THE EFFECTS OF USING MORPHOPHONIC FACES AS A METHOD FOR TEACHING SIGHT WORDS TO LOW-PERFORMING KINDERGARTNERS

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Abstract

Five kindergarten subjects who had no known disabilities, but were identified as low beginning readers received intervention using both Plain Word Cards (PWC) and pictured word cards, termed MorphoPhonic Faces (MPF). A group of eight words were presented as printed word cards and a comparable group of eight words were presented as MPF. Results revealed that MPF did not hold an advantage for learning and retaining sight words compared to the plain print words. Improvements in sight word training corresponded in time with improved skills underlying the alphabetic principle, including phonological awareness skills and letter-sound learning, as well as emerging decoding skills for two subjects. These findings suggest that working on larger units such as words with a focus on initial sounds and word patterns has a positive (and probably reciprocal effect) on phoneme and grapheme level skills.

Chapter 1: Introduction and Literature Review

Sight word reading is fundamental to reading fluency and comprehension. Skilled readers recognize the pronunciation and meaning of a word with even a quick glance, whether the word is read individually or in context (Stanovich, 1980). When words are recognized by sight, cognitive resources can be used to construct the meaning of the text and integrate text meaning with background knowledge. The more readers must stop to decode words, the more the connection between print and language is disrupted, resulting in poor fluency and loss of comprehension (Hoover & Gough, 1990). While most sight words are acquired without effort by utilizing a complex cognitive network of connections among the orthographic patterns of written language and links to the structures of oral language, some words are explicitly taught, especially during early stages of learning to read (Ehri, 2005; Hoover, & Gough, 1990; Seidenberg & McClelland, 1989). Additionally, some populations of children with disabilities show an advantage for learning sight words over learning to decode (Gates & Bocker, 1923; Gough et al., 1992; Levy & Lysynchuck, 1997; Solomon, Singh, & Kehoe 1992). In these studies, nouns have been the primary words taught, but recent work by Williams (2013) suggests that sight words from a wide range of grammatical classes can be learned.

Educators are sensitive to the importance of formally exposing preschoolers to early reading skills, including learning letter names and sounds, and phonemic awareness skills such as rhyming. Children who display such fundamental knowledge will almost seamlessly transition to begin recognizing words by sight. Fluent reading occurs when nearly every word is recognized by sight. Kamhi (2000) suggested that word recognition involves a well-defined scope of knowledge (i.e., letters, letter-sounds, and words) and processes (decoding) that can systematically be taught. Sight words are words that a student can recognize without hesitation or doubt (Burns, 2007). Burns further stated that such words must be recognized fast and effortlessly when presented in isolation to attain fluency when reading. The term ‘sight’ indicates that sight of the word triggers that word in memory, including information about its spelling, pronunciation, and meaning (Ehri, 1995). However, readers who have difficulty recognizing sight words demonstrate persistent difficulty committing printed words to memory, despite repetitive practice.

One strategy that has been used to facilitate sight word learning is to superimpose pictures depicting the meaning of the word into the printed letters. Blischak and McDaniel (1995) found this strategy facilitated word recognition by both typical readers and struggling readers. According to Ehri (2005), while most sight words are remembered because of a network of connections between phonemes, graphemes, orthographic patterns, morphemes and other phonological and semantic knowledge, sight words can be learned without the reader’s understanding of the alphabetic principle. The pre-alphabetic level, which is the lowest level of Ehri’s word recognition model, is the most relevant to this study because pre-alphabetic reading occurs before a child has mastery of the alphabetic principle.

This study will test the efficacy of teaching sight words using a form of superimposed pictures termed MorphoPhonic Faces (MPF) (Norris, 2006). It is proposed that kindergarten children who are just beginning to learn to read but are struggling because of poor phonological awareness and alphabet knowledge will benefit from the visual cues provided by MPFs. MorphoPhonic Faces are pictured words that provide speech production cues for the first phoneme in the word (i.e., a Phonic Face) and cues to meaning through superimposed pictures on the remaining letters (Norris, 2006). For example, in the MPF for “bat,” the letter “b” is cued by depicting the curve of the letter “b” as the bottom lip on the Phonic Face. The children were given an explanation of the cues by saying, “To make this sound, you stop the air as shown by the vertical line of the b and then release the sound by bouncing the bottom lip. The remainder of the word is superimposed onto a picture, which consists of a bat with the letters “a” and “t” written on the body of the object in print (see Figure 1.1). Thus, MorphoPhonic Faces provide cues to decoding print as well as using pictures to incorporate word meaning. The purpose of this study was to determine if MPFs produced better learning, retention of sight words compared to plain print words. Additionally, the effect of sight word learning on phonological awareness, learning the alphabet principle, and early decoding was explored.

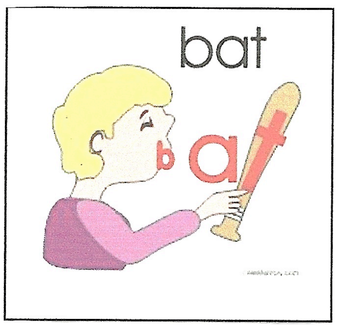

Figure 1.1 Sample of a MorphoPhonic Face.

Ehri’s Phases of Word Recognition

Current models of reading (Ehri, 2005; Seidenberg & McClelland, 1989) view sight word reading as the result of the construction of a neuro-network of relationships that is constructed across time as children learn to read. These relationships form links between letters, allowable letter sequences in spelling, sounds in pronunciations, words and word meaning and knowledge inherent in the oral language system. Connections between written graphemes and phonemes of oral language link the graphemes to known words and word meanings, which in turn are linked to syntax and higher level language skills (Ehri, 2005; Hoover, & Gough, 1990; Seidenberg & McClelland, 1989). Patterns of spelling (orthographics) and their pronunciations are constructed as children learn to read, and these patterns enable learned words to be recognized and new words to be decoded by linking to existing patterns and making adaptations as needed.

The construction of the neuro-network takes time and input that is comprehensible to the child. Pre-alphabetic reading occurs before a child has mastery of the alphabetic principle, meaning the child cannot assign relevant sounds to the patterns of spelled letters to decode the word (i.e., grapheme-phoneme association). Instead the child might recognize a whole word using something in the shape of the letters to remind him of the word's meaning. For example, four year olds may recognized the words *monkey* and *dog* because the shape and position of final letters looked like the tail or hind legs of the animals (Gates & Bocker, 1923; Gough, Juel, & Griffith, 1992).

The pre-alphabetic reading strategy has been used to teach sight words to children, especially those with disabilities who lack phonemic awareness and the alphabetic principle. Pre-alphabetic readers demonstrate the ability to read words in their environment by remembering visual cues accompanying the print rather than the written word themselves (Ehri, 2005). A relevant example would be a reader recognizing the word 'McDonalds' because the golden arches behind the name rather than the M in the name (Ehri, 2005). Another example would be eyeballs drawn into words such as "look" or "see" which have been shown to help children link print directly to meaning without the network of knowledge for letter-sounds and decoding. While shown to be effective (Blischak & McDaniel, 1995; Blischak & Lloyd, 2000; Didden, Graff, Nelemans, Lan ciono, & Vooren, 2006; Van der Bijl, Alvant & Lloyd, 2006), two major problems have been associated with word learning using superimposed pictures. The first is that by bypassing the network of connections between letters and orthographic patterns, children lack the structures needed to decode new words and will need to be taught each word explicitly (Blischak & McDaniel, 1995; Ehri, 1995, 2005; Gough, 1996). The second criticism is that pictures only work for easily depicted words such as concrete nouns.

Beginning readers remember how to read sight words by forming partial alphabetic connections between only some of the letters in written words and sounds detected in their pronunciation (Ehri, 2005). The first and last letters are often selected as the cues to be remembered (Ehri, 2005). Ehri (2005) found that the difference between pre-alphabetic readers and partial-alphabetic readers was that pre-alphabetic readers depended on visual cues rather than letter-sound relations to read words in their environment, whereas partial-alphabetic readers used grapheme-phoneme correspondences to recognize words. Ehri and Wilce (1985) conducted a study that supported the distinction between the pre-and partial alphabetic phases of sight word learning. Although pre-alphabetic readers experienced less difficulty remembering how to read words that had unique visual forms, such as WcB for 'elephant,' partial alphabetic readers had an easier time remembering how to read words that contained noticeable phonetic cues linking letters to sounds, such as 'LFT' for 'elephant (Ehri & Wilce, 1985). Partial alphabetic readers remembered how to read words they had been taught much better than pre-alphabetic, or visual cue readers, which suggests that the alphabetic system aids the task of finding and remembering relevant connections between written words and their pronunciations (Ehri & Wilce, 1985; Mason, 1980). However, because partial alphabetic readers recognize the first and last graphemes, word recognition errors generally occur, which result in confusion of similarly spelled words, such as 'soon' and 'spoon' (Ehri, 2005; Savage, Stuart, & Hill, 2001). Children in this phase still have not acquired full understanding of the alphabetic system, but heavily depend on the letters they know to recall words (Savage et al., 2001). Therefore, children who have a network of partial alphabetic links are better at learning and retaining sight words (Stuart, Masterson & Dixon, 2000).

