



# How Much You Learn from Shared Reading May Depend on How Sensitive You are to the Sound Structure

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## Abstract

Shared reading has been promoted as one of the most effective techniques for developing early literacy skills. Yet relatively little is known about the cognitive factors underlying its processes. This study examined the effect of L1 phonological awareness on the individual differences in benefiting from shared reading of English. Sixth-grade Chinese EFL learners were administered a finger-point reading task, which assessed the synchronization of voice and print in shared reading. Children with poorer L1 phonological awareness were less able to map a spoken English word onto its corresponding print than children with better phonological awareness. They also recognized fewer words in the text in a word finding task subsequently administered. These differences could be attributed neither to the differences in the children's prior knowledge of the text materials, nor to the differences in general English vocabulary knowledge, verbal short-term memory, speed in letter naming, or the one-to-one tagging concept. Finally, the two groups of children did not show differences in a written arithmetic task, indicating that the effect of phonological awareness was specific to the reading task.

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## 1 Shared reading and reading acquisition

Shared reading (joint parent-child or teacher-student reading) has been promoted by educators, whole language advocates, and the popular press as providing significant opportunities for children to develop the language abilities needed for skilled reading (Adams, 1990; Bus, van IJzendoorn & Pellegrini, 1995; Senechal, LeFevre, Thomas & Daley, 1998; Snow, 1991) and for successful acquisition of receptive vocabulary (Hargrave & Senechal, 2000; Jordan, Snow & Porche, 2000). In a literature-based EFL classroom, the teacher uses oversized books with enlarged print and illustrations. As the teacher reads the book aloud, all of the children who are being read to can see and appreciate the print and illustrations. Sometimes, if the students have a copy of the book in hand, the teacher may encourage them to follow along with their finger as they read or hear a story, a method referred to as finger-point reading. This shared reading experience is believed to be important because children can follow along as the text is being read several times, which scaffolds the acquisition of the relationship between speech and print (Constance, 1994).

However, children do not benefit equally from shared reading. Not much is known about the basic cognitive factors that might be related to individual differences in benefiting from such an activity. One reason might be that we are tempted to attribute individual differences in shared reading to the differences in more observable factors such as prior knowledge and familiarity with print, literacy exposure, parents' active involvement in children's literature, or even more remotely, the parents' own literacy experience. While variability in exposure is certainly a significant factor

in determining individual differences in literacy-related activities, it only explains a part of the variance in the beneficial effect of shared reading (Frijters, Barron & Brunello, 2000). As shared reading has been celebrated as an essential component of a balanced reading approach, it is necessary to know more about what underlying cognitive factors are associated with individual differences in shared reading.

## **2 Cognitive prerequisites for shared reading**

One of the beneficial effects of shared reading is that it provides opportunities for specific word learning through the establishment of the association between spoken and written words (Constance, 1994). Yet, this advantage is afforded only to the extent that children can read with an accurate match between voice and print (Uhry, 2002), given that rapid orthographic learning has been shown to be contingent on successfully recoding printed forms into phonological codes (Cunningham, Perry, Stanovich & Share, 2002; Share, 2004a). Thus, a logical start to understand the cognitive abilities necessary for shared reading is to ask what allows for the formation of an accurate match between voice and print. Several studies have linked the synchronization of voice and print to phonological awareness (Ehri & Sweet, 1991; Uhry, 1999, 2002). Phonological awareness refers to the ability to manipulate the internal sound components of a spoken word, an ability that is not directly related to print exposure (Cunningham & Stanovich, 1993; Whitehurst, Epstein, Angel, Payne, Crone & Fischel, 1994). Its influence in early literacy acquisition might be more essential than the shared reading experience itself. In a study of early literacy, Frijters, Barron and Brunello (2000) found that shared reading experience, combined with other indexes of home literacy (i.e. parental knowledge of children's literature and reported feelings about literacy activities), accounted for significant variance on a letter-name and letter-sound measure of early literacy. The relationship ceased to be significant after controlling for the variance in phonological awareness. It appears that phonological awareness has mediated the relationship between shared reading and success in early literacy acquisition.

