和日用品，妹妹則嚷著要買五顏六色的水果糖，於是，媽媽讓她自己去揀。妹妹個子不高，當她嘗試拿高處的糖果時，意外地把架上的糖果翻倒。那時候，糖果架旁一位理貨員正望著她，妹妹感到十分不好意思，臉也紅起來。於是，媽媽便吩咐我和妹妹一起把地上的糖果放回架上。妹妹連忙向我和媽媽道歉，並說以後會加倍小心。

最後，我們到收銀處付款，然後帶著幾袋物品回家去。

(215 字)

請順序寫上代號。





閱讀理解

（四）細心閱讀以下的故事。讀完故事之後，將背後有關故事內容的圖片，按故事發生的順序排列。把圖片的代號（A - F）按順序寫於 1 - 6 的位置上。第 1 個及第 6 個位置的代號已經寫上。

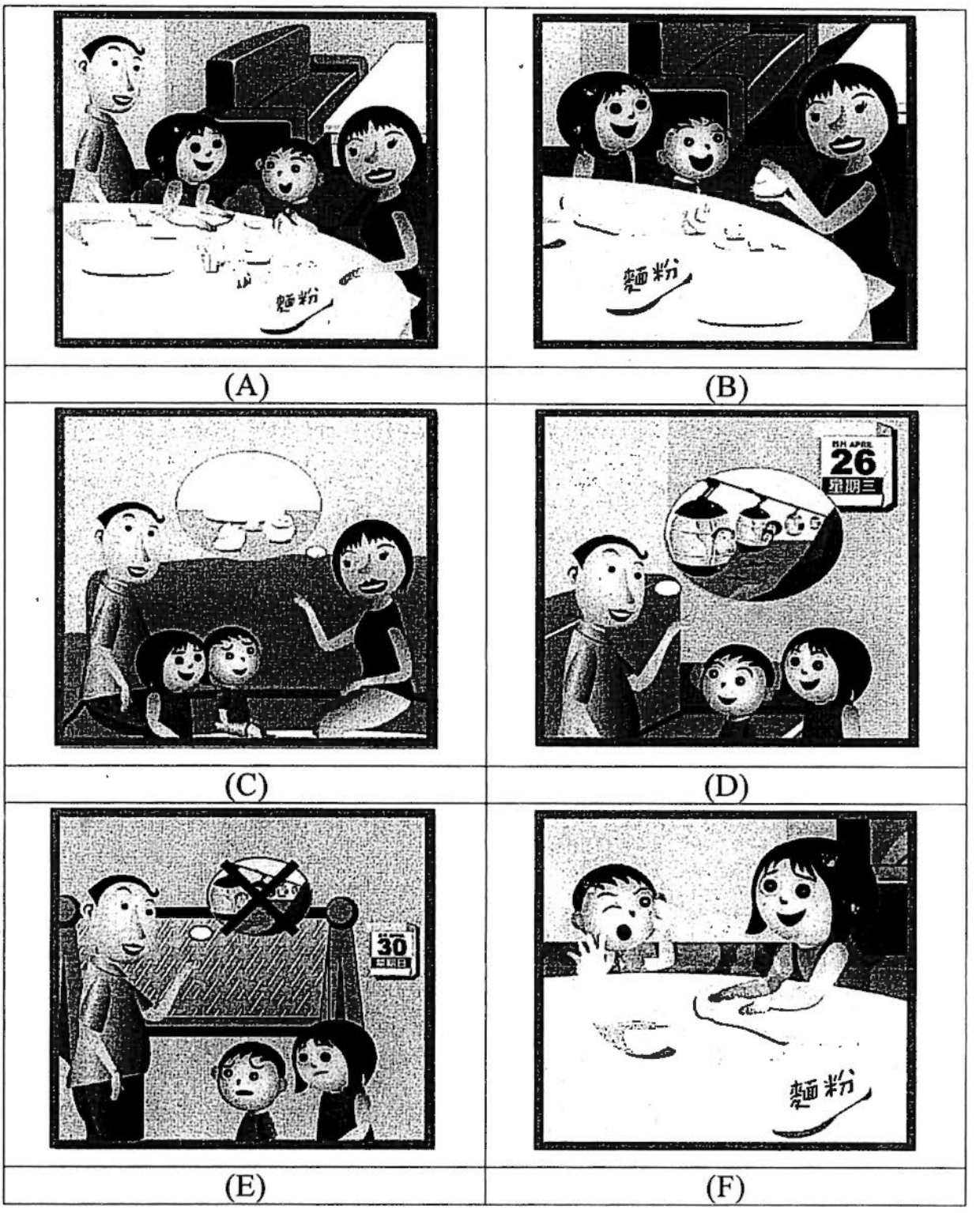
爸爸答應在這個星期日帶小青和弟弟到海洋公園去。

到了星期日，卻下起雨來，爸爸唯有取消計劃，不到海洋公園去。小青和弟弟十分失望。後來媽媽提出建議，就是教爸爸、小青和弟弟利用麵粉做公仔。小青和弟弟最初對做麵粉公仔並不感興趣，因為她和弟弟覺得麵粉會把手和衣服弄髒。但看到媽媽能把麵粉捏做成各種形狀，小青和弟弟頓感有趣，於是便跟著媽媽做起公仔來。媽媽教小青和弟弟用麵粉做了小兔、小貓和小豬等小動物。

最後，小青在家裏和爸爸、媽媽、弟弟玩得很開心。除學會了做麵粉公仔外，小青還覺得只要跟爸爸、媽媽和弟弟在一起，即使留在家裏也可以很快樂呢！

（262 字）

請順序寫上代號。



D	→		→		→		→		→	A
1		2		3		4		5		6

End 完

Appendix E
The Chinese Character Recognition Test

Read Out the Chinese Characters
我會讀的中文字

School 學校：_____

Name 姓名: _____ Class 班別：_____ ( )

Please read out the following Chinese characters.
請讀出以下漢字。

我	要	家	能	發
同	高	二	從	點
位	頭	知	平	山
每	百	愛	門	六
邊	南	林	片	且
具	石	古	支	晚
雨	細	米	升	良
免	田	拍	登	雪
封	吹	尾	斤	豆
飽	鴨	亭	兌	乞

識字數：_____

Appendix F

The Chinese Orthographic Awareness and Knowledge Test

Chinese Characters: Break the Code!

「拆」「解」中文字!

School 學校：_____

Name 姓名：_____ Class 班別：_____ ( )

a. **Break up the Chinese Characters** 中文字分拆

Try to break the following Chinese characters into two parts as the below example.

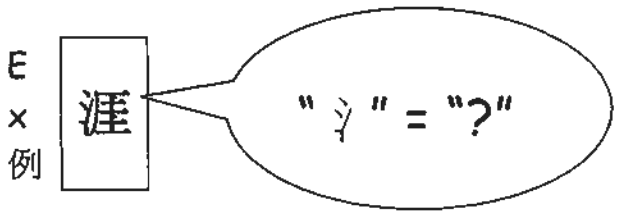
根據例子，試將下列的中文字分拆爲兩部份。

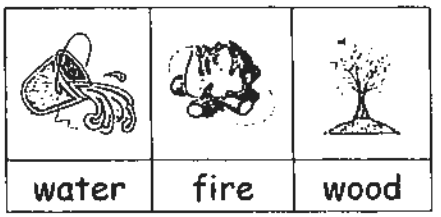
Ex 例	扼	→	扌	厄
☺	彰	→		
☺	薪	→		
1.	蔓	→		
2.	焰	→		
3.	匿	→		
4.	挪	→		
5	窺	→		
6	違	→		

b. **Make a guess of the meaning** 猜猜意思

(I) Make a guess about the meaning of the part of the following Chinese characters. An example is given below.
根據例子，猜猜下面漢字偏旁的意思。

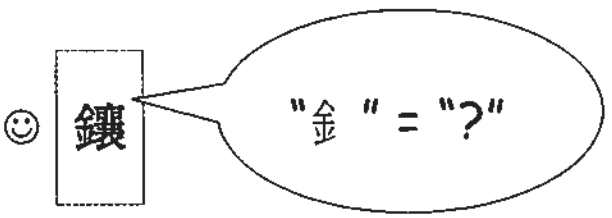
Ex 例

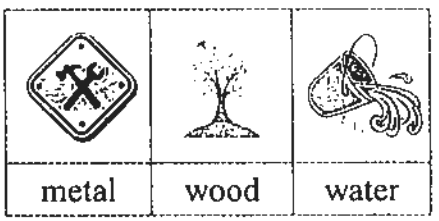




Ⓐ B C

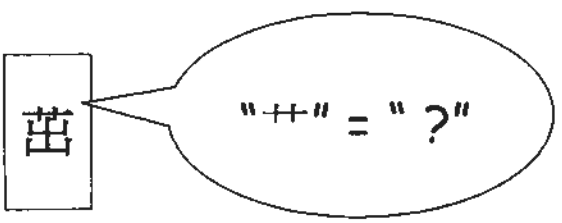
☺

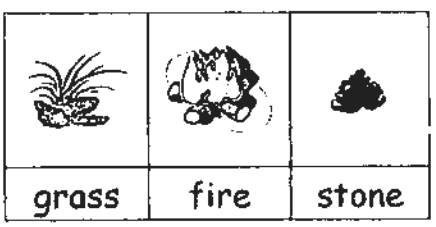




A B C

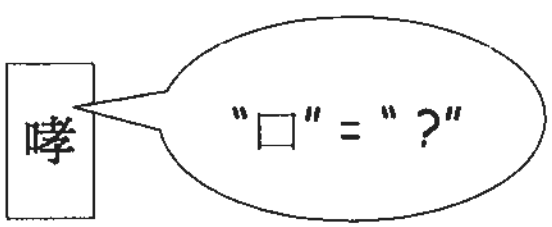
1.