Even greater sight word learning is seen in the *full alphabetic phase* where children form complete connections between each of the written letters, their phonemes, and the words associated with those pronunciations (Ehri, 1995, 2005). Ehri demonstrated this by showing skilled readers in grades 2-4 could read real words (e.g., car, tree, man, book) faster than nonsense words (e.g., baf, jad, nel, des), and as fast as single digits (4, 6, 3, 9) indicating the sight words were read as a single whole unit and not decoded (Ehri, 1992). However, poor readers exhibited greater difficulty in reading both real and nonsense words, which indicated greater difficulty with sight word reading. Additionally, in learning to read a word like 'spoon', full phase readers would recognize how the 5 letters correspond to 4 phonemes in the word, including how OO represents /u/. Readers in the full alphabetic phase are able to decode novel words quickly and more efficiently due to their ability to fully connect spellings to pronunciations of words, resulting in sight word recognition (Ehri, 2005). In a study by Ehri and Wilce (1987), kindergarteners who knew letter names received one of two treatments. The experimental group learned to spell words phonetically, while the control group practiced matching letters to isolated sounds. The results revealed a significant advantage to word reading for the subjects who learned to spell complete words because they remembered more letter-sounds and also showed better phoneme segmentation skills than the controls who learned letter-sounds in isolation.

During Ehri's (1995, 2005) final phase, the *consolidated phase*, the links in the network are consolidated into larger patterns of units, such as syllables, onset-rhyme, morphemes, and both regular and irregular orthographic patterns. The pronunciation of new words can be predicted by analogy to patterns of words already in the network (*sweep* will sound similar to *sweet*). This was demonstrated by presenting nonsense words that either did or did not conform to allowable orthographic patterns. Not only did children make fewer mistakes and learn words that followed English rules faster, they also spelled these words more accurately (Wright & Ehri, 2005).

Teaching Sight Words

Learning to read by children who lack phonemic awareness and the alphabetic principle is far more daunting than for children who have readily acquired these skills. Children with intellectual disability, autism, hearing impairment, language impairment, and poverty are those populations most at-risk for not acquiring appropriate levels of phonemic awareness (Nittrouer, 1996**).** Recall that rapid reading is not dependent on decoding but rather quick whole word recognition (Ehri, 2005). Therefore, sight words are words that should be read as a single unit without any hesitations or pauses between word parts (Ehri, 2005). Efficient word recognition is a prerequisite for reading achievement (Ashby, Dix, Bontrager, Dey, & Archer, 2013). Recognizing sight words results in fluency, and fluency supports children's comprehension of text because if read using the text and background knowledge, the text makes sense and fits the child's language patterns (Fuchs, Fuchs, Hosp, & Jenkins, 2001).

Over the years, researchers have investigated various methods of best teaching sight words (Gates & Bocker, 1923; Gough, Juel, & Griffith, 1992; Levy & Lysynchuck, 1997; Solomon, Singh, & Kehoe, 1992). As early as 1923, Gates and Bocker explored the initial steps in primary reading since many experimental studies focused on the advanced and intermediate phases of reading. Gates and Bocker (1923) observed children who were being introduced to printed words. Gough (1996) discussed how children look for something distinctive or salient to connect or associate the word with that feature. He suggested that the feature might be anything, such as the tail on the end of the word *donkey*, the humps in the middle of the word *camel*, and the two moons in the center of the word *moon*. This is a strategy that beginning readers may use to help with word identification and recall. However, this strategy is short-lived in that it soon fails because few words have such distinctive features, thus making it difficult for the child to use distinctive cues as a method for accurately identifying sight words.

Ehri (1995) explained that it is normal for children to expect letters to represent the meaning of words since pictures are an important communication system for young readers. In fact, pictures serve as a scaffold as children progressively shift from letter shape to grapheme-phoneme strategies in attempting to decode words.

However, several authors have concluded that the use of pictures placed above or below a printed word "blocks," or interferes with, sight word learning (Didden, Prinsen, & Sigafoos, 2000; Harzem, Lee, & Miles, 1976; Lang & Solman, 1979; Newton, 1995; Samuels, 1967; Singer, Samuels, & Spiroff, 1974; Singh & Solman, 1990; Solman & Singh, 1992; Wu & Solman, 1993). According to Fossett and Mirenda (2005), although the pairing of familiar pictures and unknown text should enhance learners' ability to read novel words, this pairing instead appears to interfere with their ability to attend to the unknown printed word. The established association between the picture and its name appears to disrupt the acquisition of a new association between the text and its name. They note this is a disadvantage for children using picture communication systems on an AAC device where the pictures are paired with written words. The transition to the use of print alone is an unlikely outcome.

In 1967, Samuels conducted a study with 30 kindergarten children to determine if, when pictures and words are presented together, the pictures would function as distracting stimuli and interfere with the children's acquisition of reading responses. He further explained that pictures may be used as prompts when the reader cannot read a word in the text, but pictures may miscue and serve as a distraction from the critical task of attending to the printed words. Students were divided into three equal groups of 10. Each group received one of the following treatment conditions: no-picture, simple-picture, and complex-picture. Results from Samuels' first experiment revealed that the children who were exposed to the no-picture, or plain print condition, gave more correct responses than those exposed to the other two conditions. The second experiment, which was also conducted by Samuels (1967), was designed to test the effects of pictures using a procedure that was similar to that used in actual classrooms. Samuels divided a group of 56 students into two groups, where one group used a book with pictures that went along with the words and the other group used a book with no pictures, but only printed words. The reading material and procedures were identical for both groups. Results from this experiment indicated that no significant difference was found in the reading acquisition between the picture and no-picture condition among the better readers. Gough (1996) agreed with Samuels' conclusions in that children fail to demonstrate the ability the pay attention to print and the pictures below the print simultaneously; therefore, suggesting that readers could pay attention to one or the other, but not both.

Wu and Solman (1993) investigated whether pictures can be arranged in a different manner that does not inhibit the learning of words. They investigated three presentation techniques to a sample of 12 kindergarteners, which included word-alone, matching with the fading of pictures, and feedback cueing. Applied to sight word instruction, stimulus fading involves pairing unknown printed stimuli with familiar pictures and then gradually eliminating the picture stimuli in order to transfer learners' attention from pictures to text only (Fossett &

Mirenda, 2013). The results of this study showed that the children best learned the words in the absence of pictures, or rather when words were presented alone. Pertaining to the feedback cueing condition, this technique neutralized the blocking effect of the pictures and the performance was as good as (but not better than) the word-alone condition (Wu & Solman, 1993). In a follow-up study, Solman and Wu (1995) conducted two experiments to investigate the possibility of eliminating adverse effects of pictures by encouraging children to elicit naming-responses in the absence of pictures and then using pictures as response feedback. The results indicated that this feedback cueing technique can avoid the adverse effect of pictures; therefore suggesting that the best method for teaching sight words was print alone. It was concluded that pictures can be used in a way that does not hinder learning; however, no evidence to suggest that they can be used to enhance sight word learning.

More positive outcomes have been found by other researchers, such as Miller and Miller (1968) who found that the more the printed words are visually depicted to closely resemble the objects they represent, the more children understand that printed words hold both meaning and symbolic function. Since beginning readers have the natural tendency to recognize words by distinctive visual features to help facilitate word meaning, several studies have explored sight word learning when pictures are superimposed into the words, such as eyeballs drawn into the *o's* in the word "look." Such words have been termed differently as enhanced words, picture integration, symbol accentuation, or modified orthography (Wrestling & Fox, 2000). Realizing that functional reading has become one of the basic skills to be developed by children with intellectual disability, Tabe and Jackson (1989) investigated the relationship between superimposed words that had pictures drawn into the words versus pictures juxtaposed next to words in orienting the learner's attention to the word in sight. The sample consisted of sixteen nonreading moderately disabled children between the ages of 9;0 and 13;8 who were randomly assigned training conditions. Results from this study found that participants who were trained under the superimposed condition performed significantly better than those in the juxtaposition condition. These findings suggest that the superimposed condition helped to establish the acquisition of sight word learning, which provided a direct link to word pronunciation and word meaning.

Blishchak and McDaniel (1995) conducted a study with kindergarten students, using the term “enhanced words,” to investigate the effects of varying size and position of line drawings in combination with written words. After four consecutive days of learning enhanced words or plain print words, results showed that the children recognized more plain print words that had been taught using the enhanced words. However, Blishchak and McDaniel also stated that enhanced word learning is limited in use in that it is most beneficial with concrete words, which are commonly present in the spoken vocabularies of beginning readers. In 2002, Van der Bijl, Alant, and Tönsing examined the effect of picture size and placement on memory of written words by children with little or no pre-literacy skills. Forty participants received word training for four consecutive days with written words only, words combined with standard size pictures (line drawings), words combined with small pictures (line drawings), and enhanced pictures (small line drawings superimposed on the orthography). The results of this study indicated greater performance for plain words and enhanced word conditions. This study’s results correlated with those found by Blishchak and McDaniel (1995) in that recognition and recall of print words can be taught to children with little or no pre-literacy skills.

Several researchers concluded that when the individual responds with the picture name, the response cannot solely be associated with the printed word unless both the picture and print are attended to simultaneously, as superimposed words (Dorry & Zeaman, 1973; Lang & Solman, 1979). Van der Bijl, Alant and Lloyd (2006) examined the effectiveness of superimposed words and found that they only incorporated the superimposed words during intervention, but assessment was conducted using plain words. He suggested a transition step was needed from picture to print. He also indicated that conclusions regarding the efficacy of superimposed words are difficult to make since there were a variety of training methods between studies. These ranged from presenting and pronouncing the words, to explaining the relationship of the pictures to the words, using cued feedback, and relating the pictured words to the printed words.