In learning a foreign language as well as in learning one's native language, in order to map sound onto print in shared reading, one needs to be able to encode and temporarily hold the phonetic form of the word in memory, analyze the internal structure of the spoken form, identify the component sounds, and map the identified component sounds onto the printed letters. The quality of the temporary representation of the word encoded in verbal short-term memory is critical to subsequent analyses. If the information registered in memory contains merely the holistic features of the words (such as the overall prosodic pattern, the number of the syllables, or the noise of the initial consonant) without full specifications in the segmental prototypes, then the internal structure of the word would become evasive and the analyses of the structure will become impossible. The specificity or strength of the temporary representation of the word in verbal short-term memory is usually reflected in one's phonological awareness (Edwards & Lahey, 1998; Gathercole, Willis & Baddeley, 1991; Metsala, 1999; Snowling, Chiat & Hulme, 1991). Evidence has shown that children usually have difficulty constructing full-specified phonological representations for a new foreign word if they fail to develop good awareness of the segmental structure of spoken words from the acquisition process of the native language (Hu, 2003). To complicate the matter further, the segmental units implicitly encoded in memory are not always available to conscious inspection (Hu, 2004a). Thus, even when the child is able to encode the acoustic stimuli into a fully-specified phonological representation in memory at an implicit level, the component sounds of the word have to be consciously accessible so that they can be tracked for an explicit analysis. Thus, either at the implicit or at the explicit level, a number of the multiple processes involved in voice-print matching depend on a sense of phonological awareness. In the absence of the awareness of the sound structure of a spoken word, the child might be handicapped in extracting even partial information from a spoken word, which, in turn, restricts the possibility

of discovering the match between voice and print, and, ultimately, attenuates the benefits of shared reading.

### 3 The present study

In this study, the effect of phonological awareness on the individual differences in benefiting from shared reading was examined in an EFL context. In an EFL classroom, the text selected for shared reading normally contains words that are not familiar to students, either in the spoken or written form. These unfamiliar words not only have novel phonological segments but also contain unfamiliar holistic syllable features such as novel sound patternings, stress assignments, and syllable configurations. When words are unfamiliar, children tend to attend to the most salient phonological features of the words (Walley, 1993). Thus, the phonemic composition of a foreign word, masked by unfamiliar overall syllable structure, should pose great difficulty for an EFL learner who proves to be phonologically insensitive after years of experience of processing his or her native language. In this study, individual differences in shared reading were measured by a finger-point reading task, a paradigm that has been used to assess success in synchronizing voice and print (Ehri & Sweet, 1991; Uhry, 1999, 2002). A word finding task was subsequently given to assess the gains in finger-point reading. Two groups of sixth graders participated in the study, one with poorer phonological awareness and the other with better phonological awareness. These two groups of children were matched on several measures, which were considered to be important for success in finger-point reading. The first dimension that was equated for these two groups of children was their prior knowledge of the text read in finger-point reading. This was intended to minimize the possibility that poor performance reflects poor prior knowledge with the test materials. The second dimension that was equated was non-text, cognition based, which was judged to be implicated in reading. This includes English vocabulary, verbal short-term memory, rapid automatized naming of letters, and the one-to-one tagging concepts. The importance of vocabulary in reading is well documented in the studies of second language acquisition (Garcia, 1991; Saville-Troike, 1984). Generally, it is found that vocabulary is a strong correlate of reading achievement in another language and even more important for test performance than is prior knowledge of content (Garcia, 1991). Similarly, verbal short-term memory has been documented as a significant factor associated with L2 acquisition (Carroll, 1992; Papagno & Vallar, 1995; Service, 1992) and is identified as a core mechanism in L2 reading comprehension (Lundberg, 2002).

