PHONEMIC AWARENESS AND SIGHT WORD READING IN TODDLERS

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"To learn to read is to light a fire; every syllable that is spelled out is a spark."

— Victor Hugo, Les Miserables

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Throughout my program, I was motivated by the quotes of many great philosophers. I am thankful to them all, yet the following remains at the forefront of my mind:

> *You are what your deep driving desire is.*
> *As your desire is, so is your will.*
> *As your will is, so is your deed.*
> *As your deed is, so is your destiny.*
> -Brihadaranyaka Upanishad 4.5

While I have a curious nature and a desire to thoroughly understand matters of interest, it was the Doctoral Scholars Program of the Southern Regional Education Board (SREB) and the Compact for Faculty Diversity that continued to inspire me. This program offered "more than a check and a handshake;" it presented successful examples and possible paths for my doctoral

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ABSTRACT

This study investigated emerging phonemic awareness skills and printed sight word recognition abilities in two-year-old toddlers using plain text and MorphoPhonic Face words on flash cards. MorphoPhonic Face words were used to determine if this learning process is enhanced when words are iconically represented to show the first sound and the word's meaning (purposefully creating idiosyncratic cues) using pictures superimposed into the letters.

Sixteen (16) age-matched toddlers were assigned to alternate treatment groups and received exposure to both printed and MorphoPhonic pictured words three times weekly for six weeks. During each session, children were taught 16 sight words (8 in print only format; 8 as MorphoPhonic words). Words taught using print only to Group 1 were taught using MorphoPhonic words to Group 2, and vice versa. The subjects were compared for pre and posttest measures of emergent literacy and phonological awareness skills as well as word recognition under print only and MorphoPhonic conditions. Three instruments, were administered at pre- and posttest to assess vocabulary, alphabet knowledge, phonemic awareness, and language segmentation. In addition, four measures for word recognition were administered to assess word knowledge. A Home Literacy Questionnaire, assessing direct and indirect literacy experiences, was also completed for each child.

Mean gain analyses across pre-and post-assessments revealed that two-year-old toddlers demonstrated significant improvements in early literacy and phonological awareness skills after six weeks treatment. It was also revealed that sight words learned under the MorphoPhonic condition were recognized more frequently than those learned as print only. Strong correlations between measures of literacy experience and gains in sight word recognition were evident. In addition, the toddlers' development of phonemic awareness skills and gains in emergent literacy skills produced strong interactions with their direct and indirect home literacy experiences.

The results of this study challenge the currently accepted view that phonemic awareness and early literacy skills are secondary language skills learned through explicit instruction. Instead this study supports that phonemic awareness, early literacy, and sight word recognition skills can be learned as early as two years of age via a natural language acquisition process in the presence of print-rich environments.

REVIEW OF THE LITERATURE

By the time children complete first grade, they have a vocabulary of 60 to 260 printed words they can recognize by sight (Greenup, 1992). It is unclear when this word recognition process begins, but Gates and Bocker (1923) showed that 4 year olds recognize a small vocabulary of words using idiosyncratic cues that inadvertently suggest the meaning of the word, such as the tail of the "y" on the word "monkey" or the apparent eyeballs on the word "look." Children also are exposed to the alphabet from a young age, and by 4 years demonstrate the ability to produce phonetically based spelling (Burns & Richgels, 1989; Read, 1971). Terrell (2007) showed that by 2 years children are already aware of letters of the alphabet, and with an iconic representation they can also associate correct sounds with letters. The purpose of this study is to determine if 2 year old children also can learn to recognize written words and if this learning process is enhanced when the words are iconically represented to show the first sound and the word's meaning (purposefully creating idiosyncratic cues) using pictures superimposed into the letters.

Recognizing Written Words

Recognizing written words is a process that becomes more automatic for readers with experience. Initially, words may be recognized through decoding, but fluent reading occurs when words are recognized automatically. Words that are recognized automatically are termed "sight words" and are defined as words that are immediately recognized as a whole and do not require analysis for identification (Ehri, 2000). Typically by eighth grade, readers have a vocabulary of 10,240 automatically recognized words (Harris & Jacobson, 1982). This is different from a reading vocabulary, which includes words that are both recognized and decoded (White, Slater & Graves, 1990). Models of sight word recognition have changed over time, but the past 20 years of research has made a convincing case that the letters within the word are used to recognize the word, rather than as whole complete patterns.

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The earliest theories of word recognition proposed that automatic word recognition was conducted by recognizing the holistic visual patterns of words rather than the sum of the letter parts (Cattell, 1886). To facilitate this word recognition, it was recommended that outlines be drawn around the perimeter of the words to make the shape salient (see Figure 1).