Despite there being over four decades of research using superimposed pictures, the benefits of this approach are inconclusive, partly due to the limitations of past studies. Unfortunately, research in learning sight words using the superimposed picture training method has lasted for a relatively short period of time ranging from a few days to a couple of weeks and many of the words used did not include various grammatical classes, but rather nouns only. Currently, evidence is scarce regarding whether learning superimposed words has a positive effect on learning other words, and also researchers are skeptical that they will lead to generative word learning (Blishchak & McDaniel, 1995; Ehri, 1995, 2005; Gough, 1996).

To address these problems, Norris (2006) developed pictured sight words representing a hybrid between alphabet and sight word learning, termed MorphoPhonic Faces (MPF). These are unique because the shape of the first letter is shown in the mouth in a manner that suggests speech production cues for the associated phoneme (i.e., letter “p” appears as the top lip of the face). Learners first see a pictured alphabetic cue, followed by the meaning of the word depicted with pictures superimposed into the remaining letters. The MPF also segment words into onsets and rimes, a method of teaching sight words shown to be more effective than whole words or phoneme segmentation and blending (Levy & Lysynchuck, 1997).

A study by Powell, Hartman, Hoffman, and Norris, (2007) showed that more MPF words were learned daily compared to plain words, and greater gains were made in phonemic awareness. Williams (2013) found similar results for first graders with poor reading skills. While the number of words learned daily did not differ between MPF and plain words, better short and long-term retention occurred for words learned using MPF. Greater improvement in measures of phonemic awareness, letter-sounds, and decoding also showed the predicted increases, suggesting that working at the word level has a positive effect at the phoneme and grapheme levels. In addition, qualitative analyses revealed that words from all grammatical classes were learned.

An alternative early reading strategy, such as MPF, holds the potential to enable children to enter the reading process earlier and to begin to build the needed reading network between written words, phonemic awareness, and the alphabet principle needed to support fluent reading. This study will test this prediction by providing sight word training to kindergarten children who are just beginning to learn to read but are lagging behind peers because of poor phonological and grapheme awareness. It is predicted that the visual scaffolds provided by the pictured Phonic Faces and superimposed picture meaning within the MPF cards will improve sight word reading and lead to better phonological awareness, alphabet knowledge, and early decoding skills.

The questions of this study were:

1. Do MorphoPhonic Faces (MPF) hold an advantage for sight word learning compared to plain print words?

a. Will more words from the Dolch Word List (Dolch, 1948) be recognized following intervention?

b. Will more words be recognized each week immediately following training with MPF words compared to plain print words?

c. Will more words be retained in the sessions following training (i.e., retention) with MPF cards compared to plain print words?

2. Will participants improve in skills related to the alphabetic principle?

    a. Will phonemic awareness improve following intervention of sight words?

    b. Will the number of letter-sounds recognized increase following intervention of sight words?

    c. Will improvements in letter-sound blending (i.e., decoding) improve following intervention of sight words?

Chapter 2: Methods

Design

Five subjects identified as low beginning readers received intervention using both Plain Word Cards (PWC) and pictured word cards, also known as MorphoPhonic Faces (MPF). A group of eight words were presented as printed word cards and a comparable group of eight words were presented as MPF. The purpose of this study was to determine if MPF provided faster learning and greater retention of sight words compared to the plain print words. Additionally, this study examined whether sight word training improved skills underlying word recognition, including phonological awareness skills, letter-sound learning, and early decoding.

Participants

Five kindergarten students participated in the study. Each student had been identified by his/her teacher as exhibiting poor phonological awareness and grapheme awareness skills, including poor mastery of letter/sounds and failure to learn and retain sight words. The students were recruited from two classrooms. The participants ranged in age from 5;0 to 6;4 years (see Table 2.1) and all students spoke English as their first language. All potential participants were screened for normal hearing and vision by an East Baton Rouge Parish school nurse following the return of an approved Institutional Review Board parent consent form. Given that each participant passed vision and hearing screenings, a battery of tests were administered.

Participants were included in the study if they could read fewer than 22 (out of 220) Dolch words (10%), could blend syllables and phonemes to sound out words at no greater than 50% accuracy on The Phonological Awareness Test:2 (TPAT:2), and scored in the frustration level for isolated and passage word recognition subtests of the Basic Reading Inventory (BRI) from the Pre-Primer (PP) reading levels. The Dolch, BRI, and two blending measures from the decoding subtests of the TPAT:2 were given at pre-assessment and repeated at post-assessment with alternate forms if available.

Table 2.1 Demographic and Inclusion Characteristics of Participants

Participant	CA	Gender	Race	Dolch Words	BRI Words	BRI Passage	Blending
1	5;0	F	AA	1	0	PP (Frus)	26%
2	6;4	F	AA	1	0	PP (Frus)	15%
3	5;4	F	AA	1	0	PP (Frus)	0%
4	5;0	F	AA	2	0	PP (Frus)	8%
5	5;11	M	AA	4	0	PP (Frus)	0%

Note. AA= African American; CA= chronological age; Dolch Words = number of words recognized out of 220; BRI= Basic Reading Inventory; CVC= consonant-vowel-consonant.

Table 2.2 provides a profile of the raw scores for subtests from *The Phonological Awareness Test:2*, including 10 measures of phonemic awareness and 15 measures of grapheme awareness. Raw scores were used because many scores were below the lowest norms, but rankings based on norms are provided. The phoneme subtests measure rhyme recognition and production, sentence-word-phoneme segmentation, isolation of phonemes in initial-medial-final word positions, and sound blending syllables and phonemes. Raw scores are profiled for the grapheme subtests measuring letter-sound association for consonants, long and short vowels and vowel diphthongs, and the CV and CVC decoding subtests that were administered. The profile

Table 2.2 Pre-assessment Raw Scores (out of 10) for the Phonemic Awareness, Grapheme Awareness, and Grapheme Decoding Subtests of The Phonological Awareness Test:2 (TPAT:2)

	Phonological Awareness Subtests									
Subj	RhyD	RhyP	SegS	SegSy	SegP	IsoI	IsoF	IsoM	BlSy	BlPh
1	6 ***	3 ****	7 ****	3 ***	1 **	0 *	0 *	0 *	7 ****	1 **
2	7 ***	2 *	9 ****	9 ****	1 **	1 **	1 **	0 *	6 **	0 *
3	6 ***	0 *	1 **	1 **	0 *	0 *	0 *	0 *	0 *	0 *
4	10 *****	8 ****	9 *****	3 ***	0 *	0 *	0 *	0 *	0 *	1 **
5	6 ***	2 ***	6 ****	3 ***	0 *	0 *	2 ***	0 *	0 *	0 *

	Grapheme Letter-Sound Subtests				Grapheme Decoding Subtests	
	Letter-Sound		Consonants			
Subj	Con	Vow	Blends	Digraph	VC	CVC
1	1 ***	0 *	0 *	0 *	0 *	0 *
2	5 *	1 **	0 *	0 *	0 *	0 *
3	3 ****	2 ****	0 *	0 *	0 *	0 *
4	13 *****	3 ****	2 *****	3 *****	0 *	0 *
5	0 *	0 *	0 *	0 *	0 *	0 *

Table 2.2 (continued)

Note. RD = Rhyming-Discrimination; RP = Rhyming-Production; SS = Segmentation-Sentences; SSy = Segmentation-Syllables; SP = Segmentation-Phonemes; II = Isolation-Initial; IF = Isolation-Final; IM = Isolation-Medial; BLSy = Blending-Syllables; BLP = Blending-Phonemes; Con = Graphemes-Consonants; Vow = Graphemes-Long & Short Vowels

Note: ****** = superior; ***** = above average; ****= average; *** = below average; ** = poor; * = very poor

shows that all 5 subjects could identify words that rhymed, and all but one subject could produce a few rhymes.

Manipulating words and syllables is considered a prerequisite to manipulating phonemes, or phonemic awareness. All of the subjects could segment sentences into words (scoring in the average range) except one who scored in the very poor range. One subject could segment words into syllables within the average range with the others showing emerging awareness (below average to very poor). None of the subjects could perform the tasks at the level of phonemes, scoring primarily 0 with only a few scores of 1 out of 10 (placing their performance in the very poor range). Two subjects were able to blend spoken syllables to form words at the average range, while three could not blend any words. All five performed in the very poor range for blending phonemes.

One subject knew 16 letter-sounds and was beginning to blend consonants. The other four subjects knew letter-sounds for 0 to 5 consonants and 0 to 2 vowels, and these responses were inconsistent. None of the subjects could blend letter-sounds to produce syllables. Two additional measures were administered as measures of general verbal ability and visual memory (see Table 2.3). Scores ranged from poor (subject 5 PPVT) to average for both measures, with subjects 3, 4, and 5 scoring below average on both tests.

Table 2.3 Standard Scores for Peabody Picture Vocabulary Test (M = 100; SD 15) and Wide Range Assessment of Memory and Learning (M = 10; SD 3) at Pretest

Subjects	1	2	3	4	5
PPVT	93	85	82	81	79
VM	8	11	7	7	7

Test Battery

Peabody Picture Vocabulary Test (PPVT-4). The PPVT-4 (Dunn & Dunn, 2007) is a norm-referenced test that quickly assesses an individual's vocabulary knowledge. The vocabulary presented includes verbs, nouns, and adjectives. For its administration, the examiner orally presents a word that refers to one of four colored pictures. The examinee is required to point to or say the number of the picture that corresponds to the word the examiner is describing. Test-retest reliability is .93 and validity measures range from .80 to 90s.