Rapid automatized naming of letters was used as an index of the children's letter knowledge. Letter knowledge has been shown to be one of the best predictors of word reading ability in English (de Jong & van der Leij, 1999; Lonigan, Burgess & Anthony, 2000) and critical to the acquisition of letter sounds (Share, 2004b). Rapid automatized naming of letters tapped at least two abilities related to letter knowledge: first, the automaticity in retrieving letter names; second, the ability to process orthographic information quickly (Bowers & Wolf, 1993; Wile & Borowsky, 2004). If a child is slow in accessing individual letters as reflected in rapid automatized naming, representations of single letters will not be activated fast enough to allow sensitivity to letter patterns, and the voice-print matching in shared reading is expected to suffer as a result. It is felt that rapid automatized naming is a more sensitive index of letter knowledge for older children than accuracy in letter naming because maximal performances are expected for the latter measure.

The one-to-one tagging concept is a basic concept required for success in finger-point reading (Uhry, 2002). To synchronize voice and finger pointing of a text, a child must understand that both oral and written words are discrete units and that one unit in one set corresponds to one unit in the other set.

Finally, a written arithmetic task was included to test whether phonological awareness is *specifically* related to the beneficial effects of shared reading. In order to solve an arithmetic problem, the child may first convert the terms and operator of the problem into a speech-based code (Campbell, 1998). The child may have to retrieve a phonologically based code from long-term memory for a simple arithmetic problem such as "6 x 3 =" (Geary, Hoard & Hamson,

1999). This certainly requires efficiency in verbal short-term memory and rapid access of phonological codes (Hecht, Torgesen, Wagner & Rashotte, 2001; Lee & Kang, 2001). The third phonological factor that has been found to be predictive of math skills is phonological awareness (Bryant, MacLean, Bradley & Crossland, 1990; Hecht et al., 2001). The role of phonological awareness in the development of math skills is less straightforward than that of verbal short-term memory and rapid access of phonological codes. Some researchers pointed out that the relation between phonological awareness and math skills might arise from component working memory demands of the phonological awareness tasks (Hecht et al., 2001), rather than the demands in the insight to the phonological structure of a spoken word or a digit. In this study, the two groups of children, differing in phonological awareness, were matched in verbal short-term memory and in the speed of processing phonological information. If the two groups of children in the current work do not differ in the arithmetic task but show differences in the shared reading performances, we will be more confident to conclude that the insight into the phonological structure of the spoken word is specifically responsible for the variance in shared reading.

## 4 Methods

### 4.1 Participants

The participants in the present study were a subset of Chinese-speaking elementary students reported in Hu (2004b). The original pool contained 37 children with better phonological awareness (High PA) and 37 with poorer phonological awareness (Low PA), based on their performances on L1 sound categorization, L1 deletion, and *zhuyin fuhao* spelling. In this study, children with better phonological awareness were selected and individually matched to the children with Low PA on two dimensions: text-based and cognition-based. The text-based dimension involved three measures of the printed word knowledge relevant to the test material, including initial phoneme reading, whole word reading, and word definition. The cognition-based dimension involved English vocabulary, verbal short-term memory, rapid automatized naming of letters, and the one-to-one correspondences concept. The children were first matched individually on the three measures of printed word knowledge (text-based), which were assumed to affect performances in finger-pointed reading directly. Other measures were taken into consideration in an ad hoc fashion. Some children with Low PA had particularly low scores in the three measures of printed word knowledge of the text. These children were excluded because no High-PA counterparts could be found. The matching procedure identified 18 children with High PA and 18 with Low PA. The Low-PA children who were not included in the study were the ones who were particularly poor in the three measures of printed word knowledge. The results of unpaired *t*-tests indicated that they were significantly poorer than the included Low-PA peers in the measures of initial phoneme reading ( $t(35) = 3.1, p < .01$ ), whole word reading ( $t(35) = 3.4, p < .01$ ), and word definition ( $t(35) = 5.1, p < .001$ ). These children also performed more poorly on phonological awareness ( $t(35) = 2.4, p < .05$ ) than the Low-PA peers included in the study. Thus, the Low-PA children finally included in this study did not represent a sample in the extreme low tails of the distribution of phonological awareness.