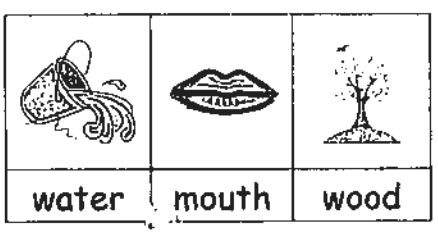




A B C

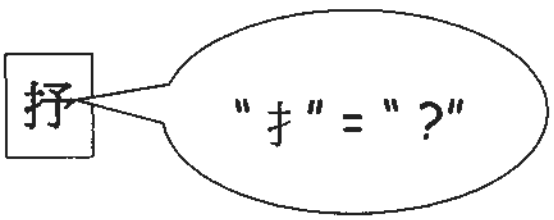
2

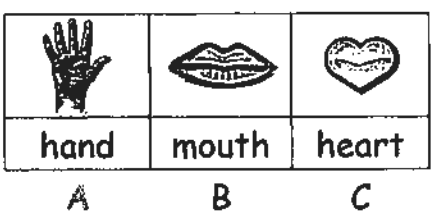




A B C

3





A B C

(II) Choose the Chinese character that matches with the picture with English illustration. An example is given below.
選擇最能與圖畫及英文說明相配的中文字。下面附有一個例子。

Ex 例

waiter

恃	峙	侍
A	B	ⓒ

☺

boat

艇	庭	誕
A	B	C

☺

sunrise

曦	羲	犧
A	B	C

4

to dry by heat

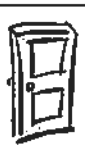
洪	哄	烘
A	B	C

5

sad

萋	悽	淒
A	B	C

6



door

侶	宮	閭
A	B	C

c. **Make a guess of the pronunciation** 猜猜讀音

Guess about the pronunciations of the following unknown Chinese characters. For every item, you will hear three sounds and choose the one that you think is the character's pronunciation. An example is given below.

猜猜以下一些你不認識的中文字的讀音。在每一題中，你會聽到三個讀音，選擇你認爲是那個字的讀音。下面附有一個例子。

Ex 例	酮	Ⓐ	B	C
☺	胱	A	B	C
☺	鞍	A	B	C
1.	舺	A	B	C
2.	殃	A	B	C
3.	抖	A	B	C
4.	疤	A	B	C
5.	銥	A	B	C
6.	芊	A	B	C

END 完

Appendix G
Consent Letter to Parent (with Questionnaire)

September, 2009

Dear Sir/Madam,

I am a doctorial degree student of the Faculty of Education of the Chinese University of Hong Kong. My research topic is about ethnic minority children's Chinese literacy acquisition in Hong Kong primary schools. I would be very grateful if you would consider allowing your child to participate in my study.

The study would help to broaden our understanding of the children's Chinese language proficiency, their learning process and problems, and to develop proper Chinese instructional methods and materials for them. For the study, I would need to collect some personal data about the children and to conduct some tests to evaluate their Chinese language proficiency. There are a questionnaire for linguistic background and experiences (attached at the back for reference), two sets of Chinese reading and listening tests, a Chinese character recognition test, and a test on Chinese orthographic knowledge. The tests would be conducted in one to two days, and the total time needed would be about 2 hours for each student. It is my aim to ensure the participant children to be comfortable in taking part in the study and their learning in school unaffected.

The collected data would be useful not only for the study but also for evaluating the children's Chinese language attainment. In view of this, the data collected would be used by this study and be feed-backed to the respective Chinese teachers for reference.

If you would agree to allow your child to take part, please complete the slip below. The slip would be returned to the school.

Thank you for your considerations.

Yours sincerely,

Gary Wong

This is a consent slip regarding Gary Wong's study on Hong Kong ethnic minority students' Chinese learning.

I would like my child, _____ to take part in the study.

Signed parent/guardian _____

The Questionnaire for Linguistic Background and Experiences
語言背景及經驗問卷

School 學校:_____ Class 班別:_____

** Please circle as appropriate.*

1. Name 姓名：_____

2. Gender* 性別：M 男 / F 女

3. Ethnicity* 國籍：

   Indian 印度人 / Pakistani 巴基斯坦人 / Nepalese 尼泊爾人 /

   Thai 泰國人 / Filipino 菲律賓人 / Indonesian 印尼人

   /Others (specify) 其他（注明）：_____

4. Native Language:*

   Hindi 印地語 / Urdu 烏爾都語 / Nepali 尼泊爾語 / Filipino 菲律賓語 /

   Indonesian 印尼語 / Thai 泰國語 / Others 其他：_____

5. Date of Birth 出生日期：_____

6. Does the student born in Hong Kong?* 是否在香港出生？Yes 是 / No 否

7. If the student was not born in Hong Kong, please specify the year he/she arrived at Hong Kong 抵港年份：_____

8. Did the student attend Kindergarten in Hong Kong?* 曾在港讀幼稚園？Yes 是 / No 否 / Unknown 不知道

9. The kindergarten the student attended in Hong Kong is 所就讀的香港幼稚園:

   _____

10. For how many year(s) have the students studied in this primary school?*在這間小學讀了多少年？_____ year(s)年

Thank You

Appendix H

Consent Letter to Principal

September, 2009

Dear Sir/Madam,

I am a doctorial degree student of the Faculty of Education of the Chinese University of Hong Kong. My research topic is about ethnic minority children's Chinese literacy acquisition in Hong Kong primary schools. I would be very grateful if you would consider allowing your grade-four students to participate in my study.

The study would help to broaden our understanding of the children's Chinese language proficiency, their learning process and problems, and to develop proper Chinese instructional methods and materials for them. For the study, I would need to collect some personal data about the children and to conduct some tests to evaluate their Chinese language proficiency. There are a questionnaire for linguistic background and experiences, two sets of Chinese reading and listening tests, a Chinese character recognition test, and a test on Chinese orthographic knowledge. Samples of the materials would be presented to you for reference. The tests would be conducted in one to two days, and the total time needed would be about 2 hours for each student. It is my aim to ensure the participant children to be comfortable in taking part in the study and their learning in school unaffected.

The collected data would be useful not only for the study but also for evaluating the children's Chinese language attainment. In view of this, the data collected would be used by this study and be feed-backed to the respective Chinese teachers for reference.

If you would like to take part, or would like any further information regarding the study, please contact me through my mobile at XXXX XXXX or e-mail xxxxxx@gmail.com. Upon your consent for allowing the grade-four students to participate in the study, letters will also be sent to the students' parents to seek for their approval.

Thank you for your considerations.

Yours sincerely,

Gary Wong

Appendix I
Handbook for Test Administrator

Acquisition of Chinese Literacy by Ethnic Minority Children in Hong Kong Primary Schools: Handbook for Test Administrator

香港少數族裔小學生中文認讀能力習得研究: 測驗人員手冊

Content 目錄

General Guidelines 一般指引

1. 確保測驗順利進行，以使所取資料準確。
2. 於不影響測驗的公正性的原則下，儘量令到受測的學生保持輕鬆心情。不要讓他們有接受測驗的感覺，亦不可讓他們全不在意，胡亂填寫答案，或傾談商量，影響測驗結果。
3. 測驗進行時或須用英文輔助以讓學生明瞭測驗內容，但不要於下列指示外以英文解題，以免影響測驗結果。

Assessment Tools 測驗工具

	Tools	Focus	Format	Duration
1.	* Questionnaire for Background Information and Linguistic Experiences* * 背景資料及語言經驗調查問卷	▪ To collect personal data like background information and linguistic learning experiences	Individual	---
2.	Chinese Character: Break the Code! 「拆」「解」中文字!	▪ Chinese Orthographic Awareness and Knowledge	Group	25 min
3.	Read Out the Chinese Characters 我會讀的中文字	▪ Chinese character recognition ability	Individual	5 min @ (total: 35 min)
4.	Arrange the Story Sequence Right (Form A or B) 故事排順序（A 本或 B 本） ■ Listening (聆聽) (10 min) ■ Reading (閱讀) (10 min)	▪ Chinese listening and reading comprehension competence	Group	20 min
5.	Chinese Language Proficiency Test 中文語文能力測驗 ■ Listening (聆聽) (10 min) ■ Reading (閱讀) (20 min)	▪ Chinese listening and reading comprehension competence	Group	30 min

*Collected through aids from teachers/parents

Sampling Procedure 取樣程序

(1) 確定每校的參與學生人數（小四級）。

(2) 通過學校/家長，先取得學生的背景及語言學習資料。

(3) 測驗總共須 2 小時，分兩天舉行。第 1 天舉行前述的第(2)及(3)項測驗，預計約須 1 小時。第 2 天舉行前述第(4)及(5)項測驗，預計約須 1 小時。

4. Guide for Test Conduction 測驗施行須知

4.1 「拆」「解」中文字! (Chinese Characters: Break the Code!) 施行須知

* 本測驗形式不爲學生熟悉，故每部份均設兩題練習題。

（A）測驗前的準備

測驗人員於測驗前，須：

a. 點算足夠的測驗卷；

b. 查核學生的座位適當（如有適當的間距）；

（B）進行測驗

(1) 測驗人員向學生宣佈：

> 我地依家一齊做一啲分拆中文字既練習，睇下你地可唔可以將一啲唔識既中文字分開，或者估到佢地既意思；
> 每個練習我都會畀指示同埋同你地一齊做--至兩題，你地要留心聽；而係每個部份，我都會畀足夠既時間你去完成，唔駛心急，亦唔好自己先做，要聽我既指示；
> 唔識做既話，漏空個答案就得；
> 做練習時唔好傾偈，唔好睇人地；
> 將答案寫係練習紙上面。我宜家派練習紙。
>
> We're going to do some exercises about decomposing Chinese characters, to see if you can decompose some Chinese characters that you haven't learnt before or to guess their meanings or pronunciations;
> For every parts of the exercises, I'll give you instructions and do one to two items with you, listen carefully; for each section, I'll give you enough time to complete it, don't be rush, and don't do the item ahead by yourself, just follow my instruction;
> If you don't know the answer, just leave it blank, it's OK.
> Don't talk to each other; don't look at others' papers;
> Write down all the answers on the exercise paper. I am going to distribute the paper

(2) 派給每名學生一份測驗卷，然後宣佈：

> 係練習上面寫上學校名稱、學生姓名、班別、班號及日期。如有問題，請舉手。
>
> Write down on the exercise paper the school name, your name, class, class number and today's date. If you have question, please raise up your hand.