The Phonological Awareness Test:2 (TPAT:2). TPAT:2 (Robertson & Salter, 2007) is a standardized test that assesses all the pre-reading skills that are early indicators of reading success. It is used to identify children who lack explicit phonological awareness and have difficulty acquiring sound/symbol correspondences in words and phonetic decoding skills. The TPAT:2 assesses a student's awareness of the oral language segments that comprise words, such as syllables and phonemes. The test is comprehensive and includes a wide range of tasks. Subtests include Rhyming: Discrimination and Production; Segmentation: Sentences, Syllables, and Phonemes; Isolation: Initial, Final, Medial; Deletion: Compound Words, Syllables, Phonemes; Substitution with Manipulatives; Blending: Syllables and Phonemes; Graphemes; and

Decoding. Performance on each of these tasks has been correlated with success in early reading and spelling. The reliability and validity coefficients for all subtests are in the highly satisfactory range.

Dolch-Sight Word List. The Dolch Word List (Dolch, 1936) is a list of 220 commonly used words that should be recognized by "sight" for fast or "fluent" reading. Many of the words do not follow basic phonic principles, so they cannot be sounded out. The list includes the most frequently used words in the English language, such as pronouns, adjectives, adverbs, prepositions, conjunctions, and verbs. Although the word list is traditionally divided up into grades, the Dolch words should be mastered by the end of first grade.

Basic Reading Inventory 5th Edition (BRI). The BRI (Johns, 2012) is an informal reading assessment. It includes graded word lists and reading passages from beginning reading through grade twelve to assess oral reading. Each participant was administered the Pre-Primer (PP) level word list where a ceiling was met, indicating the participant had reached his/her frustration level. Additionally, each participant read aloud a reading passage that was accompanied by ten comprehension questions pertaining to the passage. The participant's Percent of Word Recognition in Context and Percent of Comprehension were both calculated. Testing concluded when the participant reached frustration level for both criteria. The reliability and validity coefficients for all passages and word lists are minimally .80 and most in the .90s.

Wide Range Assessment of Memory and Learning Second Edition (WRAML2). The WRAML2 (Sheslow & Adams, 2003) is a standardized test that measure's an individual's memory functioning. This assessment provides an evaluation of both immediate and delayed memory ability, as well as acquisition of new word learning. Of the four recognition subtests pertaining to working memory, only the design recognition subtest was administered prior to beginning intervention and at the conclusion of intervention at post-testing. Reliability of this instrument is .93.

Materials

Printed Word Cards (PWC). The plain words that were used for intervention were printed on 3 ½ x 4-inch cardstock with a high-gloss finish. The words were printed in large type (90 point; AvantGarde, black, bold text font) within the bottom half of the card, and again printed in smaller type (55 point; AvantGarde, black, bold text font) centered at the top of the card (see Figure 2.1).

MorphoPhonic Face Cards (MPF). The pictured words used for intervention were also printed on 3 ½ x 4-inch cardstock with a high-gloss finish. The first letter or sound of the word was illustrated using a Phonic Face, which suggested the sound with which the word began. The remainder of the printed word was superimposed into drawings that represented the meaning of the word. The MPF words were printed in color within the superimposed pictures, and again printed in smaller type (55 point; AvantGarde, black, bold text font) at the top of the card (see Figure 2.1).

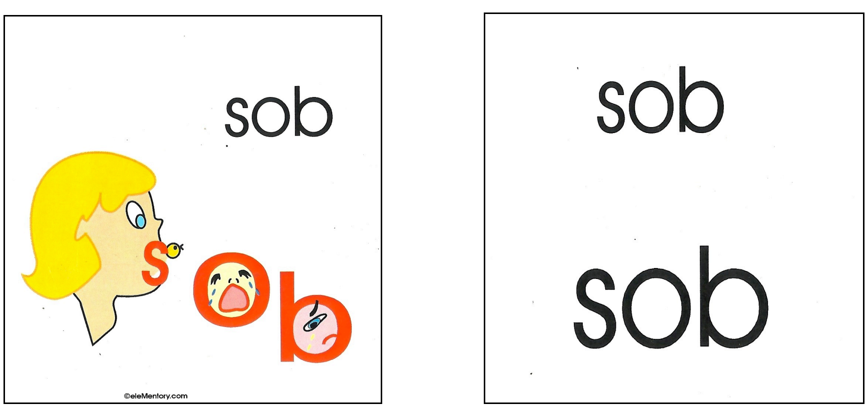

Figure 2.1 Sample of a Morphonic Face on left and a plain word card on right.

Word Lists

Six word lists were generated, three conforming to Group 1 word patterns and three conforming to Group 2 patterns. Each core word list had two parallel sets of eight words (Sets A and B) that fit patterns designed to test factors that assist or limit word learnability, such as words whose pronunciation contained the letter sound ("peak" sounds like the letter-name "p" + /k/) or rhyming words. The lists were formed by first matching word pairs, then randomly assigning one word to the A word list and the other to the B word list.

Table 2.4 Parallel Words Taught Using MorphoPhonic Face Cards and Printed Word Cards across Six Weeks of Intervention

	Group 1 Words				Group 2 Words				
		Week 1	Alt 1	Alt 2		Week 4	Alt 1	Alt 2	
Letter-name initial	A Words	bee	beak	beach	A Words	nest	mess	vest	Letter-name medial
CVC no letter-name		bed	bus	bad		sit	sick	stop	Short vowel no L-N
Letter-name final		when	been	women		art	are	yard	ar vowel
Letter-name initial		elephant	ocean	age		caterpillar	lollipop	baseball	unique words
Letter-name final		fell	bell	well		is	was	this	function words
Onset-rime pattern		cat	rat	ant		coat	sack	snack	noun words
Silent e verbs		bake	save	hide		made	come	ride	present/past verbs
pronouns		him	she	us		who	what	here	Function words
Letter-name initial	B Words	pea	peak	peach	B Words	best	less	west	Letter-name medial
CVC no letter-name		pig	pan	pop		sob	sock	spot	Short vowel no L-N
Letter-name final		then	them	garden		arm	car	farm	ar vowel
Letter-name initial		envelope	open	ape		alligator	popsicle	birthday	unique words
Letter-name final		gel	sell	yell		am	were	that	function words
Onset-rime pattern		dog	hog	frog		goat	duck	truck	noun words
Silent e pattern		poke	gave	like		make	came	rode	present/past verbs
pronouns		her	he	we		why	when	where	Function words

Group 1 patterns included letter-name words in initial (i.e., "bee" "pea") and final positions ("when" "been"), CVC words ("bed" "pig"), onset-rime ("cat" "rat"), silent e ("bake" "poke") and pronoun ("him" "her") words (see Table 2.4). Group 2 patterns included letter-name medial ("nest" "best"), short vowel words ("sit" "sob"), ar vowel ("art" "arm"), polysyllabic unique words ("caterpillar" "alligator"), function words ("is" "am", noun ("coat" "goat"), verb/silent e ("made" "make"), and wh-function ("who" "why") words. Two alternative word lists for Group 1 and 2 patterns were generated for a total of 96 words.

Procedure

Intervention took place over the course of six weeks, with an additional week devoted to conducting pre-assessments and another at posttest, resulting in eight weeks overall. During the first two sessions of pre-assessment, participants attempted to read the 16 week-one core words to establish the baseline. If subjects knew the core word, it was replaced by an alternative word with the same pattern. This procedure was repeated during week three when a baseline was established for Group 2 core words (see Table 2.5).

During the treatment phase, each session began by testing the words learned the previous day for retention. This took approximately 2 minutes. The child was shown a plain print word for a maximum of 5 seconds to limit decoding. If the word was not recognized, it was marked incorrect on the scoring form and the next word was presented until the 16 words were scored. If any word was recognized for two sessions, it was considered a learned word and an alternative word with the same patterns was added to the words to be learned that day.

Intervention

All participants received both intervention methods during each session. Eight of the words were taught using the Plain Word Cards (PWC) and eight using MorphoPhonic Faces (MPF).

Table 2.5 Weekly Schedule Depicting Baseline, Treatment, and Retention Testing Cycle

	Pretest	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Posttest
A and B Words	Baseline Group 1 words Pretest	Presession baseline Treatment week 1 Postsession Word probe	Presession retention Treatment week 2 Postsession Word probe	Presession retention Baseline Gr 2 words Treatment week 3 Postsession Word probe	Presession retention Treatment week 4 Postsession Word probe	Presession retention Treatment week 5 Postsession Word probe	Presession retention Treatment week 6 Postsession Word probe	Posttest Retention weeks 1-6

Half of the children were exposed to the A words as MPF B words as PWC, while the other participants had the opposite presentation. The order in which the lists were presented was switched each session to counterbalance for the effects of time on learning. A weekly scoring sheet is shown in Table 2.6.

Children were seen individually for 45 minutes each session. The first and last 2 ½ minutes were devoted to pre-session retention testing, including any alternative words that may have been added and the last 2 ½ minutes were devoted to a probe measuring post-session learning. Forty minutes were devoted to instruction, where each condition was taught for 20 minutes. On day A, half of the participants received MPF intervention for 20 minutes followed by PWC, and half received the opposite. The order of intervention conditions was switched on day B. The researcher prepared the Weekly Score Sheet with the correct word sets and order of intervention prior to every session. This form and the corresponding word card sets for each condition were placed in each participant's folder weekly to assure the correct protocol was followed each day of intervention.