### 4.2 Materials and procedure

Phonological awareness and English vocabulary were measured when the children were third graders. Verbal short-term memory was measured at the fifth grade. Thus, the results of this study also shed some light on the long-term effect of phonological awareness in early literacy acquisition. At the sixth grade, the children took the finger-point reading task. Prior to the administration of the finger-point reading task, the children's one-to-one correspondences in concept and automatized naming of letters were tested. The children's prior knowledge of the words employed in the

reading was also tested, yielding three measures – initial phoneme reading, whole word reading, and word definition. Right after the finger-point reading task, a word finding task was given, followed by a written arithmetic task.

#### 4.2.1 *Phonological awareness*

There were three tests of phonological awareness: L1 sound categorization, L1 deletion, and *zhuyin fuhao* spelling. In sound categorization, the children heard 16 sets of three one-syllable words (e.g. *bi* ‘pen’, *ban* ‘plank’, *gou* ‘dog’). In half of the sets, one word in each set did not start with the same consonant as the other two (in this case *gou*). In the other half, the odd word did not rhyme with the others. The children had to select from among the triplet of words the one that sounded differently according to the onset or the rime designated by the test giver. In L1 deletion, the test giver read a disyllabic word twice and asked the children what was left if the initial consonant of the word was deleted. There were ten trials. In *zhuyin fuhao* spelling, the children were required to spell 33 wordlike stimuli in *zhuyin fuhao*. Used in Taiwan, *zhuyin fuhao* contains a set of phonetic characters representing consonants, vowels, or rimes, which are printed alongside Chinese characters in early primary school years to aid pronunciations of the characters. This task was included because it was closely related to phonological awareness among Chinese speakers (Hu & Catts, 1998; Read, Zhang, Nie & Ding, 1986; Siok & Fletcher, 2001) and thus could provide a good index of phonological awareness for children who were familiar with *zhuyin fuhao*. All the stimuli were monosyllabic; 10 were high-frequency words, 13 low-frequency words, and 10 pseudowords. Children’s performances in the tests were converted into *z*-scores and then summed, yielding a composite score for phonological awareness.

#### 4.2.2 *Text-based knowledge*

The text for finger-point reading was a verse adapted from "Clarence Lee from Tennessee" selected from Silverstein’s popular book "A Light in the Attic" (1981). Though popular in the United States, it was judged to be unfamiliar to most sixth graders in Taiwan. There were 33 lines in the original verse. Given the time constraints in testing, the verse was shortened to ten lines and one line was added to the end so that the verse had a smooth ending (see Appendix 1 for the verse). To test the children’s prior knowledge of the verse, 25 words (8 function words and 13 content words) were sampled from the adapted version of "Clarence Lee from Tennessee". The following three measures yielded three indexes for the children’s prior knowledge of the verse.

*Initial phoneme reading.* It has been argued that the ability to form the association between the initial phoneme of a word and its printed letter provides a child with control over the match between voice and print (Ehri & Sweet, 1991). For example, a child who hears /f/ and /t/ at the beginning of the spoken words *from Tennessee* and knows that /f/ and /t/ are represented by the letters *f* and *t* will enjoy the advantage of keeping the synchronization of voice and print more than the child who cannot form the association. Given that individual differences in forming the association between the initial phoneme of a word and its printed letter may be involved in shared reading, accuracy in reading the initial phonemes of the 25 words sampled from the text was measured. One point was awarded to each initial phoneme that was correctly read (Max = 25).

*Whole word reading.* Children who knew more words in the test material would find the finger-point reading easier to tackle than children who knew fewer words. Each child was presented with the 25 words one by one in a printed form and was instructed to read the words aloud. This measure was different from the measure of initial phoneme reading because, in principle, there could be children who were able to accurately read the initial phonemes of many words but could not accurately read those words as a whole. One point was awarded to each word that was correctly read (Max = 25).