(3) 第 1 部份：Break up the Chinese Characters 中文字分拆

係依個部份，係要你地將啲唔識既中文字拆開你覺得合適既兩部份，然後將果兩部份分別寫係右手邊兩個方格入面；
你地睇下例子入面果個「扼」字（寫在黑板上），我地可以將佢拆做「扌」同「厄」兩部份（寫在黑板上）；
好啦，到依個「彰」字（寫在黑板上），我地可以點樣拆呢？（給時間學生思考）係啦，我地可以咁樣拆：「章」同「彡」（寫在黑板上）；
咁依個「薪」字（寫在黑板上），我地又可以點樣拆呢？（給時間學生思考）係啦，我地可以咁樣拆：「艹」同「新」（寫在黑板上）；
好啦，你地試下自己做下面個 6 題，你地有大約 6 分鐘時間。

In this part, you'll try to divide some unknown Chinese characters into two parts that you think is appropriate. Write out the two parts in the boxes provided on the right-hand side;
Look at the character "扼" in the example (write it down on the blackboard), we can decompose it into "扌" and "厄" (write down on the blackboard);
Look at the following character "彰" (write it down on the blackboard). How can we decompose it ? (give the students time to think) We can decompose it into "章" and "彡" (write down on the blackboard);
Look at the following character "薪" (write it down on the blackboard). How can we decompose it ? (give the students time to think) We can decompose it into "艹" and "新" (write down on the blackboard);
OK? So now it's your turn, do the following six items by yourself, you have about 6 minutes.

(4) 第 2 部份：Make a guess of the meaning 猜猜意思

係依個部份，你會估下一啲唔識既中文字既意思。
依部份又再分開兩種練習，第一種就係要你哋估下一個中文字其中一個部份既意思，然後係右手邊既三幅附有英文解釋的圖畫入面，圈出你認爲最能表現果個部份意思的選項。
譬如你睇例子既"涯" 字(寫在黑板上)，其中有一個部份係 "氵" (寫在黑板上)，而佢既意思同水係有關既，所以我地就選左答案 "A" "Water"，而唔係 "B" Fire 或者 "C" Wood 顯示它的意義與水有關。
好啦，宜家你地睇下依個 "鑲"字(寫在黑板上)，其中有一個部份係 "釒" (寫在黑板上)，咁佢既意思係同咩有關既呢？（給學生時間思考）其實佢既意思係同 metal 有關既，所以我地會揀答案 "A"。
好啦，之後個 3 題就到你地自己做，你地有 2 分鐘時間。 *(待續見下...)*

In this section, you'll make a guess about the meaning of some unknown Chinese characters.
This section will be divided into two parts. In the first part, you'll guess for the meaning of a component of some characters, and from three options on the right-hand side showing pictures with English illustrations, circle the one that you think the meaning is matched with the meaning.
For example, the character "涯" (write down on board) has the component "氵" (write down on board) which means water, so we choose the option "A" Water, but not "B" Fire and "C" Wood.
So, in the following item, you have the character "鑼" (write down on board) and what does that component "釒" (write down on board) mean? (give students time to think) It means "metal", so we choose option A.
Now, it's your turn, try to do the following three items, you have about 2 minutes.

係下一個部份，你會繼續估下一啲唔識既中文字既意思。
係左手邊，你會見到一幅圖畫及英文說明，然後你要係右手邊三個不認識的中文字中，估下邊一個字係意義上同幅圖畫係最相近既。
譬如係例子入面，你見到一個 "waiter", 然後睇下隔籬個三個中文字，三個字都有個一樣既邊 "寺" (寫在黑板上)，但係就有三個唔同既部份, 分別係 A 既 "忄" (寫在黑板上)，B 既 "山" (寫在黑板上)，同 C 既 "亻" (寫在黑板上)。Waiter 係人所做既一種職業，所以我地揀 C。
係跟住個題，幅圖畫係 boat。而個三個字都有一個相同既部份，係乜嘢呢？（給時間學生思考）係啦，就係 "廷" (寫在黑板上)，而佢地分別有三個唔同既部份："舟" "广" "言" (寫在黑板上)。咁 boat 係同咩有關既呢？（給學生時間思考）係啦　係同船有關，所以我哋揀 A。
係跟住個題，幅圖畫係 sunrise。而個三個字都有一個相同既部份，係乜嘢呢？（給時間學生思考）就係 "羲" (寫在黑板上)，而佢地分別有三個唔同既部份："日", "無嘢", "牛" (寫在黑板上)。Sunrise 係同太陽有關，所以我哋揀 A。

下面既 3 題就會係你自己做，你有 3 分鐘時間。
(待續見下...)

In the following part, you'll continue to guess about the meaning of some unknown Chinese characters.

In the left-hand side, you'll see a picture with English illustration, and on the right-hand side you'll find three unknown characters, circle the one that you think the meaning of which matches with the picture.

In the example, you see the picture of a waiter. Then for the three unknown characters on the right-hand side, you see they both share one common component "寺" (write down on the board), but with three different component as: A "忄", B "山", and C "亻" (write down on the board). As Waiter is one of the occupation take up by man, we choose C as the answer.

So, for the following item, the picture is a boat. And what component does the three characters all share? (give students time to think) Yes, it's the component "廷". And they have three different component as: "舟" "广" "言" (write down on the board). What does a boat related to? (give students time to think). Yes, that's ship, so we choose A.

For the following item, it's a picture of sunrise. And what component does the three characters all share? (give students time to think) Yes, it's the component "羲". And they have three different component as: "日", "nothing", "牛" (write down on the board). What does the sunrise related to? (give students time to think). Yes, that's the sun, so we choose A.

It's your turn now to complete the following 3 items by yourself. You have 3 minutes.

(5) 第 3 部份：Make a guess of the pronunciation　猜猜讀音

係依個部份，你會估下一啲唔識既中文字既讀音。

係每一題，我會讀出三個聲音，而你就要根據果個中文字入面你知道讀音既部份，去估下邊個係果個字既讀音。
譬如例子依個字 "酮" (寫在黑板上), 我會讀 A "同", B "酒", C "酉"。因爲 依個字 "酮" 入面有個字 "同" (寫在黑板上), 佢既讀音就係 A "同"，所以我哋選擇 A。
下面個題，個字係 "胱" (寫在黑板上), 我會讀 A "光", B "肉", C "月"。因爲 依個字 "胱" 入面有個字 "光" (寫在黑板上), 佢既讀音就係 A "光"，所以我哋選擇 A。
下面個題，個字係 "鞍" (寫在黑板上), 我會讀 A "革", B "安", C "女"。因爲 依個字 "鞍" 入面有個字 "安" (寫在黑板上), 佢既讀音就係 B "安"，所以我哋選擇 B。
好啦，之後個 6 題就到你地自己做，留心聽我讀每一題既讀音。

In this section, you have to guess about the pronunciation of the following unknown Chinese characters.

For every item, I'll read out three sounds, and based on the component of the character that you know the pronunciation, you choose the option that you think it's the character's pronunciation.

In the example, it's the character "酮" (write down on board), I will read out: A "同", B "酒", C "酉". As there is the component "同" (write down on board) and it's pronunciation is A 同, so we choose A as the answer.

In the following item, it's the character "胱" (write down on board), I will read out: A "光", B "肉", C "月". As there is the component "光" (write down on board) and it's pronunciation is A 光, so we choose A as the answer.

In the following item, it's the character "鞍" (write down on board), I will read out: A "革", B "安", C "女". As there is the component "安" (write down on board) and it's pronunciation is B 安, so we choose B as the answer.

Complete the following 6 items by yourself. Listen carefully when I read out the three sounds for each item.

慢慢讀出各題的讀音，如以下所示：

第一題, The first item: A 舟, B 甲, C 船。

第二題, The second item: A 央, B 殘, C 歹。

第三題, The third item: A 斗, B 手, C 打。

第四題, The fourth item: A 病, B 疾, C 巴。

第五題, The fifth item: A 金, B 衣, C 鎗。

第六題, The sixth item: A 草, B 千, C 花。

(6) 測驗人員宣佈測驗結束，並收回試卷。

4.2 <u>我會讀的中文字 (Read Out the Chinese Characters) 施行須知</u>

This test is an individual test, conducting on a one-to-one basis.

本測驗爲個人測驗，由測驗人員與學生一對一進行。

（A）測驗前的準備

測驗人員於測驗前，須：

a. 點算足夠的測驗卷；

b. 座位安排：3-4 位測驗人員與學生進行測驗，各組須一枱兩椅；1 位測驗人員爲主持，安排測驗流程及維持秩序。

（B）進行測驗

(1) 主持向學生宣佈：

> 同學依家會逐個出嚟同我地既哥哥、姐姐做一啲認字練習，睇下你地識唔識讀一啲中文字；
> 你哋會分組出嚟，未做練習或者做完練習既同學，我地會一齊先做住其他既活動先。
> 宜家我會先派練習紙，你地係上面寫左名同班別、班號之後，就傳出嚟畀番我。
>
> You'll now come out one by one to do a Chinese characters recognition exercise, to see if you know how to read out some Chinese characters;
> You'll come out one by one in group, for those not yet to do the test or you've completed the test, we'll do some other activities first.
> I'll now distribute the exercise. Write down your name, class and class no. on it and pass it back to me.