Table 2.6 Weekly Scoring Sheet Profiling Word Lists, Teaching Method, and Order of Word Presentation

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GROUP 2:1 WORDS

Child ______________ Week __ Day 1 Date ______ Week __ Day 2 Date ______

Day 1

	Presession retention Print words only (0/1)		Postsession recall: Point to X (receptive) Rapid recall print, rapid recall MPF (0/1)			
Taught:	__Print __Picture			Recept	Print	MPF
A	nest	__	nest	__	__	__
Words	sit	__	sit	__	__	__
Teach	art	__	art	__	__	__
1st	caterpillar	__	caterpillar	__	__	__
2nd	is	__	is	__	__	__
	coat	__	coat	__	__	__
152 min	made	__	made	__	__	__
Total:	who	__ /8	who	__ /8	__ /8	__ /8
Taught:	__Print __Picture			Recept	Print	MPF
B	best	__	best	__	__	__
Words	sob	__	sob	__	__	__
Teach	arm	__	arm	__	__	__
1st	alligator	__	alligator	__	__	__
2nd	am	__	am	__	__	__
	goat	__	goat	__	__	__
15 min	make	__	make	__	__	__
Total:	why	__/8	why	__ /8	__ /8	__ /8
Total:		/16		/16	/16	/16

Day 2

	Presession retention Print words only (0/1)		Postsession recall: Point to X (receptive) Rapid recall print, rapid recall MPF (0/1)			
Taught:	__Print __Picture			Recept	Print	MPF
A	nest	__	nest	__	__	__
Words	sit	__	sit	__	__	__
Teach	art	__	art	__	__	__
1st	caterpillar	__	caterpillar	__	__	__
2nd	is	__	is	__	__	__
	coat	__	coat	__	__	__
15min	made	__	made	__	__	__
Total:	who	__ /8	who	__ /8	__ /8	__ /8
Taught:	__Print __Picture			Recept	Print	MPF
B	best	__	best	__	__	__
Words	sob	__	sob	__	__	__
Teach	arm	__	arm	__	__	__
1st	alligator	__	alligator	__	__	__
2nd	am	__	am	__	__	__
	goat	__	goat	__	__	__
15 min	make	__	make	__	__	__
Total:	why	__/8	why	__ /8	__ /8	__ /8
Total:		/16		/16	/16	/16

Plain Card Word Intervention

This treatment condition required clinicians to focus on word cues that are important in recognizing words (Norris, 2006; Powell et. al., 2007). First, children were shown the word on the plain print word card, and then attention was directed to the first letter(s), while connecting the letter sound with the word (i.e., the first letter in *made* is "*m*"; it makes the /mmmmm/ sound). The final letter/sound in the word was examined using a similar procedure. Next, the word was examined for common letter/phonic patterns such as the long vowel, silent –e rule for the word *made*. The child was encouraged to think of other words that were similar in nature belonging to the same "word family" (e.g, shade, fade, jade). Each of the eight words was discussed following this pattern and then practiced by shuffling and then presenting the word cards. If needed, the clinician provided reminders to focus on noticeable features if the word was not immediately recognized.

MorphoPhonic Faces Intervention

This treatment condition required clinicians to focus on word cues to bring attention to both letter/sound and word meaning. Clinicians covered the bottom portion of the card at first as not to reveal the pictured word. Children were first shown the printed word at the top of the card. Shortly after, the pictured word was shown and used to emphasize important features (see Figure 2.2). For example, taking into account the word 'made,' the first letter of the word was examined by pointing to the Phoinc Face and then talking about how the first sound is made by the character (i.e., the *m* sound is made putting the top lip and bottom lip together). This word follows the long vowel, silent-e rule; therefore, the last sound heard is *d*; however, because this is a past tense word, the final letter *e* looks like a clock with the hand pointing backwards, indicating the action already happened. The letters *a* and *d* are both being nailed, drawing meaning to the context of the word. The clinician asked the child to explain the elements of the word previously discussed and then envision the picture embedded in the printed word that was initially shown. Finally, all the pictured words were turned face down and then practiced using only the plain print words on back of the cards. If needed, the clinician provided reminders to focus on noticeable features if the word was not immediately recognized.

Figure 2.2 Sample of a MorphoPhonic Face.

Reliability

The test administrator scored the pre and post-assessments and weekly score sheets, or protocols. All forms were then submitted to the Language Intervention Lab. The lab assistants entered data into Excel files using subject numbers for identification. All assessments and weekly score sheets were rechecked and rescored if scores during data entry or Excel file check if scores did not match the protocol. Raw scores were added from the protocol scoring pages and at least two people checked scores. In addition, at least 50% of the weekly interventions were rescored by the researcher, which resulted in 100% agreement.

Fidelity

The two intervention sessions for the five participants were staggered throughout the week, typically on Monday and Friday or Monday and Wednesday. The same clinician provided intervention to the same participant the entire six weeks of the study. Furthermore, a PhD supervisor with American Language-Speech-Hearing Association (ASHA) certification observed clinicians at least half of each session weekly. While observing, if needed, the supervisor would model the appropriate teaching technique. Additionally, students were given corrective feedback when a participant/s had difficulty with word learning.

Data Analysis

The first question of this study addressed whether or not MorphoPhonic Face word cards hold an advantage for learning sight words compared to plain print words taught each week and measured for retention in successive weeks. Sign tests were used to compare gains made for the two word learning conditions. In addition, to determine if more rapid word learning was occurring by posttest, a repeated measures ANOVA was used to compare the number of high frequency words gained (i.e., the Dolch Word List; Dolch, 1948). PPVT scores were included in this analysis as a control variable.

The second question asked whether skills pertaining to phonological awareness, the alphabetic principle, and decoding would improve following intervention. Sign tests were used to compare gains made at posttest for composite scores from TPAT:2.

Chapter 3: Results

This study examined the differences learning sight words under two conditions, which consisted of plain print word cards (PWC) and MorphoPhonic Face word cards (MPF). Measures of word learning and retention were assessed using printed words and MorphoPhonic words regardless of the treatment condition used to teach the words during intervention. The number of words learned each week and the words retained at post-assessment were examined, as well as patterns of learning on weekly probes.

The first question asked whether MorphoPhonic Faces held an advantage for sight word learning compared to plain print words. This was measured using a pre-to-post comparison of Dolch words learned, examining recall immediately following treatment, and examining retention of words.

Word Learning

Dolch Words. The first question of this study examined the number of words learned across time and compared learning of plain print word cards versus MorphoPhonic Face word learning conditions. Table 3.1 shows a mean of 1.8 words (out of 220) recognized at pre-assessment (range 1 to 4 words) and 11.8 at post-assessment (range 6 to 16). To determine if these differences were reliable, a repeated measures ANOVA was used and revealed a significant change ($z = 2.032$, $p < .042$) at post-assessment as predicted. The Dolch Word List was the source of 23 of the treatment words. Of these, a mean of 1.2 of the learned words were taught in this study as plain words and 1.8 were taught as MPF words. The category of “other” words was learned from other sources, such as sight word practice in class.

Table 3.1 Number of Dolch Words Recognized at Pretest and Posttest and Number of Dolch Words Recognized that were Learned under Plain Word or MorphoPhonic Word Treatment Conditions

	Total Dolch Words			Dolch Words Learning Method		
Subj	Pretest	Posttest	Gain	Print	MPF	Other
1	1	10	9	2	1	7
2	1	13	12	0	3	10
3	1	16	15	2	3	11
4	2	11	9	2	1	13
5	4	6	2	0	1	5
Mean	1.8	11.8	9.4	1.2	1.8	9.2

The PPVT was examined as a control variable since oral vocabulary acquisition was not targeted in treatment. Table 3.2 shows that there were minimal changes in the mean scores for the PPVT from pre to post-assessment. The repeated measures ANOVA conducted to determine if these differences were reliable showed no significant difference ($z = -.276$, $p = .783$). Oral

Table 3.2 Changes in Dolch Word and PPVT Scores from Pre-Assessment to Post-Assessment

	Pretest Means	Posttest Means	t-test value	Sig level
DOLCH	1.8 (1.17)	11.8 (3.49)	$z = 2.032$	$p < .042$
PPVT	84 (4.90)	84.2 (6.43)	$z = -.276$	$p < .783$

vocabulary was not targeted in the treatment, and as predicted minimal changes occurred through maturation or other factors, compared to the large changes in Dolch word recognition.

Number of Words Learned Immediately Following Intervention. The total number of words recognized immediately following intervention for plain print words and MorphoPhonic Face words are profiled in Table 3.3. The numbers reflect the sum of words added across 12 sessions for receptive recognition (point to the word named among 16 plain print cards) and for expressive recognition (produced the correct word within 5 seconds given the plain print cards). The Sign columns of the table indicate if the direction of the difference favored MorphoPhonic Faces (+) or Plain Words (-).

Visual inspection reveals that for both receptive and expressive word recognition, three children learned more words under the MPF condition and two learned more under the plain print condition. In order for the sign test to show a significant difference between the two conditions at the $p < 0.05$ level, all five children would have had to have learned more words in one condition or the other. The two-tailed probability that this result occurred by chance was $p < 1.0$. (http://www.graphpad.com/quickcalcs/binomial2/).