Figure 1. Lines drawn around word perimeter to facilitate holistic visual pattern recognition in early word recognition theories.

Cattell (1886) supported his model by showing that words presented in isolation were more accurately recognized than letters presented in isolation. Reicher (1969) showed that when presented with strings of random letters versus words, subjects could recognize if a specific letter had been present more accurately in the real word, a finding he attributed to rapid recognition of the word by its shape, followed by deducing the presence of the target letter. Woodworth (1938), replicated by Smith (1969) and Fisher (1975), showed that text written in lower case letters are recognized 5-10% faster than the same words written in uppercase. They proposed that the ascending and descending lines of lower case letters make the visual configuration of a word more distinct. Monk and Hulme (1983) showed subjects were more likely to fail to catch misspelled words in a proofreading task when the misspellings were similar in shape to the actual spelling (e.g., "tesf" for "test" as opposed to "tesc"). However, McClelland and Johnson (1977) showed that real words had no advantage over nonsense words as long as the patterns were regular. They concluded that readers recognize the patterns of letters within words rather than the shape of the whole word. Kolers and Perkins (1975) showed that the lower case advantage quickly disappeared with practice. Even more convincing, they showed mirror reading, where the visual shape of the word was reversed, could be done as quickly as forward reading following a short period of practice. Finally, Paap, Newsome, and Noel (1984)

showed that the misspelling data could be accounted for on the basis of letter shape, and not the entire word.

Thus, models of sight word recognition refocused from word shape models to patterns of letters within words. Models proposed by Coltheart (1978) and Rayner and Polatsek (1989) suggested that patterns of letters could be connected to words via two different routes, direct and indirect. The direct route connects letters directly to words and their meanings (visuo-semantic connections) using visuo-spatial features, such as letters, letter patterns, and word configurations that are stored in memory. No knowledge of the alphabet or phoneme-grapheme correspondence is needed for this route. The association between printed letters and the words they represent are arbitrary, resulting in connections that are learned by rote. Word pronunciations are activated only after the meaning (i.e., semantic connections) has been activated. The second, an indirect route or grapheme-phoneme conversion route, identifies words based on connections between letters and phonological knowledge as well as knowledge of word patterns. In this dual coding model, sight words would be learned and stored in memory differently than words that are decoded or learned through alphabetic principles.

Others argue that there is no need for a dual coding model since the same underlying mechanisms can account for reading words by sight and decoding unfamiliar words. Using computer modeling, Plant, McClelland, and Seidenberg (1995) were able to show that both types of word recognition could be achieved using the same mechanism. Further, these computer models have been able to demonstrate principles of adult reading, as well as simulate a child learning to read. Ehri (1992; 2005) came to the same conclusion regarding a single mechanism by comparing the correlations between alphabetic knowledge, phonological awareness, and word recognition. She suggested visuo-phonological connections are made wherein readers utilize their alphabetic knowledge to negotiate connections between graphemes and phonemes. Under this model, the spellings of specific words are connected to their pronunciations in memory so that differentiations between phonemes in pronunciations and

graphemes in spelling are made simultaneously (Ehri, 2007). Children who know the alphabet

have a scaffold that enables these connections to form. The predictable patterns provided by

the alphabet and previously learned orthographic patterns aid in establishing connections to

new words, and for accurately retrieving familiar words. This type of model better accounts for

findings such as children who can encode a word to memory after one sighting and without

practice, and that few semantic errors (e.g., reading "father" for "dad") occur when reading, an

error pattern that would be predicted from the visuo-semantic route (Perfetti, 1992; Share,

1995).

Further evidence to support a visuo-phonological coding model can be found in the

changes found in patterns of development as children acquire sight words. Children learning to

read utilize increasingly more complex associations between graphemes, orthographic patterns,

and the pronunciations of words that can be explained using this model.

<center>Developmental Phases of Word Recognition</center>

Ehri (1995) built her model upon the foundation of one provided by Frith (1985). In his

model, Frith proposed that reading progresses in stages from a picture reading, or logographic

stage, through an alphabetic stage, and finally a mature orthographic stage as readers acquire

fluency and skill at word recognition. The three stages in Frith's model represented qualitative

differences in the strategies, or routes, children used to read on the road from beginning to

mature reading. Ehri (1995) suggested that these changes were flexible and represented

phases of development, rather than clearly defined stages. She also disagreed that the stages

represented different routes to reading. Instead, she proposed that alphabet processing was

fundamental to all phases of reading development. She subdivided Frith's alphabetic stage into

two parts, partial and full connections between phonemes and graphemes, and relabeled Frith's

first and last stages (i.e., from *logographic* to *pre-alphabetic; and orthographic* to *consolidated*

alphabetic) to reflect the continuity between phases. The resulting model of word recognition

<center>4</center>

has undergone refinement but has basically remained the same in the past two decades since Ehri first proposed these phases.