(2) 主持收回測驗卷，並分發給測驗人員。

(3) 測驗人員

1. 確定應試學生的卷別姓名無誤。

2. 開始測試，以手指由左至右、上至下的次序逐字指字，讓學生讀出中文字讀音。

3. 學生能讀出該字讀音（因少數族裔咬字發音或未十分準確，要求從寬則可），即圈起該字；學生未能讀出，則跳往下字

4. 指字速度不快不慢，不須給予學生時間思考，但學生回讀或改正而正確者，可給予分數。每個學生的讀字時間約爲 2-3 分鐘。

4.3 **Arrange the Story Sequences Right (Form A and B)** 故事排順序 (A 及 B 本) 施行須知

（A）測驗前的準備

測驗人員於測驗前，須：

a. 點算足夠的測驗卷；

b. 查核學生的座位適當（如有適當的間距）；

c. 檢查錄音光碟及播音設備。

（B）進行測驗

(1) 測驗人員向學生宣佈：

> 我地依家一齊去聽或者讀一啲中文既故仔，然後就將啲相關既圖片按故事順序排番好佢，睇下你地明唔明啲故仔內容；
> 我地會先聽或者讀故仔，然後先排圖畫，我會一路畀指示你地，唔駛心急；亦唔好自己先做前面既故仔，你只要聽我既指示就得啦；
> 唔識做既話，漏空個答案就得；
> 做練習時唔好傾偈，唔好睇人地；
> 將答案寫係練習紙上面。我宜家派練習紙。
>
> You're going to listen or read some stories, and then to arrange some pictures about the story in the right order according to the story sequence, to see if you understand the story.
> We'll first listen or read the stories, then do the picture arrangement; I'll give you instructions all the way, don't be rush; and don't do the item ahead by yourself, just follow my instruction;
> If you don't know the answer, just leave it blank, it's OK.
> Don't talk to others during the test, don't look at others' papers;
> Write down all the answers on the exercise paper. I am going to distribute the paper now.

(2) 派給每名學生一份測驗卷，然後宣佈：

在測驗卷上填寫學校名稱、學生姓名、班別、班號及日期。如有問題，請舉手。

Write down on the test paper the school name, your name, class, class number and today's date. If you have question, please raise up your hand.

(3) 練習題

你地依家個份練習上面，有幾個故事，其中有啲要你聽既，有啲就要你讀既，然後你就要按照故仔既順序去排列圖畫，咁係點排列既呢？
我地跟住嚟會做一個聆聽練習先，做完你就會明架啦。
依家我會先播一個故仔，個故仔係有關一個媽媽同仔仔係地鐵站發生既故仔，聽完之後，我地會一齊做練習。
我地依家先聽個故仔先啦。

In this exercise, you'll listen to or read about several stories, and then you have to arrange the story pictures in the right order; what exactly you'll have to do?
We'll do one listening exercise together, and you'll know how to do it after that;
Now, I'll play a record of a story. It's a story about a mother and her son and what happened to them in a MTR station.
Listen to the story first, after that, we'll do the exercise together;
So, I'll play the record of the story right now.

播放音帶「地鐵」。下附音帶的內容。

星期六下午，媽媽和小明準備乘地鐵。二人進入地鐵站大堂後，媽媽拿著八達通卡率先過了入閘機。當媽媽入了閘後，她才發現小明的八達通卡因儲值是負數而不能入閘。於是，媽媽便叫小明拿著八達通卡往票務處增值，而她則在閘內等候他。小明走到票務處，正要拿錢出來時，發現銀包沒有錢。於是，他連忙跑回閘口告訴媽媽。媽媽從銀包取出紙幣交給小明。小明再到票務處把八達通卡增值。增值後，小明終於可以入閘，跟媽媽一起搭地鐵了。
（字數：199）

然後指示學生轉到試卷背面，指示他們如何完成練習，如下示：

依家你地轉去後面個版，你地會見到上面有 6 幅有關個故事既圖畫：
依 6 幅圖畫個次序掉亂咗，你地就要按你頭先聽到既故事順序去排番啱個次序；
你只要將代表個幅圖畫既代號 A 至 F，按順序寫係最下面既 1-6 既方格就得；
第 1 個位置既圖畫 D，同最後既第 6 個位置圖畫 C 已經寫咗畀你，你只要排好中間四個位置就得架啦。
好啦，宜家你地就做埋跟住果幾幅圖畫啦，慢慢做，你地有 2 分鐘時間。

Now, turn over the page. You'll see there are 6 pictures about the story;
The pictures are not in the right order, you have to arrange them right according to the story sequences you have just heard;
You have to put the English letter A to F of the pictures into the 1 to 6 boxes below according to the right order;
The first one Picture D and the last one Picture C have been done for you, you only have to arrange the remaining four pictures;
OK, now you'll do the following by yourself; take the time, you have 2 minutes.

(以下爲 A 本的指示)

(3) 聆聽練習第 1 題

> 跟住會有第二個故仔，係有關一個媽媽同仔仔、女女係超級市場發生既故仔，聽完之後，就會做頭先既排圖畫次序練習。
> 我地依家先聽個故仔先啦。
>
> The following is another story, It's a story about a mother, her son and daughter, and what happen to them in a supermarket.
> Listen to the story first, after that, you'll do the picture arrangement exercise;
> So, I'll play the record of the story right now.

播放音帶「超級市場」。下附音帶的內容。

> 昨天，媽媽帶我和妹妹到超級市場去。我們到了超級市場後，拿了一部手推車購物。我們揀了一些食物和日用品，妹妹則嚷著要買五顏六色的水果糖，於是，媽媽讓她自己去揀。妹妹個子不高，當她嘗試拿高處的糖果時，意外地把架上的糖果翻倒。那時候，糖果架旁一位理貨員正望著她，妹妹感到十分不好意思，臉也紅起來。於是，媽媽便吩咐我和妹妹一起把地上的糖果放回架上。妹妹連忙向我和媽媽道歉，並說以後會加倍小心。最後，我們到收銀處付款，然後帶著幾袋物品回家去。（字數：215）

然後指示學生轉到試卷背面，指示他們完成練習，如下示：

> 依家你地轉去後面個版，按順序去排番個次序：
> 第 1 個位置既圖畫 C，同最後既第 6 個位置圖畫 B 已經寫咗畀你，你只要排好中間四個位置就得架啦。
> 好啦，宜家你地就做埋跟住果幾幅圖畫啦，慢慢做，你地有 2 分鐘時間。
>
> Now, turn over the page. Put the English letter A to F of the pictures into the 1 to 6 boxes below according to the right order;
> The first one Picture C and the last one Picture B have been done for you, you only have to arrange the remaining four pictures;
> OK, now you'll do the following by yourself; take the time, you have 2 minutes.

(4) 聆聽練習第 2 題

跟住會有另一個故仔，係有關一個家庭係屋企發生既故仔，聽完之後，就會做頭先既排圖畫次序練習。
我地依家先聽個故仔先啦。

The following is another story, It's a story about a family and what happen to them at home.
Listen to the story first, after that, you'll do the picture arrangement exercise;
So, I'll play the record of the story right now.

播放音帶「泥公仔」。下附音帶的內容。

爸爸答應在這個星期日帶小青和弟弟到海洋公園去。到了星期日，卻下起雨來，爸爸唯有取消計劃，不到海洋公園去。小青和弟弟十分失望。後來媽媽提出建議，就是教爸爸、小青和弟弟利用麵粉做公仔。小青和弟弟最初對做麵粉公仔並不感興趣，因爲她和弟弟覺得麵粉會把手和衣服弄髒。但看到媽媽能把麵粉捏做成各種形狀，小青和弟弟頓感有趣，於是便跟著媽媽做起公仔來。媽媽教小青和弟弟用麵粉做了小兔、小貓和小豬等小動物。最後，小青在家裏和爸爸、媽媽、弟弟玩得很開心。除學會了做麵粉公仔外，小青還覺得只要跟爸爸、媽媽和弟弟在一起，即使留在家裏也可以很快樂呢！

然後指示學生轉到試卷背面，指示他們完成練習，如下示：

依家你地轉去後面個版，按順序去排番個次序；
第 1 個位置既圖畫 D，同最後既第 6 個位置圖畫 A 已經寫咗畀你，你只要排好中間四個位置就得架啦。
好啦，宜家你地就做埋跟住果幾幅圖畫啦，慢慢做，你地有 2 分鐘時間。

Now, turn over the page. Put the English letter A to F of the pictures into the 1 to 6 boxes below according to the right order;
The first one Picture D and the last one Picture A have been done for you, you only have to arrange the remaining four pictures;
OK, now you'll do the following by yourself; take the time, you have 2 minutes.

(5) 閱讀練習第 1 題

跟住落嚟既練習，你地會係去讀…啲故仔，跟住就…樣係要根據故事內容去排番好圖畫既次序。
跟住落嚟個故仔，係有關一個哥哥同妹妹係屋企發生既事。
好啦，你地依家可以先睇個故仔，然後轉去後面個頁去排好個圖畫順序。第 1 個位置既圖畫 E，同最後既第 6 個位置圖畫 A 已經寫咗畀你，你只要排好中間四個位置就得架啦。
慢慢做，你地有 5 分鐘時間。
。

In the following exercises, you'll have to read the story, and then to arrange the picture in the order according to the story sequences.
The following story is about a brother and his little sister, and what happen to them at home.
You can now read the story first, and then turn over the page to do the picture arrangement exercise. The first one Picture E and the last one Picture A have been done for you, you only have to arrange the remaining four pictures;
Take the time, you have 5 minutes.

(6) 閱讀練習第 2 題

跟住落嚟個故仔，係有關兩個同學係學校發生既事。
好啦，你地依家可以先睇個故仔，然後轉去後面個頁去排好個圖畫順序。第 1 個位置既圖畫 A，同最後既第 6 個位置圖畫 B 已經寫咗畀你，你只要排好中間四個位置就得架啦。
慢慢做，你地有 5 分鐘時間。
。

The following story is about two students, and what happen to them in school.
You can now read the story first, and then turn over the page to do the picture arrangement exercise. The first one Picture A and the last one Picture B have been done for you, you only have to arrange the remaining four pictures;
Take the time, you have 5 minutes.

(7) 測驗人員宣佈測驗結束，並收回試卷。

(以下爲 B 本的指示)

(3) 聆聽練習第 1 題

> 跟住會有第二個故仔，係有關一個哥哥同妹妹係屋企發生既事。聽完之後，就會做頭先既排圖畫次序練習。
> 我地依家先聽個故仔先啦。
>
> The following is another story. The story is about a brother and his little sister, and what happen to them at home.
> Listen to the story first, after that, you'll do the picture arrangement exercise;
> So, I'll play the record of the story right now.