The means for both receptive (48.6 versus 49.2) and expressive (42.6 versus 42) word recognition support the finding that learning method (plain print versus MPF) did not affect immediate recall of sight words.

Number of Words Retained. The mean number of words that were retained for plain print words and MorphoPhonic words across intervention sessions and at post-assessment are profiled on Table 3.4. The intervention session numbers reflect the sum of words added across 10 sessions for retention (baseline rather than retention measures the first day of both Group 1

Table 3.3 Number of Words Recognized Receptively and Expressively Immediately Following Intervention under Plain Print Words and MorphoPhonic Words Conditions

	Receptive (Point to Word Named)			Expressive (Produce Sight Word)		
Sub	Print	MPF	Sign	Print	MPF	Sign
1	38	40	+	73	61	-
2	57	52	-	38	41	+
3	34	40	+	21	27	+
4	76	73	-	58	55	-
5	38	41	+	23	26	+
Means	48.6	49.2		42.6	42	

Note: Sign Test Marks; - advantage to plain print, + advantage to MPF, x = tie

and Group 2 word training). The Sign columns of the table indicate whether the direction of the difference favored MorphoPhonic Faces (+) or Plain Words (-). For intervention session measures, two children learned more words under the MPF condition and two learned more under the plain print condition, while one child learned an equal number in both conditions. For the posttest measure, one child learned more words under the MPF condition and two learned more under the plain print condition, while two children learned an equal number in both conditions. In order for the sign test to show a significant difference between the two conditions at the $p < 0.05$ level, all five children would have had to have learned more words in one condition or the other. The two-tailed probability that this result occurred by chance was $p < 1.0$. (http://www.graphpad.com/quickcalcs/binomial2/).

Table 3.4 Number of Words Recognized in Plain Print at the Beginning of Intervention Sessions (i.e, Retained from Previous Learning) and at Posttest under Plain Print Words and MorphoPhonic Words Conditions

	Retention across Intervention Sessions			Retention at Posttest		
Sub	Print	MPF	Sign	Print	MPF	Sign
1	36	25	-	6	2	-
2	18	12	-	7	5	-
3	12	12	x	5	5	x
4	22	24	+	4	4	x
5	6	10	+	2	6	+
Means	18.8	16.6		4.8	4.4	

Note: Sign Test Marks; - advantage to plain print, + advantage to MPF, x = tie

The means for both retention across intervention sessions (18.8 versus 16.6) and retention at posttest (4.8 versus 4.4) word recognition support the finding that learning method (plain print versus MPF) did not affect immediate recall of sight words.

Learning the Alphabetic Principle

The second question asked whether skills related to the alphabetic principle would show improvement following intervention. The included measures of phoneme awareness, letter-sound association (grapheme awareness), and letter-sound blending (decoding).

Phoneme Awareness. The Phonological Awareness Test:2 (TPAT:2) (Robertson & Salter, 2007) assesses a range of phonological (word and syllable manipulation) and phonemic awareness (phoneme manipulation) skills. Table 3.5 profiles the raw scores for ten of the subtests of the TPAT:2. Pretest scores showed that some subjects had average to low average skills in some of the phonological awareness skills (discriminating words that rhyme, producing rhyme, segmenting sentences to words and words to syllables, blending syllables), but all were below the norms for their age for phonemic level skills (see subject description in Chapter 2). Examination of posttest scores reveals that all subjects made gains at posttest, with Subjects 1 and 2 gaining in 8 of 10 subtests, Subjects 3 and 4 in six and seven subtests, respectively, and Subject 5 in three (although he also showed losses in rhyme, sentence-to-word segmenting, and isolating final sounds).

Table 3.5 Pretest and Posttest Raw Scores for Phonological Awareness Subtests of The Phonological Awareness Test:2

	Phonological Awareness Subtests Pretest/Posttest									
Subj	RhyD	RhyP	SegS	SegSy	SegP	IsoI	IsoF	IsoM	BlSy	BlPh
1	6/9	3/8	7/6	3/5	1/3	0/9	0/5	0/0	7/8	1/8
2	7/8	2/1	9/10	9/7	1/2	1/10	1/5	0/5	6/8	0/2
3	6/8	0/0	1/6	1/4	0/0	0/9	0/2	0/0	0/2	0/0
4	10/9	8/10	9/9	3/3	0/5	0/10	0/8	0/2	0/8	1/3
5	6/7	2/0	6/4	3/3	0/0	0/4	2/0	0/0	0/8	0/0

Note. RD = Rhyming-Discrimination; RP = Rhyming-Production; SS = Segmentation-Sentences; SSy = Segmentation-Syllables; SP = Segmentation-Phonemes; II = Isolation-Initial; IF = Isolation-Final; IM = Isolation-Medial; BLSy = Blending-Syllables; BLP = Blending-Phonemes

To see if the gain scores represented a reliable gain, the subtest scores were added to form a composite phonemic awareness score at pretest and posttest. Table 3.6 profiles the composite TPAT:2 scores at pretest and the magnitude of the gain. The Sign columns of the table indicate whether the direction of the gain reflected an increase at posttest. The one-tailed probability that this result occurred by chance was $p < 0.03$.

Table 3.6 Pretest and Posttest Composite Scores of Ten Phonological Awareness Subtests from The Test of Phonological Awareness:2 and Results of Sign Analysis

Subject	Pretest	Posttest	Gain	Sign
1	38	62	24	+
2	36	58	22	+
3	8	31	23	+
4	31	67	36	+
5	11	26	15	+
Means	24.8	48.8	24	

The significant gains at posttest support the prediction of this study that phonological awareness skills would increase following sight word training. Although changes in phonemic awareness cannot be directly attributed to the intervention or either condition (plain print or MorphoPhonic), the changes did occur during the time of the instruction. This finding is consistent with the results of Williams (2013). These findings suggest that work on larger units, or sight words, corresponds with a positive effect on smaller grained skills (i.e., phonemic awareness).

Grapheme Awareness. The Phonological Awareness Test:2 (TPAT:2) (Robertson & Salter, 2007) assesses a range of grapheme awareness skills. Table 3.7 profiles the raw scores for four of the grapheme subtests of the TPAT:2; however, only Consonants and Vowels were of interest in this study. Pretest scores revealed two subjects scored in the very poor range at pretest for knowledge of consonants, including Subject 2 who was repeating kindergarten and a year older than the others and Subject 5 who also was older (6;1 years) although this was his first year in school. At posttest, Subject 2 had improved to the average range with 17/20 consonant letter-sounds correct, and Subject 5 improved to the below average rage with 11 consonants.

Subject 1 had just turned 5 at pretest and knew a single consonant, ranking in the below average range at pretest but improving to the above average range at posttest (16 consonants). Subject 3 recognized three consonants at pretest (average) and achieved near mastery with 19/20 (above average). Subject 4, also 5;0 years, knew 13 of the 20 consonants tested, ranking at the above average level at pretest and showed mastery of all 20 (superior ranking) at posttest. Thus, four out of five subjects improved their knowledge of letter-sounds for consonants to an average or above ranking, while the fifth student who had no concept of letters or sounds at pretest showed gains of 11 letter-sounds, improving from a very poor to a below average range.

The TPAT:2 tests for letter-sounds for both short and long vowels, for a total of 10. Subjects 1 and 5 knew zero vowels at pretest, placing them in the very poor range. At posttest, Subject 1's performance was average (3 vowels) while Subject 5 knew only 1 (poor). Subject 2 knew only 1 vowel at pretest (poor) and improved to 4 (below average). Subjects 3 and 4 also made small gains resulting in 4/10 vowels at posttest, placing their ranking at average and above average, respectively, based on their age. Thus, three of the subjects performed in the average or above range for vowel letter-sounds at posttest, and the other improved their ranking by one.

Table 3.7 Pretest and Posttest Raw Scores for Grapheme Awareness Subtests of The Phonological Awareness Test:2

		Grapheme Letter-Sound Subtests							
		Consonants		Vowels		ConBlends		ConDigraph	
Subj	Age	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	5;2	1 ***	16 *****	0 *	3 ****	0	0	0	0
2	6;6	5 *	17 ****	1 **	4 ***	0	0	0	3
3	5;6	3 ****	19 *****	2 ****	4 ****	0	0	0	1
4	5;2	13 *****	20 ******	3 ****	4 *****	2	1	3	1
5	6;1	0 *	11 ***	0 *	1 **	0	0	0	0

Note: ****** = superior; ***** = above average; **** = average; ***= below average; ** = poor; * = very poor

To see if the gain scores represented a reliable gain, the consonant and vowels subtest scores were added to form a composite letter-sound score at pretest and posttest. Table 3.8 profiles the composite TPAT:2 scores at pretest and the magnitude of the gain. The Sign columns of the table indicate whether the direction of the gain reflected an increase at posttest. The one-tailed probability that this result occurred by chance was $p < 0.03$.

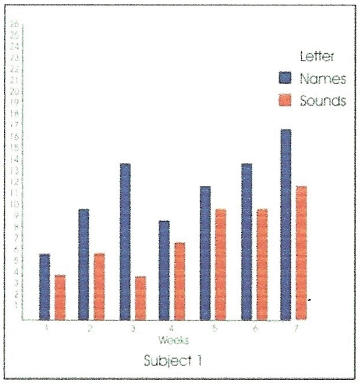
The significant gains at posttest support the prediction of this study that phonological awareness skills would increase as a result of sight word training.