*Word definition.* Each child was presented with the printed word and was instructed to orally give a definition for each word as clearly and concisely as possible in Chinese. Words to be defined were the 13 content words selected from the text. Definitions were to be such that the

target would be recognizable from the definition alone. These included direct translation and/or circumlocution. This measure was different from the measure of whole word reading because accurate reading of a word did not entail an understanding of the meanings of the word. One point was awarded to each word that was correctly defined (Max = 13).

### 4.2.3 *Cognition-based knowledge*

*English vocabulary.* The English vocabulary task was developed by Lee (2000). The task consisted of a series of 40 plates, each containing four line drawings of objects or actions. For each plate, the test giver provided an English word orally. The children were required to respond by circling the line drawing on the plate that best illustrated the meaning of the stimulus word (Max = 40). The reliability of the task (Spearman-Brown) is .90.

*Rapid automatized naming of letters.* Rapid automatized or serial naming has been associated with reading and with reading difficulty (Bowers, Sunseth, & Golden, 1999; Ho, Chan, Lee, Tsang & Liuan, 2004). It has been identified as a component skill in finger-point reading (Uhry, 2002). Six repeated letters *m*, *b*, *t*, *g*, *f*, and *s* that appeared in the verse and that provided sound clues to the pronunciation were selected. There were six tokens for each letter. The letters were presented simultaneously in a matrix (six rows and six columns; random occurrences of the six letters with no adjacent repetitions). Each child was asked to name each symbol as quickly and accurately as possible. The speed was timed by a stopwatch. The average errors in naming were .5.

*Verbal short-term memory.* Given the established relationship between verbal short-term memory and reading ability (e.g. Wagner, Torgesen & Rashotte, 1994), it was important to equate these two groups on verbal short-term memory. Each child was presented with a sequence of digits (with values between 0 and 9), which had to be memorized and reproduced subsequently in the correct order. The length of the sequence varied from three to 11 digits, two trials for each length. The presentation time was approximately one second per digit. The task discontinued when the children failed to repeat two trials of the same length consecutively. The score reflected successful completion of one trial of the maximum list length (Max = 11).

*One-to-one tagging.* This task was adopted from Uhry (2002). The children were asked to count 0.5-cm<sup>2</sup> squares, simultaneously presented in a matrix (6 rows and 5 columns), while touching each one in turn, moving across lines from left to right and top to bottom as with reading English. Credit was given for all squares tagged in synchrony with the oral counting (Max =30).

### 4.2.4 *Finger-point reading*

Each child was presented with the printed form of the verse "Clarence Lee from Tennessee". The text was plain without illustration in this experimental setting to avoid the extraneous factor that might influence the voice-print matching. There has been evidence that pictures divert attention away from the printed words and thus impede word learning (Harzen, Lee & Miles, 1976). The audio form of the verse was presented to each child six times, two by the test giver and four by the pre-recorded voice. First, the test giver read the verse following the normal rhythm of English, simultaneously pointing at each word read. Then the test giver modeled the finger-point reading again and invited the child to point to the word following the model. The 3<sup>rd</sup> round of finger-point reading started with the running of the tape. The test giver pointed to the word in synchrony with the pre-recorded voice, and the child pointed to the word following the model of the test giver and the voice. In the 4<sup>th</sup> round of finger-point reading, the child was presented with the pre-recorded voice and finger-pointed the word in synchrony with the voice without a model from the test giver. Accuracy in the voice-print match was measured by awarding one point for each content word correctly pointed by the child in synchrony with the voiced word. The task was scored on-line and was videotaped for later scoring. The 5<sup>th</sup> and the 6<sup>th</sup> rounds of the reading replicated the 4<sup>th</sup> and the 5<sup>th</sup> rounds. The child's performance in finger-point reading was the

summed number of the content words pointed in synchrony with the voice in the 4<sup>th</sup> and the 6<sup>th</sup> rounds of reading (Max = 34 content words x 2 = 68).