播放音帶「爭看電視」。下附音帶的內容。

> 復活節假期的早上，哥哥和妹妹在客廳看電視。哥哥想看鐵甲超人卡通片，妹妹卻想看魔法仙子卡通片。大家都搶著遙控器要選台，互不相讓。二人爭來搶去，哥哥終於搶到遙控器，開心地看鐵甲超人。妹妹看不到魔法仙子卡通片，於是大哭起來，甚至打哥哥。爸爸媽媽聽到他們吵架的聲音，便出來看個究竟。當爸爸媽媽看到他們吵架，爸爸首先把電視關掉，然後問哥哥發生了什麼事。爸爸向哥哥說，兄妹要互相禮讓，不可以吵架。如果二人都想看電視，就只好輪流看！媽媽亦教訓妹妹不可以打哥哥。最後，妹妹向哥哥說對不起，而哥哥決定今次先讓妹妹看，下次才看他喜歡的鐵甲超人卡通片。妹妹十分開心！（字數：272）

然後指示學生轉到試卷背面，指示他們完成練習，如下示：

> 依家你地轉去後面個版，按順序去排番個次序：
> 第 1 個位置既圖畫 E，同最後既第 6 個位置圖畫 A 已經寫咗畀你，你只要排好中間四個位置就得架啦。
> 好啦，宜家你地就做埋跟住果幾幅圖畫啦，慢慢做，你地有 2 分鐘時間。
>
> Now, turn over the page. Put the English letter A to F of the pictures into the 1 to 6 boxes below according to the right order;
> The first one Picture E and the last one Picture A have been done for you, you only have to arrange the remaining four pictures;
> OK, now you'll do the following by yourself; take the time, you have 2 minutes.

(4) 聆聽練習第 2 題

跟住會有另一個故仔，係有關兩個同學係學校發生既事。聽完之後，就會做頭先既排圖畫次序練習。
我地依家先聽個故仔先啦。

The following is another story. It's about two students, and what happen to them in school.
Listen to the story first, after that, you'll do the picture arrangement exercise;
So, I'll play the record of the story right now.

播放音帶「新筆盒」。下附音帶的內容。

小強和小明是三年級 A 班的同學。兩人感情十分要好，就是在班上，兩亦坐在隔鄰。今天上數學堂時，小明從書包裏拿出一個新的筆盒，很高興的告訴小強，因爲他默書得到了一百分，所以他的媽媽買了一個又新又漂亮的筆盒給他。小強連聲稱讚，十分羨慕。小息過後，小明發覺在書桌上的新筆盒不見了，心裏十分難過，跟著他更誤會是別的同學偷了他的新筆盒。小強和其他同學不斷地安慰他。後來，老師便叫小強和其他同學幫小明四處尋找筆盒。小強和其他同學小心地找尋班房內每處地方，發現筆盒原來放在小明的書包內。小明十分高興，而老師亦稱讚小強及其他同學的互助精神。（260 字）

然後指示學生轉到試卷背面，指示他們完成練習，如下示：

依家你地轉去後面個版，按順序去排番個次序；
第 1 個位置既圖畫 D，同最後既第 6 個位置圖畫 A 已經寫咗畀你，你只要排好中間四個位置就得架啦。
好啦，宜家你地就做埋跟住果幾幅圖畫啦，慢慢做，你地有 2 分鐘時間。

Now, turn over the page. Put the English letter A to F of the pictures into the 1 to 6 boxes below according to the right order;
The first one Picture D and the last one Picture A have been done for you, you only have to arrange the remaining four pictures;
OK, now you'll do the following by yourself; take the time, you have 2 minutes.

(6) 閱讀練習第 1 題

跟住落嚟既練習，你地會係去讀一啲故仔，跟住就一樣係要根據故事內容去排番好圖畫既次序。
跟住落嚟個故仔，係有關一個媽媽同仔仔、女女係超級市場發生既故仔。
好啦，你地依家可以先睇個故仔，然後轉去後面個頁去排好個圖畫順序。第 1 個位置既圖畫 C，同最後既第 6 個位置圖畫 B 已經寫咗畀你，你只要排好中間四個位置就得架啦。
慢慢做，你地有 5 分鐘時間。
。

In the following exercises, you'll have to read the story, and then to arrange the picture in the order according to the story sequences.
It's a story about a mother, her son and daughter, and what happen to them in a supermarket.
You can now read the story first, and then turn over the page to do the picture arrangement exercise. The first one Picture C and the last one Picture B have been done for you, you only have to arrange the remaining four pictures;
Take the time, you have 5 minutes.

(7) 閱讀練習第 2 題

跟住落嚟個故仔，係有關一個家庭係屋企發生既故仔。
好啦，你地依家可以先睇個故仔，然後轉去後面個頁去排好個圖畫順序。第 1 個位置既圖畫 D，同最後既第 6 個位置圖畫 A 已經寫咗畀你，你只要排好中間四個位置就得架啦。
慢慢做，你地有 5 分鐘時間。
。

The following is another story. It's a story about a family and what happen to them at home.
You can now read the story first, and then turn over the page to do the picture arrangement exercise. The first one Picture D and the last one Picture A have been done for you, you only have to arrange the remaining four pictures;
Take the time, you have 5 minutes.

(8) 測驗人員宣佈測驗結束，並收回試卷。

4.4 「中文語文能力測驗（Chinese Language Proficiency Test）」施行須知

（A）測驗前的準備

測驗人員於測驗前，須：

a. 點算足夠的測驗卷；

b. 查核學生的座位適當（如有適當的間距）；

c. 檢查錄音光碟及播音設備。

（B）進行測驗

(1) 測驗人員向學生宣佈：

> 我地依家會做中文既理解能力測驗，目的是考核你們的中文聆聽及閱讀理解能力；
> 測驗既每個部份都會畀指示你地，你地要留心聽；而係每個部份，我都會畀足夠既時間你去完成，唔駛心急，亦唔好自己先做，要聽我既指示；
> 唔識做既話，漏空個答案就得；
> 做測驗時唔好傾偈，唔好睇人地；
> 將答案寫係練習紙上面。我宜家派測驗紙。
>
> We're going to do a Chinese comprehension ability test, to evaluate your Chinese listening and reading comprehension skill;
> I'll instruct your for every parts of the test. For each section, I'll give you enough time to complete it, don't be rush, and don't do the item ahead by yourself, just follow my instruction;
> If you don't know the answer, just leave it blank, it's OK.
> Don't talk to others during the test, don't look at others' papers;
> Write down all the answers on the exercise paper. I am going to distribute the paper

(2) 派給每名學生一份測驗卷，然後宣佈：

> 在測驗卷上填寫學校名稱、學生姓名、班別、班號及日期。如有問題，請舉手。
>
> Write down on the test paper the school name, your name, class, class number and today's date. If you have question, please raise up your hand.

(3) 聆聽測驗 (第 1 題)

在聆聽測驗部份，你將會聽到三個故事，然後回答問題。
以下是第一個故事，係有關小動物的故事。聽完之後，讚出第 1 至 4 題適當的答案，把答案的英文字母寫在方格內。我會在故事音帶播放完後，將問題逐一讀出，你可以留待那時才將答案寫在方格內。

In the listening test, you will fist listen to three stories, and then answers questions. The following is the first story, it is a story about little animals. After the tape, choose the right answer for question 1 to 4, and write down the English character in the square provided. I will read out each question after the tape, you can wait till then to answer the questions.

播放音帶「小老虎的故事」。下附音帶的內容。

小老虎係小動物之中係最惡架，平時佢最鐘意蝦啲善良既小動物，好似小鹿、小羊、小松鼠，特別係小白兔。有一日，獵人黎到森林打獵，係河邊將小老虎射傷，小老虎大叫一聲，跟住就忍住痛搏命走啦，傷口仲不停咁流血，其他動物聽到獵人既槍聲，都各自各咁搵地方理埋。因爲小老虎既傷口流左好多血，佢知道獵人好快就會搵到黎，所以心裏面好驚。厘個時候，小白兔走過黎，叫小老虎伏係大樹下面，而小白兔就將一塊塊既落葉，鋪係小白兔既身上，當獵人經過既時候，真係發現唔到小老虎喎。
過左一陣，老虎媽媽黎搵小老虎啦，仲將小白兔捉住。小老虎即刻同媽媽講：「唔好食佢呀，佢頭先救左我架，我以後都唔會再蝦佢架啦。」

然後逐題讀出問題，須用廣東話讀出，以下爲問題的廣東話讀稿。不要重複問題，不要用英語解釋。每條問題讀完後，留約 10-15 秒時間給學生作答。

1. 小動物各自搵地方理埋，因爲：
(A) 害怕小老虎。(B) 害怕老虎媽媽。(C) 聽到獵人既槍聲。(D) 聽到小老虎既叫聲

2. 小老虎知道獵人好會會搵到佢，因爲：(係四幅圖畫入面揀一正確既答案)。

3. 小白兔利用左咩嘢救左小老虎？(係四幅圖畫入面揀一正確既答案)

4. 小白兔救左小老虎，小老虎應承：
(A) 以後會保護小白兔 (B)從此唔再蝦小白兔 (C)以後同小白兔做好朋友 (D)叫老虎媽媽唔後理小白兔。

(4) 聆聽測驗 (第 2 題)

以下是第二段錄音內容，係係小息時，珍珍同東東既對話。聽下佢地講乜嘢。聽完之後，讀出第 5 和第 6 題適當的答案，把答案的英文字母寫在方格內。我會在故事音帶播放完後，將問題逐一讀出，你可以留待那時才將答案寫在方格內。

The following is the second piece of sound record, it is a dialogue between two classmates 珍珍 and 東東 during recess time. Listen to what they said. After the tape, choose the right answer for question 5 and 6, and write down the English character in the square provided. I will read out each question after the tape, you can wait till then to answer the questions.