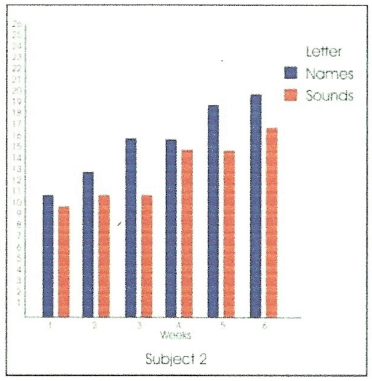
Table 3.8 Pretest and Posttest Composite Scores of the Consonant and Vowel Grapheme Awareness subtests from The Test of Phonological Awareness:2 and Results of Sign Analysis

Subject	Pretest	Posttest	Gain	Sign
1	1	19	18	+
2	6	21	15	+
3	5	23	18	+
4	16	24	8	+
5	0	12	12	+
Means	5.6	19.8	14.2	

Although changes in letter-sound learning cannot be directly attributed to the intervention or either condition (plain print or MorphoPhonic), the changes did occur during the time of the instruction. This finding is consistent with the results of Williams (2013). The findings were also supported by weekly probes measuring letter-names and letter-sounds that were taken at the beginning of the first session each week. The results are profiled in Figures 3.1 through 3.5.

Visual inspection of the figures showed that in all cases, letter names preceded letter sounds. Subjects 1, 2 and 5 showed a close relationship between increases in letter names and concomitant increases in letter sounds but at a lower level each week. Their progress was gradual but steady across time. Subjects 3 and 4 showed a different pattern that I will term the "big bang" discovery of letter-sounds. Both started out with good letter-name knowledge but few letter sounds in week 1. Following the addition of several sounds at week 2, the subjects appeared to discover how graphemes symbolize phonemes and their scores rose to near mastery almost immediately. Subject 5 appeared to be following a similar pattern at week 6.





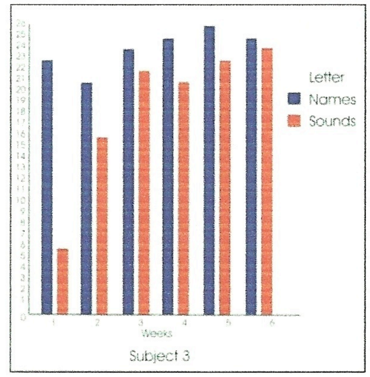
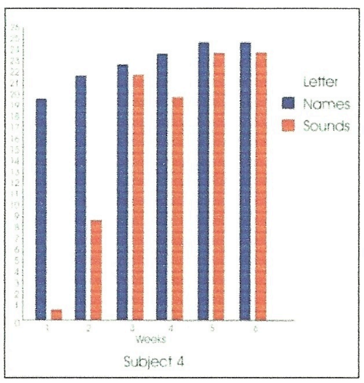


Figure 3.1

Figure 3.2

Figure 3.3



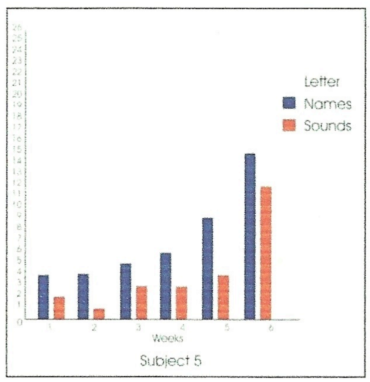


Figure 3.4

Figure 3.5

When probes for sight words were compared to letter-learning probes, Subjects 1 and 2 and 5 (for the first five weeks) recognized a steadily increasing number of words in print across weeks, in a pattern similar to alphabet letter gains. However, Subjects 3, 4, and 5 made their big jumps in letter-sound recognition during the same week when words were recognized in print at high rates for both plain print and MPF words (Subjects 3 and 4 during the third week and Subject 5 at week 6).

These findings suggest that learning to read words has a positive effect on learning letter names, and learning letter-sounds improves sight word learning. All of the children except Subject 2 had a good concept of words, as reflected by an average score on the Sentence-to-Word Segmentation task of the TPAT:2. None of them could segment words-to-phonemes or identify phonemes in initial word positions. The intervention began with words, a unit they understood, and practiced attending to phonemes within words. The first letter-sound of the MPF was shown as a Phonic Faces producing the relevant sound and may have provided a visual scaffold.

Decoding. Two of the Decoding Subtests of the TPAT:2 were administered to capture emerging decoding abilities. During intervention, subjects were made aware of beginning letter-sounds, final sounds, and word patterns for both the plain word and MPF conditions. Examination of Table 3.9 reveals that subject 4 showed no decoding abilities at pretest but was near mastery of VC words (standard score 168; Very Superior) and decoded two CVC words (standard score 121; Superior). Subject 5 likewise scored zero at pretest but decoded two VC words at posttest (standard score 106; Average). This provides early evidence that sight word learning may facilitate learning to decode.

Summary

Five subjects identified as low beginning readers received intervention using both Plain Word Cards (PWC) and pictured word cards, termed MorphoPhoinc Faces (MPF). A group of eight words were presented as printed word cards and a comparable group of eight words were presented as MPF.

Table 3.9 Pretest and Posttest Raw Scores for Two Decoding Subtests of The Phonological Awareness Test:2

	Grapheme Decoding Words Subtests	
Subject	VC	CVC
1	0/0	0/0
2	0/0	0/0
3	0/0	0/0
4	0/8	0/2
5	0/2	0/0

Results showed that MPF did not produce an advantage for learning and retaining sight words compared to the plain print words. Improvements in sight word training corresponded in time with improved skills underlying the alphabetic principle, including phonological awareness skills and letter-sound learning, as well as emerging decoding skills for two subjects.

Chapter 4: Discussion

The purpose of this study was to determine if MorphoPhonic Faces (Norris, 2006) improved learning and retention compared to plain print words for sight words. Kindergarten children were selected who were just beginning to learn to read but were struggling because of poor phonological awareness and alphabet knowledge. It was predicted that these participants would benefit from the speech production and semantic cues provided by the MorphoPhonic Faces. Additionally, the effects of sight word learning on phonological awareness, learning the alphabet principle, and early decoding were explored. It was predicted that working at the more concrete whole word level, but focusing on letter-sound cues would not only teach sight words but also improve smaller grain skills such as phonemic awareness and letter-sound knowledge.

The first question asked whether MorphoPhonic Faces (MPF) held an advantage for sight word learning compared to plain print words. While earlier studies had shown positive effects for learning (Powell, Hartman, Hoffman, & Norris, 2007) and retention (Williams, 2013) of sight words, this study found no advantage. Words were learned equally well within sessions and retained at the same level.

One of the reasons for this outcome is that few words were learned. Retention testing at the beginning of sessions showed an average of 2 to 5 words recognized by sight and these were often the same words across days. At posttest, children knew only 8 to 12 words, meaning on average each child learned 1.5 words per week. This suggests that the 16 words taught during each session (eight plain print and eight MPF) were too many. Children practiced eight words for 20 minutes and then immediately were presented a second set of eight completely different words. After three weeks (six 20-minute sessions per condition) only 4.5 words (on average) were retained. Since the number retained was equal across conditions, the visual cues provided by the MPF did not help the children commit more words to memory. Further, new words were added if a word was recognized on two days. This meant that 9 or more words were practiced by the third week for some students.

Another reason for the few words learned is that there were two completely different word lists taught, Group 1 and 2 words. The kindergarteners only saw each list six times for 20 minutes each session. Thus, by the third week, both the number of words recalled immediately after the training session and retained from previous sessions was increasing. Many subjects were recalling most or all of the words immediately following training. This suggests that if training on these words would have continued for a few more sessions, retention of both short and long term may have improved.

Word learning was a challenging task for the kindergarteners, especially during the first three weeks. Several of the children did not have a concept of a written word and responded randomly to teaching trials. They did not know the alphabet or letter sounds and had difficulty discriminating between printed words and misnamed the MPF words by the picture cues without attending to the letter-sound cue (i.e., saying “sleep” for “bed” or “mail” for “envelope”). Only 13 of the Group 1 words were recognized at posttest (by one child each) compared to 22 Group 2 words (12 words learned by multiple children). By the time Group 2 words were introduced, children had a much more advanced concept of words and many were quickly mastering letter-sounds and identifying them within both the plain print and MPF words. Again this suggests that if the sessions would have continued, word retention would have increased.

Instructional sessions twice weekly were probably not optimum and the children might have done better if intervention took place three times weekly. Some met on Monday and

Wednesday so learning was just beginning and they would not see the words again for five days. Others met on Monday and Friday, with an entire school week between sessions. However, despite all of the challenges, daily probes do show that children improved in their ability to recognize words receptively and/or expressively across sessions for both word groups. The modest but significant change in Dolch words recognized from pretest to posttest supports that word learning was improving.

The second question of this study explored whether attention to letters and sounds during word training would result in improvements in phonological awareness and alphabet knowledge. Both of these abilities improved for all subjects from pretest to posttest and showed steady gains across the six weeks of intervention.