*Word finding in text.* After finger-point reading "Clarence Lee From Tennessee", the children were presented with a portion of the verse. Each child had to point to the word designated by the test giver. In order to minimize the demands in visual scanning, two lines were presented at a time. Credit was given for each of the 17 words correctly pointed.

#### 4.2.5 Written arithmetic

A timed written arithmetic test was used to assess the children's basic mathematical computational abilities (addition, subtraction, multiplication, and division). The questions were blocked. Each block contained four simple arithmetic questions, one addition, one subtraction, one multiplication, and one division. The questions in each block were ordered in a fixed order according to the acquisition order, from addition to subtraction, multiplication, and division. Each child was asked to write down the answer to each question sequentially as quickly and accurately as possible within a time limit of one minute.

## 5 Results

Table 1 gives an overview of the background of the two subject groups. The results of the series of unpaired *t*-tests revealed no differences between the Low PA and the High PA children in English vocabulary, verbal short-term memory, rapid automatized naming of letters, and the three measures of printed word knowledge (all  $p > .05$ ), but the composite scores in phonological awareness were significantly different ( $p < .001$ ). These results indicated that the two groups were comparable in the text-based knowledge prior to taking the finger-point reading task. They were also comparable in the identified cognitive domains relevant to finger-point reading.

Variables	Low PA ( <i>n</i> = 18)		High PA ( <i>n</i> = 18)		<i>t</i> (34)
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Phonological awareness	-2.0	1.4	2.2	.5	12.2***
<i>Text-based knowledge</i>					
Initial phoneme reading	17.4	4.4	17.5	7.3	.0
Whole word reading	14.6	3.8	13.4	5.1	.8
Word definition	4.5	2.0	4.2	1.9	.5
<i>Cognition-based knowledge</i>					
English vocabulary	24.8	7.7	26.4	6.3	.7
Verbal short-term memory	8.3	1.1	8.7	1.5	.8
Rapid automatized naming	13.4	2.2	14.0	2.7	.8
One-to-one tagging	30.0	0.0	30.0	0.0	.-

\*\*\*  $p < .001$

**Table 1: Descriptive Statistics for Two Group of Participants**

Group differences in finger-point reading, word finding, and written arithmetic are displayed in Table 2. Both groups of children demonstrated near maximal performances in finger-point reading for both groups of children. Children with High PA all achieved the voice-print matching without any errors. Children with Low PA did not show obvious difficulty in finger-point reading either. They could point to approximately 98% of the content words in synchrony with the pre-recorded voice. In spite of the fact that the children's performances on finger-point reading were near the maximum, the results of unpaired *t*-tests revealed that the children with Low PA demonstrated significantly poorer performance in finger-point reading ( $t(34) = 2.2$ ,  $p < .05$ ) and word finding ( $t(34) = 2.5$ ,  $p < .05$ ) than children with High PA. In contrast, group differences in written arithmetic did not reach significance ( $t(34) = .9$ ,  $p > .05$ ). The children's letter-sound knowledge was not directly tested in the study. However, the results of a 2 x 2 ANOVA with reading

component as a within-subject factor (initial phoneme reading vs. whole word reading) and group as a between-subject factor (High PA vs. Low PA) revealed a main effect of reading component ( $F(1, 34) = 48.1, p < .001$ ). Children could decode the initial phoneme of the words more accurately than the whole words, indicating that both groups of children had a certain level of letter-sound knowledge, which enabled them to decode some unfamiliar words at the level of initial phoneme. Neither the effect of group nor the interaction effect between group and reading component was significant. The lack of the interaction effect suggests that the ability to decode the initial phoneme of some unfamiliar words was comparable across these two groups of children.