播放音帶「珍珍和東東」。下附音帶的內容。

東東：珍珍，點解你塊面咁紅既？
珍珍：哦，尋日係星期日，爸爸媽媽都唔駛番工，我地一家人去海灘游水，畀太陽晒左成日，塊面咪變成左紅卜卜囉！
東東：你尋日咪好開心囉？
珍珍：係呀，我係海灘度捉左啲蟹仔，姐姐用沙堆左個城堡，我將啲蟹仔困係城堡入面，我地又係沙灘度燒烤添！東東呀，你尋日做左啲乜嘢呀？
東東：我就無你咁開心啦，尋日我婆婆入左醫院呀！
珍珍：點解呀？
東東：尋日婆婆係浴室度跌低左，媽媽送佢入醫院，剩番我同哥哥係屋企做功課，過左好耐媽媽先至返黎，原來婆婆既手骨斷左，要係醫院度留醫呀！
珍珍：點解你婆婆會跌低架？
東東：媽媽話浴室地下可能有啲水，婆婆踩到，就跌低啦。
珍珍：係呀，老師時時都教我地洗手之後要抹乾手，真係好啱架。
東東：睇見婆婆咁慘，我地以後都要小心啲啦。
珍珍：係呀。

然後逐題讀出問題，須用廣東話讀出，以下爲問題的廣東話讀稿。不要重複問題，不要用英語解釋。讀完後，留約 10-15 秒時間給學生作答。

係試卷上面，你會見到由 A 到 H 八幅圖畫。其中邊啲事係同珍珍有關既？又有邊啲事係同東東有關既呢？
係第 5 題上面寫上同珍珍有關既事情既英文字母。
係第 6 題上面寫上同東東有關既事情既英文字母。

(5) 聆聽測驗 (第 3 題)

以下是第三段錄音內容，係上體育堂既時候，老師吩咐同學要記住佢講既說話。你地聽下老師講乜嘢。聽完之後，讚出第 7 和第 8 題適當的答案，把答案的英文字母寫在方格內。我會在故事音帶播放完後，將問題逐一讀出，你可以留待那時才將答案寫在方格內。

The following is the third piece of sound record. During PE lesson, teacher required the students to remember what she told them to do. Try to listen what the teacher said. After the tape, choose the right answer for question 7 and 8, and write down the English character in the square provided. I will read out each question after the tape, you can wait till then to answer the questions.

播放音帶「體育堂衣飾」。下附音帶的內容。

老師：冬天就快到啦，我知道好多同學都好怕凍，或者你地屋企人怕你會凍親，係冬天既時候要你地着羊毛底衫，其實，香港既冬天只有幾日好凍，如果唔係咁凍，又着左羊毛底衫，上完體育堂之後，出左汗會好辛苦，又好難除左件羊毛底衫，係上體育堂個日，如果唔係太凍，你地就唔好着羊毛底衫啦。真係好怕凍既同學，可以着冷衫，不過記住，冷衫要着係運動衫外面，因爲會容易啲除，另外，同學要注意，上體育堂個陣唔好帶任何飾物，因爲做運動既時候好容易會唔見左，又會整親自己或者係同學，記住話畀家長聽啦。

然後逐題讀出問題，須用廣東話讀出，以下爲問題的廣東話讀稿。不要重複問題，不要用英語解釋。每條問題讀完後，留約 10-15 秒時間給學生作答。

7. 同學如果想係上體育堂既時候着冷衫，要著係：
(A)校服外面 (B)運動衫外面 (C)運動衫裏面 (D)羊毛底衫裏面

8. 上體育堂既時候，唔可以著羊毛底衫，因爲：
(A)同學流好多汗 (B)外套比羊毛底衫暖 (C)汗水會整污糟羊毛底衫 (D)同學好難除低件羊毛底衫

(6) 閱讀測驗 (第 1-6 題)。讀出以下的指示，然後給予 6 分鐘時間給學生作答。

係第 1 至 6 題，你會讀到關於丁丁既 6 個句子。選出最適當的答案，把答案前既英文字母寫作方格入面。你有 6 分鐘時間完成依個部份。

For question no. 1 to 6, you will read six sentences about 丁丁. choose the right answer for question 1 to 6, and write down the English character in the square provided. You have six minutes to finish this part.

(7) 閱讀測驗 (第 7-9 題)。讀出以下的指示，然後給予 5 分鐘時間給學生作答。

係第 7 至 9 題，你會讀到 3 句中間有漏空既句子。在括號上填上適當的字。你有 5 分鐘時間完成依個部份。

For question no. 7 to 9, you will read three sentences with blanks. Write down the appropriate Chinese character to fill up the sentences. You have five minutes to finish this part.

(8) 閱讀測驗 (第 10-13 題)。讀出以下的指示，然後給予 10 分鐘時間學生閱讀及作答。

係依個部份，你會讀到一個小故事，然後回答第 10-13 題。係第 10-12 題，你要將答案用中文寫出嚟，而係第 13 題，你就要選擇適當既答案。你有 10 分鐘時間去閱讀故事及回答問題。

In this part, you have to read a story and answer question no. 10 to 13. For question 10 to 12, you have to write down the answers in Chinese; and for question 13, you have to choose the appropriate answer. You have 10 minutes to read the sory and answer the questions.

(9) 閱讀測驗 (第 14-16 題)。讀出以下的指示，然後給予 5 分鐘時間給學生作答。

> 係第 14 至 16 題，你會讀到 3 句中間有漏空既句子。在括號上填上適當的字。你有 5 分鐘時間完成依個部份。
>
> For question no. 14 to 16, you will read three sentences with blanks. Write down the appropriate Chinese character to fill up the sentences. You have five minutes to finish this part.

(10) 測驗人員宣佈:

> 閱讀部份既測驗都已經完成。你地依家有 5 分鐘時間去睇番你頭先所做既答案，並作出改正。
>
> The reading comprehension test is finished. You have 5 minutes to review all the answers and make revisions.

(11) 測驗人員宣佈測驗結束，並收回試卷。

Appendix J
Results of Normality Tests on the Original and Transformed Scores' Distributions

(1) Normality test on the original scores' distributions of the measures

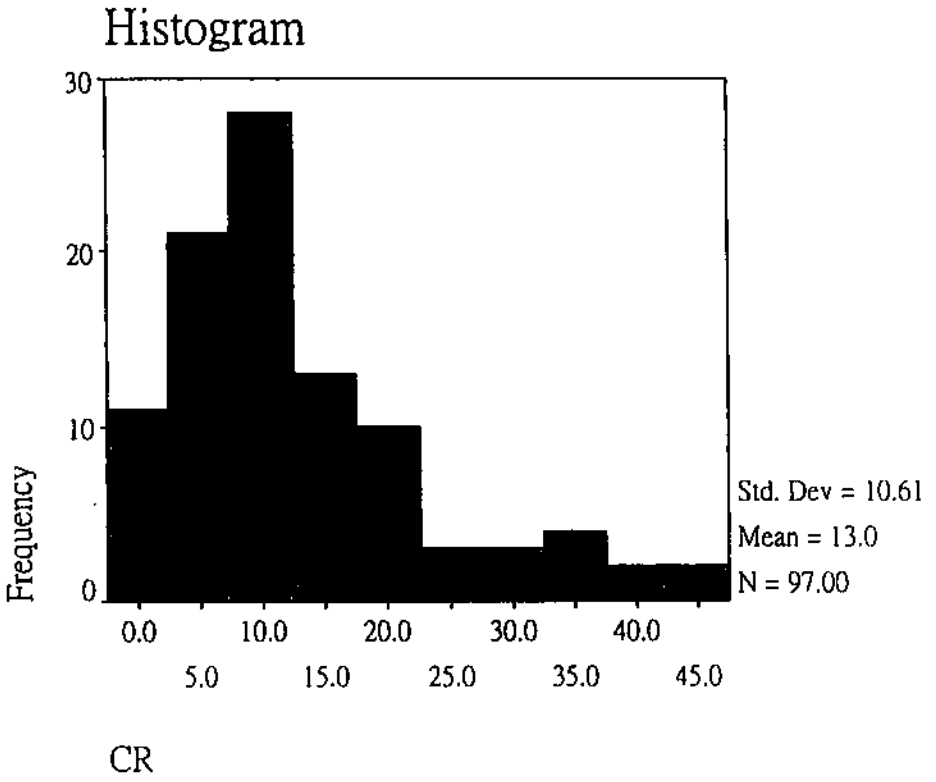
The Skeweness values, the kurtosis values, and the results of the Kolmogorov-Smirnow and Shapiro-Wilk tests are reported in the following table.

Measures*	Skewness	Kurtosis	Tests of Normaility			
			Kolmogorov-Smirnow		Shapiro-Wilk	
			Statistic	Sig	Statistic	Sig
CRT	1.339	1.463	.181	.000	.870	.000
COAKT	-.801	.525	.123	.001	.950	.001
ST_LC	.448	-.511	.132	.000	.950	.001
ST_RC	1.724	3.114	.216	.000	.823	.000
DCT_L	-.286	-.350	.128	.000	.932	.000
DCT_R	.466	-.788	.181	.000	.916	.000
LC	.286	-.355	.117	.002	.972	.035
RC	1.537	2.314	.164	.000	.855	.000

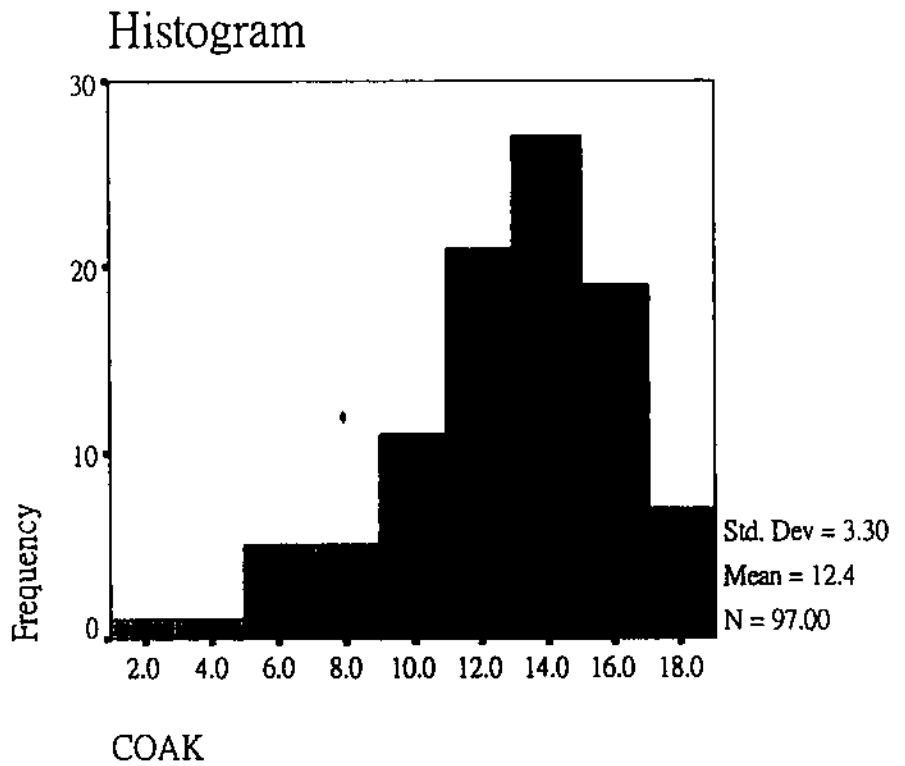
**CRT: Chinese Character Recognition Test; CQAKT: Chinese Orthographic Awareness and Knowledge Test; ST_LC: Standardized Listening Comprehension Test; ST_RC: Standardized Reading Comprehension Test; DCT_LC: Discourse Comprehension Test: Listening Comprehension; DCT_RC: Discourse Comprehension Test: Reading Comprehension; LC: Composite Score for Listeningc Comprehension; RC: Composite Score for Reading Comprehension*

The distributions are not normally distributed as indicated by the results. Histograms of the distributions are shown in the following.