Recall that Ehri (2005) has shown most sight words are remembered, often after a single exposure, because experienced readers have constructed a network of connections between phonemes, graphemes, orthographic patterns, morphemes and other phonological and semantic knowledge that supports word learning and easily retrieves known words. Beginning readers, particularly those at the pre-alphabetic level, can and do learn a vocabulary of sight words using pre-alphabetic strategies such as associating a salient cue in the word to its pronunciation (i.e., the "y" in monkey looks like a tail). However, she argues that most words do not contain salient cues and so this level of reading will not become generative and each would need to be explicitly taught. Only as children become aware of the alphabet and learn letter names and sounds can they begin to construct the network of connections between letters, sounds, words, and their meanings. In this view, learned sight words (i.e., pre-alphabetic reading) are not important for learning to read using alphabetic strategies.

However, the data of this study provide some intriguing findings. While all of the kindergarteners in this study started out low in phonemic awareness and letter-sound knowledge, their abilities were distributed across a range from very poor to below average. Those who started out highest in phonological awareness made gains in nearly every measure, while the lowest child made minimal gains. This is consistent with previous literature correlating phonemic awareness with reading achievement (Ehri, 2005).

In this study, letter-name knowledge predicted letter-sound learning. For every week and for every child, increases in letter-names corresponded with increases in letter sounds. In all cases, more letter names were recognized than letter sounds. Two patterns of learning were clear. Three of the subjects showed increases in letter names and letter sounds slowly and gradually. While steady gains were made, they still only knew from 11 to 17 letter sounds at posttest. In contrast, two of the students learned letter-sounds in a "big bang" pattern. They had nearly mastered letter names at pretest but knew few letter-sounds. Within the first few sessions, both appeared to discover the alphabetic principle and mastered letter-sounds at a high rate almost immediately. The fifth subject, who scored the lowest across measures at pretest, showed both patterns in his learning. Starting at zero, each week he added a few letter names and fewer letter-sounds. By week 5 he still only knew 8 letter names and 4 sounds. However, on the final week, his interest, demeanor and success changed, resulting from a "big bang" discovery of the alphabet principle. That week he nearly doubled letter names to 15 and tripled letter-sounds to 12.

These advances in alphabet knowledge coincided with the number of sight words that were recognized in plain print on probes. The weeks that the three children gained an understanding of the alphabetic principle, based on sudden increases in letter-sound scores, they also recognized a large number of words in plain print in the probes immediately following the sessions. This recognition occurred regardless of how the words had been taught (i.e., plain print or MPF).

These findings suggest that learning sight words has a positive (and probably reciprocal) effect on learning the alphabet principle. It also suggests that even children who had no letter-names or letter-sounds could learn to read a small vocabulary of sight words, and that alphabet knowledge changed as a result. Likewise, this effect also extended to gains in phonemic awareness. It is suggested that words are more concrete than sounds because words refer to known entities such as objects or actions. But letter-sound associations are far more abstract, and the child must cognitively link an abstract phoneme to the sound and an abstract grapheme to the letter and mentally link the phoneme and grapheme. Working at the more concrete level of words and examining the sound structure within the words may have provided children with a bridge to discovering how the alphabet works.

The extent to which Phonic Faces either did or did not facilitate this process cannot be determined because all children received both conditions. However, during the first two weeks, the three subjects who showed the "big bang" profile (i.e., performed higher on post-session probes) showed a better response to the MPF words. The two children showing slow and steady progress responded better initially to print, and then quickly responded to both equally well. This suggests that they were far enough along in alphabet knowledge that they neither benefitted nor were "blocked" by the picture words (Didden, Prinsen & Sigfoos, 2000).

These conclusions must be interpreted cautiously because this study did not employ a control group that received no treatment. A control group could better determine if the changes in phonological awareness and letter-sounds occurred as a result of sight word training or because of some other school program or simply maturation. But they do provide interesting insights that suggest working at the word level to teach letter-sounds and phoneme awareness may be a highly beneficial way for young and/or struggling students to learn. The results also suggest that letter names may provide a benefit for alphabet learning that is currently not recognized.

Future Research

Further study is needed with kindergarten children, including those who have good phonemic awareness and alphabet skills and those who are delayed to further understand how young children begin to read. A better understanding of factors that contribute to early failures can lead to appropriate intervention strategies. Repeating this study with fewer words and longer periods of intervention would determine if these factors limited the results of the present study. A larger group of subjects would allow for subject matching and random assignment to a plain print or MPF group, as well as a control group to better understand what the sources are for the significant changes in phonemic awareness and alphabet knowledge shown by both Williams (2013) and this study. Also, words taught in this study were selected to examine patterns of syllable shapes, grammatical class, or letter-sound. This results in a random collection of words. An exploration of words unified by a theme may facilitate learning by providing children a context for understanding the words and their function.

Finally, comparison of the learning of kindergarteners with both typically developing and language impaired children at younger and older ages could provide a continuum of learning. Chronological and language age matches could be compared to examine differences between typical and atypical learners.

Limitations of this Study

There are several factors that present limitations for the generalization of the findings of this study. Only five subjects, all of which represented the same ethnic background, participated in the study. A larger population is needed to make any generalizations. This study should also be replicated with similar subjects, but representative of a more diverse population, from different schools. Also, findings from this study cannot be generalized to other populations, such as students with disabilities. This study was conducted during the school year when students receive daily instruction in addition to all participants receiving small group instruction. Leaning sight words and TPAT gains in phonological and grapheme awareness and letter-sound decoding cannot be directly attributed to the intervention of either condition (plain print or MorphoPhonic); however, the changes did occur during the time of the instruction. Too many words presented across too few sessions spaced too far apart may all have contributed to the limited learning of sight words in this study.

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Appendix: Consent Forms

Consent for Participation

Project Title: The Effects of Using MorphoPhonic Faces as a Method for Teaching Sight Words to Low-Performing Kindergarteners

Location: Highland Elementary

Investigators: The following investigator is available for questions, M-F, 8:00 a.m. – 4:30 p.m.
Dr. Jan Norris COMD, Louisiana State University (LSU), (225) 578-3936

Purpose of the Project: At LSU we are looking for methods to teach sight words to young children. Many children find learning easier when concepts are pictured. We will be working with kindergarten children who are just beginning to learn sight words. Half of their words will be practiced with pictures and half will be plain print. We will determine which types of words are easiest for children to learn.

Inclusion Criteria: The participants of this study will be kindergarten students who are just beginning to learn to read words. To qualify for the study, your child must be able to read fewer than 20 Dolch words and score no higher than the instructional level for all subtests of the Basic Reading Inventory.

Exclusion Criteria: Children who are already reading more than 20 words.

Description of the study: Participating children will first be tested for early reading skills, including vocabulary, phonological awareness skills like rhyming and hearing sounds at beginning and ends of words, letter-sounds, and sight words. These tests will be repeated at the end of the study to measure improvements.

Students from LSU will work with participating children individually twice each week for 8 weeks. They will help children learn to read sight words with and without pictures. LSU students will help children practice words using games and other activities.

Benefits: Subjects of this study will have the opportunity to increase language and early reading skills including sight words. These skills are important to higher performance in the classroom and learning to read. The study may identify intervention strategies that teachers and Speech-Language Pathologist can use to improve the reading skills of their students. Better team work between professionals may also occur which will benefit all children.

Risks: There are no known risks.

Right to Refuse: Participation is voluntary, and a child will become part of the study only if both child and parent agree to the child's participation. At any time, either the subject may withdraw from the study or the subject's parent may withdraw the subject from the study without penalty or loss of any benefit to which they might otherwise be entitled.

Privacy: We will use data to see if our assessments and interventions help children become better readers and writers. The school records of participants in this study may be reviewed by investigators. Your child's name will not be shared with anyone. We will anonymously enter the test scores into a file for statistical analysis. Results of the study may be published, but no names or identifying information will be included for publication. Subject identity will remain confidential unless disclosure is required by law.

Financial Information: There is no cost for participation in the study, nor is there any compensation to the subjects for participation.

Signatures:

The study has been discussed with me and all of my questions have been answered. I may direct additional questions regarding study specifics to the investigator. If I have questions about subjects' rights or other concerns, I can contact Robert C. Mathews, Chairman, Institutional Review Board, (225) 578-8692, irb@lsu.edu, www.lsu.edu/irb. I will allow my child to participate in the study described above and acknowledge the investigator's obligation to provide me with a signed copy of this consent form.

Child's Signature: ______________________ Date: ______________

Parent's Signature: ______________________ Date: ______________

The parent/guardian has indicated to me that he/she is unable to read. I certify that I have read this consent from to the parent/guardian and explained that by completing the signature line above he/she has given permission for the child to participate in the study.

Signature of Reader: ______________________ Date: ______________

Institutional Review Board
Dr. Robert Mathews, Chair
203 B-1 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
F: 225.578.6792
irb@lsu.edu | lsu.edu/irb

STUDY EXEMPTED BY:
Dr. Robert C. Mathews, Chairman
Institutional Review Board
Louisiana State University
130 David Boyd Hall
225-578-8692 / www.lsu.edu/irb
Exemption Expires: 9/16/2015

Vita

Ashley A. Brown, a native of Baton Rouge, Louisiana, received her bachelor's degree at Louisiana State University in 2010. Thereafter, she completed an urban education fellowship in Boston, Massachusetts where she worked at a public charter middle school providing individual students with year-round academic support and building meaningful relationships with the students and their families. As her interest grew in developing interpersonal relationships with individuals of diverse backgrounds, she made the decision to enter graduate school in the Department of Communication Sciences and Disorders at Louisiana State University. She will receive her master's degree in May 2014 and plans to begin work as a Speech-Language Pathologist.