Variables	Low PA (n = 18)		High PA (n = 18)		<i>t</i> (34)
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Finger-point reading	66.4	3.1	68.0	.0	2.2*
Word finding in text	15.0	2.5	16.6	.5	2.5*
Written arithmetic	7.6	2.7	8.8	2.7	.9

\*  $p < .05$

**Table 2: Group Differences in Finger-Point Reading, Word Finding, and Written Arithmetic**

## 6 Discussion

The issue promoting this study is the cognitive abilities that prepare children to benefit from shared reading, which has been recognized as one of the most effective techniques for developing early literacy and language skills. In this study, phonological awareness was of interest because its unique association with early reading ability has been repeatedly documented. In the current work, the 18 children with Low PA were a subset of the 37 Low-PA children recruited in Hu (2004b). When compared to their Low-PA peers that were excluded from the study, the included subset, in fact, demonstrated significantly better performances in phonological awareness and better prior knowledge of the test material. This was important because it indicated that the subset did not represent an extremely poor sample in the low-tailed distribution of phonological awareness. Neither were they a selective sample, who had particularly poor prior knowledge about the text material used in finger-point reading. The subset was put into the current study because an appropriate matched peer could be found in the High-PA group. The Low-PA and the High-PA sixth graders included in this study, though differing in phonological awareness measured at the third grade, were matched in automatically retrieving letter names, verbal short-term memory, English receptive vocabulary, and the one-to-one tagging concept. They were also comparable in their prior knowledge of the words appearing in "Clarence Lee from Tennessee".

The primary finding of the study is that the beneficial effects of shared reading were greater for children with better phonological awareness than those with poorer phonological awareness. In spite of being comparable to the High-PA children in relevant cognition-based and text-based dimensions of ability, the children with Low PA performed significantly more poorly in the on-line measure of finger-point reading and in the off-line measure of word finding. However, group differences might have been underestimated by their near maximal performances in finger-point reading. The near maximal performances in finger-point reading were not expected prior to the administration of the task. As shown in Table 1, children defined only 26% of the content words before taking the task. However, they achieved over 98% accuracy in finger-point reading in spite of the few numbers of words they knew before reading the text. Experimentally, the near maximal performances can render a measure insensitive to tap the variability in the construct of interest. As individual differences are compressed at the higher end of the scores, the statistical power to detect group differences is reduced. Regardless of the near maximal performances on finger-point reading in the current work, group differences were significant, strengthening the argument that phonological awareness is important for children to profit from the shared reading activity. It is expected that as the finger-point reading task becomes harder, the group differences will become



larger because reliance on phonological awareness to decode unfamiliar words will increase as well. Practically, the near maximal performances indicated that children generally did not have difficulty finger-pointing text materials they were not familiar with. Children with some basic knowledge of phonics appeared to be able to synchronize voice with individual printed words quite successfully. Many ESL/EFL teachers are hesitant to read with children with limited vocabulary. The results of the current work may encourage those teachers to read books with text vocabulary slightly richer than the students' current level.

The findings were consistent with a model in which children encode the voice in memory, analyze the sound structure of the word, look in text for a letter match as a guide, and match voice with print (Ehri & Sweet, 1991; Uhry, 1999, 2002). Unless the children were relying on sight word reading as their only strategy, these processes had to be accomplished with some insight into the phonological structure of the spoken word. With good awareness of the internal structure of spoken words, the component sounds of the spoken word could be identified and matched onto print, and mismatching, if there is any, could be monitored and corrected in time. In fact, solely relying on sight word reading was highly impossible in the current work because most words were unfamiliar to the subjects according to the measures given prior to the finger-point reading task. Although the children's letter-sound knowledge was not directly tested in the study, there was evidence that both groups of children were equipped with a certain level of letter-sound knowledge given that they could decode the initial phoneme of some unfamiliar words. And this knowledge was comparable for these two groups as evidenced by a lack of interaction effect between group and reading component. It appears that to maximally benefit from shared reading, children need to have a good sense of phonological awareness in addition to adequate letter-sound knowledge.