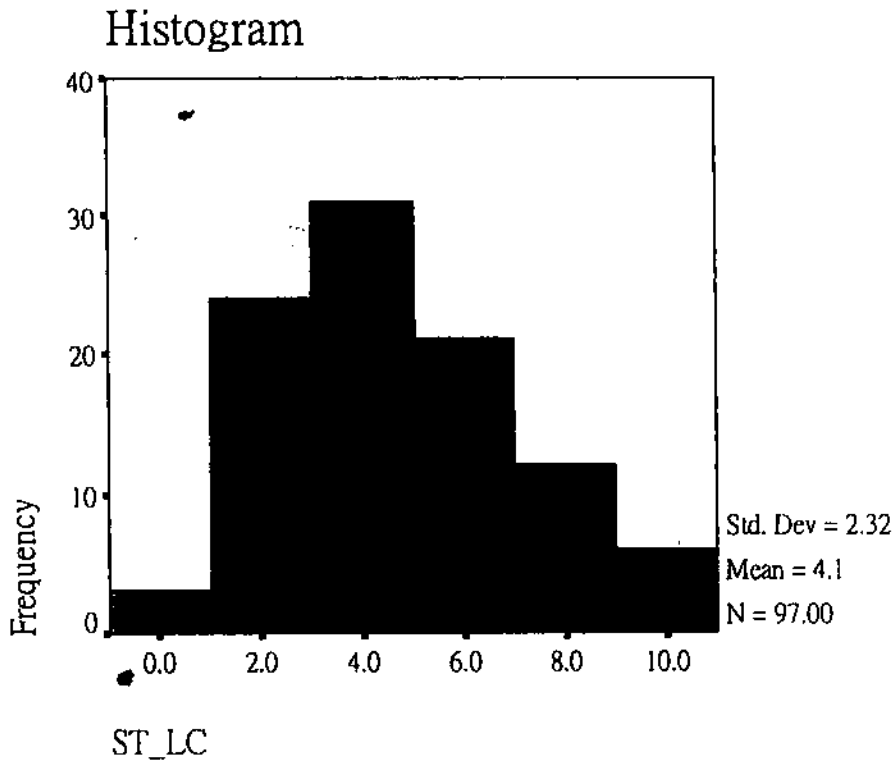
(a) Histogram for the Chinese Character Recognition Test



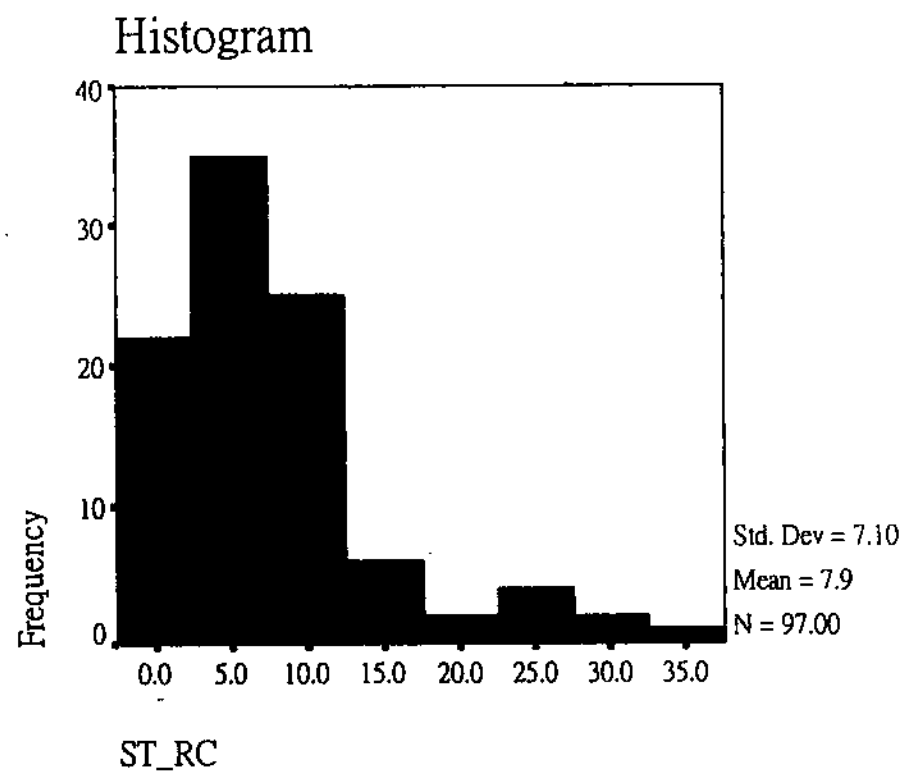
(b) Histogram for the Chinese Orthographic Awareness and Knowledge Test



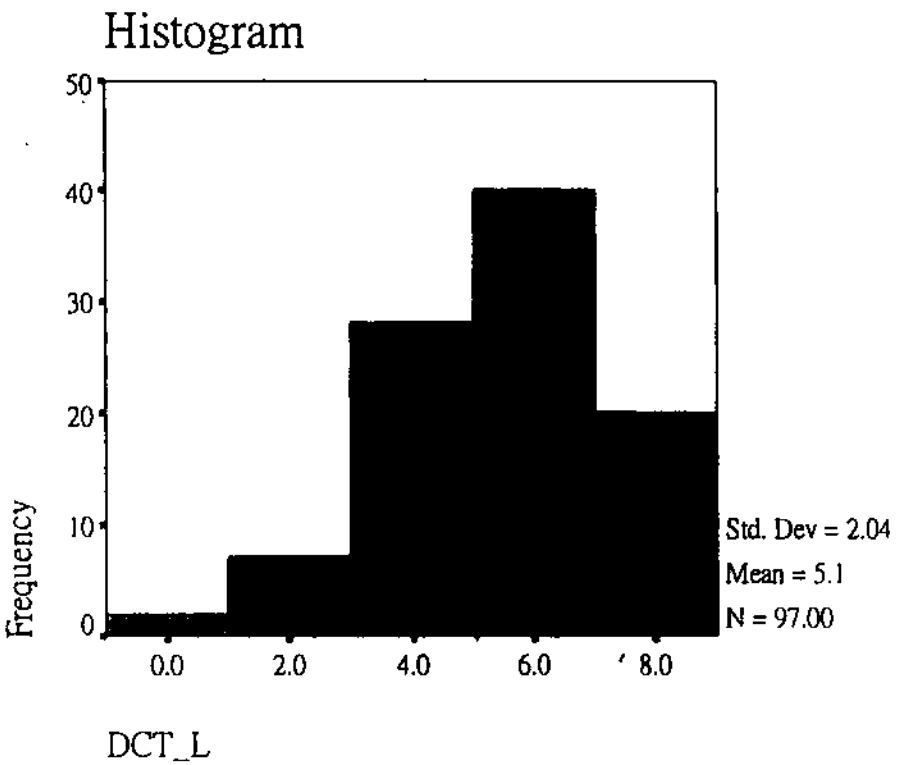
(c) Histogram for the Standardized Listening Comprehension Test



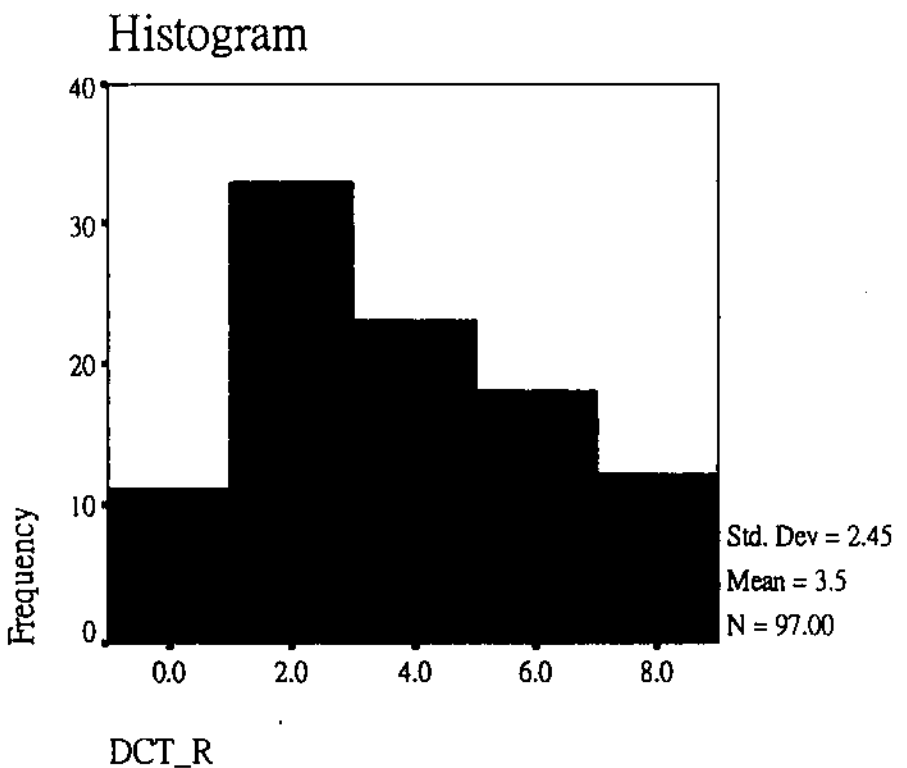
(d) Histogram for the Standardized Reading Comprehension Test



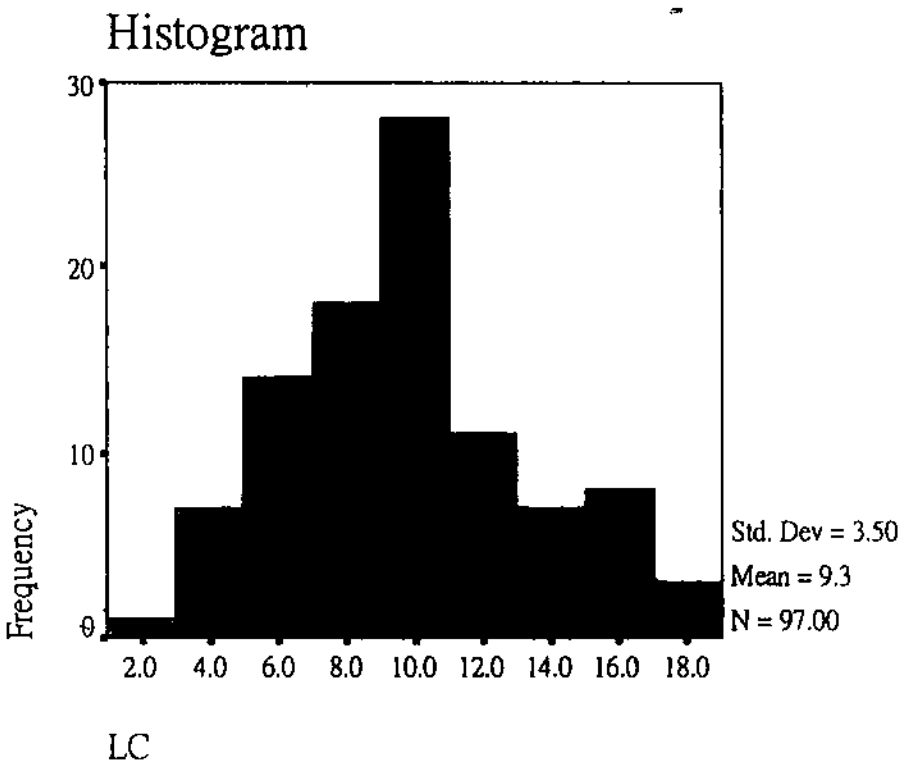
(e) Histogram for the Discourse Comprehension Test: Listening Comprehension



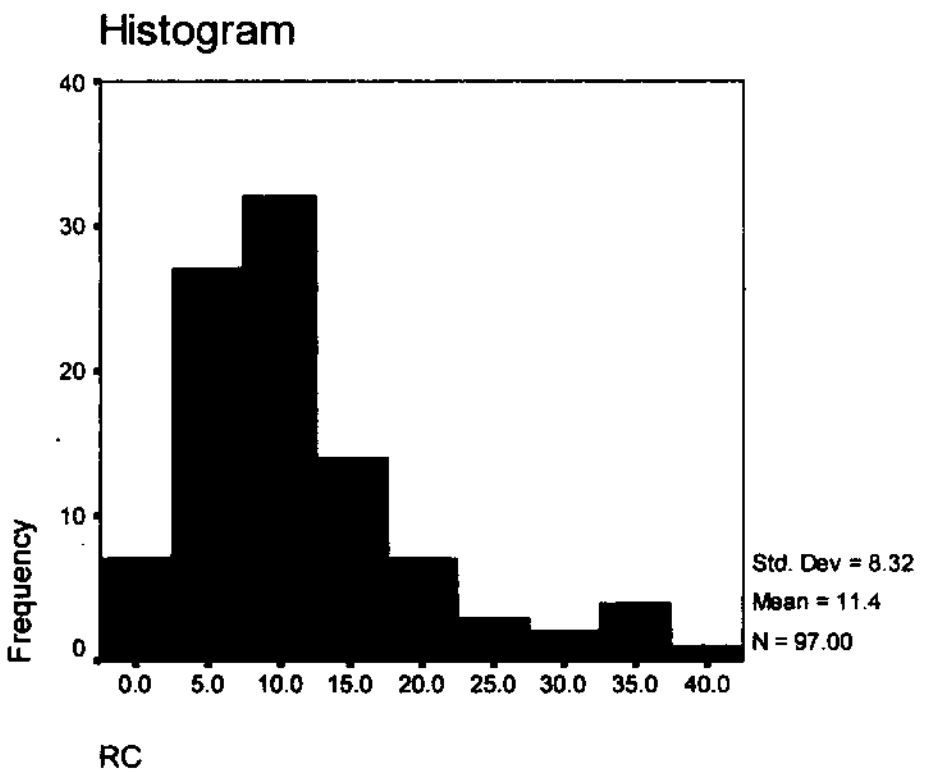
(f) Histogram for the Discourse Comprehension Test: Reading Comprehension



(g) Histogram for the Composite Score: Listening Comprehension



(h) Histogram for the Composite Score: Reading Comprehension



(2) Normality test on the transformed scores' distributions of the measures

Various data transformation methods for normality, including the square root, the logarithmic, the inverse and the arcsine, were performed. No transformation could normalize all the measures' distributions. Results are reported in the following tables.

(a) The Square Root Transformation

Measures	Skewness	Kurtosis	Tests of Normaility			
			Kolmogorov-Smirnow		Shapiro-Wilk	
			Statistic	Sig	Statistic	Sig
CRT	.359	.091	.106	.009	.963	.008
COAKT	-1.356	2.361	.150	.000	.898	.000
ST_LC	-.065	-.450	.097	.025	.967	.016
ST_RC	.683	.599	.141	.000	.942	.000
DCT_L	-.877	.998	.137	.000	.908	.000
DCT_R	-.023	-.823	.146	.000	.938	.000
LC	-.231	-.138	.098	.022	.977	.082
RC	.507	.615	.109	.006	.967	.014

**CRT: Chinese Character Recognition Test; COAKT: Chinese Orthographic Awareness and Knowledge Test; ST_LC: Standardized Listening Comprehension Test; ST_RC: Standardized Reading Comprehension Test; DCT_LC: Discourse Comprehension Test: Listening Comprehension; DCT_RC: Discourse Comprehension Test: Reading Comprehension; LC: Composite Score for Listeningc Comprehension; RC: Composite Score for Reading Comprehension*

(b) The Logarithmic Transformation

Measures	Skewness	Kurtosis	Tests of Normaility			
			Kolmogorov-Smirnow		Shapiro-Wilk	
			Statistic	Sig	Statistic	Sig
CRT	-1.006	1.097	.144	.000	.902	.000
COAKT	-2.174	6.752	.187	.000	.808	.000
ST_LC	-.758	.730	.124	.001	.938	.000
ST_RC	-.570	.347	.161	.000	.935	.000
DCT_L	-1.748	4.403	.178	.000	.831	.000
DCT_R	-.627	-.266	.168	.000	.909	.000
LC	-.865	.975	.137	.000	.942	.000
RC	-.387	.866	.108	.007	.977	.086

**CRT: Chinese Character Recognition Test; COAKT: Chinese Orthographic Awareness and Knowledge Test; ST_LC: Standardized Listening Comprehension Test; ST_RC: Standardized Reading Comprehension Test; DCT_LC: Discourse Comprehension Test: Listening Comprehension; DCT_RC: Discourse Comprehension Test: Reading Comprehension; LC: Composite Score for Listeningc Comprehension; RC: Composite Score for Reading Comprehension*

(c) The Inverse Transformation

Measures	Skewness	Kurtosis	Tests of Normaility			
			Kolmogorov-Smirnow		Shapiro-Wilk	
			Statistic	Sig	Statistic	Sig
CRT	2.742	6.198	.366	.000	.507	.000
COAKT	5.118	34.391	.278	.000	.511	.000
ST_LC	2.776	9.616	.229	.000	.699	.000
ST_RC	2.346	4.434	.319	.000	.608	.000
DCT_L	4.203	20.922	.291	.000	.531	.000
DCT_R	1.760	2.091	.306	.000	.715	.000
LC	2.520	8.385	.209	.000	.748	.000
RC	4.475	28.160	.263	.000	.602	.000

**CRT: Chinese Character Recognition Test; COAKT: Chinese Orthographic Awareness and Knowledge Test; ST_LC: Standardized Listening Comprehension Test; ST_RC: Standardized Reading Comprehension Test; DCT_LC: Discourse Comprehension Test: Listening Comprehension; DCT_RC: Discourse Comprehension Test: Reading Comprehension; LC: Composite Score for Listeningc Comprehension; RC: Composite Score for Reading Comprehension*

(d) The Arcsine Transformation (on Percentage Score)

Measures	Skewness	Kurtosis	Tests of Normaility			
			Kolmogorov-Smirnow		Shapiro-Wilk	
			Statistic	Sig	Statistic	Sig
CRT	1.689	2.790	.201	.000	.825	.000
COAKT	.129	.597	.089	.058	.981	.166
ST_LC	.811	.103	.150	.000	.922	.000
ST_RC	2.042	4.765	.229	.000	.785	.000
DCT_L	.675	-.496	.246	.000	.863	.000
DCT_R	1.200	.565	.193	.000	.828	.000
LC	.762	.342	.157	.000	.944	.000
RC	1.821	3.588	.172	.000	.819	.000

**CRT: Chinese Character Recognition Test; COAKT: Chinese Orthographic Awareness and Knowledge Test; ST_LC: Standardized Listening Comprehension Test; ST_RC: Standardized Reading Comprehension Test; DCT_LC: Discourse Comprehension Test: Listening Comprehension; DCT_RC: Discourse Comprehension Test: Reading Comprehension; LC: Composite Score for Listeningc Comprehension; RC: Composite Score for Reading Comprehension*