The results of the study added support to the notion that there was a long-term effect of phonological awareness on the development of reading abilities (Bruck, 1992; Pennington, Van Orden, Smith, Green & Haith, 1990). The reader may recall that children's phonological awareness was measured at Grade 3 and their finger-point reading performances were measured at Grade 6. When it comes to early reading skills, it is generally recognized that the rich (good readers) get richer and the poor (readers) get poorer, a vicious cycle usually referred to as the Matthew Effect (Stanovich, 1986). The Matthew Effect might be a mediating factor in the long-term relationship between phonological awareness and reading abilities. In this study, it was difficult to find sufficient number of Low-PA children matchable to children who had better phonological awareness based on their text relevant knowledge measured at Grade 6. Many children with poor PA had very poor text-based knowledge of the reading material and thus were not put into the study. It appeared that children who started with poorer phonological awareness at Grade 3 were likely to have become even poorer readers after three years of schooling, languishing behind their High-PA peers.

It is interesting to note that the two groups of children did not differ in a timed written arithmetic task. It is not that solving an arithmetic task does not require phonological processing. Indeed, many studies have found that basic computation depends on the efficiency in phonological processing, including phonological awareness (Hecht et al., 2001). However, it has also been pointed out that phonological awareness and arithmetic might be related because both tasks required efficient verbal short-term memory (Hecht et al., 2001). This view is supported by the results of the present study. The two groups of children, differing in phonological awareness but comparable in verbal short-term memory, did not demonstrate differences in the timed arithmetic task. The lack of group differences in arithmetic, in conjunction with the significant group differences in finger-point reading, singles out the specificity and the locus of the effect of phonological awareness on early literacy acquisition: it is the insight into the phonological structure of a spoken word rather than the working memory demands of the phonological awareness task that matters in the shared reading task of English.

This study is, of course, limited in the questions it can answer about the beneficial effects of shared reading. First, the near maximal performances in finger-point reading could be a problem and may have underestimated the group differences in finger-point reading. Future studies should seek to reduce the near maximal performances in the measures of finger-point reading by making

the experimental task more difficult. One possibility is to test with a non-poetic narrative, which does not have regular rhythm to assist children in voice-print matching. Second, the children's comprehension of the verse was not tested. The children were only tested on their ability to synchronize voice and print in shared reading and their subsequent ability to find the words designated in the test material. In the shared reading model normally administered in the classroom, the teacher may pause in the reading and ask for predictions as to what will happen next. Students focus on the text to make predictions and to generate meaning. The teacher may ask questions to elicit words and phrases that are used in the text. Comprehension of the story takes place through questioning and discussion of each story. The model adapted in the current experimental framework can only answer a quite restricted scope of shared reading, i.e. the synchronization of voice and print. It is likely that phonological awareness is limited in its utility for predicting the beneficial effects of shared reading when children's comprehension is bolstered by the teacher-student discussion on the story. It is also likely that the increased verbal interaction between the teacher and the students may pose even greater demands on phonological awareness, which is usually important in the initial encoding and construction of a stable phonological representation for a new word (Hu & Schuele, in press). Future studies should examine the cognitive factors underlying shared reading in a situation that has higher ecological validity.

Finally, a caveat should be put forth. The group of Low-PA children in the study was not an unbiased sample of the Low-PA children originally recruited when the children were at the third grade. The included sample was better than the excluded sample in terms of phonological awareness and text-related knowledge. Their performances in finger-point reading should not be taken as a reflection of the performances for the children with Low PA in general.

## Acknowledgements

This research was supported in part by grants from the National Science Council in Taiwan, R.O.C. (NSC922411H133002). The author thanks the people and institutions that helped locate the children, the parents who gave their consent, and the children who participated in the study.

## Appendix 1

Clarence Lee from Tennessee  
Loved the commercials he saw on TV.  
He watched with wide believing eyes  
And bought everything they advertised—  
Toothpaste for his cavities,  
Powder for his doggie's fleas  
Purple mouthwash for his breath.  
Deodorant to stop his sweat.  
He bought each cereal they presented,  
Bought each game that they invented.  
Don't you want to be as happy as little Clarence?

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