Pre-Alphabetic Phase. As the name suggests, this phase occurs prior to knowledge of the alphabet; in other words, it does not rely on an understanding of the sound-symbol relationship of the alphabet. Instead, at this level, associations are made between the most salient visual features of words and their pronunciations or semantic representation. For example, young children have been shown to recognize and "read" logos from familiar brand names or labels (Mason, 1980). These words are not recognized from their letters, but rather from the context in which the letters are embedded. Because the letters lack an alphabetic connection, the child may see the large letters of the "Bubble Yum ®" logo on a package and read, "gum." Further, the golden arches of the "M" on a red background is immediately identified as "McDonald's®." If the letters of the word were rearranged, a child in the pre-alphabetic phase would not recognize any difference in the word but would recognize the word just as easily, as long as the context remains the same (Masonheimer, Drum, & Ehri, 1984). Children who do know the alphabet are more likely to notice the change in letters. The same response to visual features can be created by manipulating other visually salient aspects of a word. For example, nonreaders learned more experimenter-created words that were visually distinctive (printed with varying print sizes) than words containing regular letter-sound relationships (Ehri & Wilce, 1985; Rack, Hulme, Snowling, & Wightman, 1994). Children in this stage ignore alphabetic information and instead attend to idiosyncratic visual cues. According to Mason (1980), attending to meaning cues such as logos and brand names enables children to first become aware of words and thus serves an important function. Children also begin to understand the function of print, so that seeing "stop" printed on an octagonal shape elicits "stop sign."   However, since these words cannot be recognized without the distinct print size, picture, or other context cues, and that the order or even presence of critical letters is unnecessary to recognition, Ehri argues this phase does not represent true word recognition and is a phase that

is, in fact, unnecessary in learning to read words. The relative importance of this phase of word recognition thus remains unresolved.

Another variation of reading using visually salient cues occurs when children recognize a small vocabulary of words because something in the shape of the letters of the word reminds them of the word's meaning. For example, the word "look" suggests its meaning because it is easy to imagine the two "o"s as eyes. Other words recognized by 4-year-olds include "monkey"and "dog" because the "y" and "g" look like tails, or "camel" because the "m" looks like humps (Gates & Bocker, 1923; Gough, Juel, & Griffith, 1992). This principle was exploited by researchers (Blischak & McDaniel,1995; Miller & Miller, 1968, 1971) to create what they termed "enhanced words," or words with pictures drawn into the letters. Preschool-age children were able to name sight words taught using this method as well as or better than a printed word alone condition. It was proposed that the pictures called attention to orthography which is used in discriminating and later recognizing letter sequences.   However, there is no evidence that recognition of these words led to earlier or improved decoding skills, and would require longitudinal studies to explore. Norris (2007) proposed that using salient letter cues represents a level of development higher than logo-picture reading in what may be a continuum of word recognition (as opposed to Ehri's four-phase model). At this level, children expect words to be "readable" and search for cues in the letters themselves, as opposed to the context. Other levels along this continuum include levels earlier than pre-alphabetic, including a level where children think pictures are read and print is irrelevant, followed by a level when children point to print when asked what to read, but then use only picture information to attempt reading (Peterman & Mason, 1984), thus indicating an emerging awareness of the relevance of print. Two additional levels may be seen within Ehri's second phase, or partial alphabetic phase of word recognition which occurs as children begin to learn the names and the sounds of alphabetic letters.

Partial Alphabetic Phase. In this phase, the child is beginning to form connections between written words and pronunciations based on matches between graphemes and phonemes. However, the connections are only made for some of the letters and sounds, often the first and last letters of a word since these are the easiest to detect (Ehri, 1995). This results in confusion with similarly spelled words, so that a child might recognize "spoon" as "skin" (Savage, Stuart, & Hill, 2001). According to Ehri, children are limited to partial connections at this stage because they have not yet mastered phonemic awareness, or the ability to segment the word's pronunciation into all of its respective phonemes. They also lack full knowledge of the alphabetic system, especially the complex vowel system and digraphs such as "ch" or "sh." Thus, they use letters they can detect to recall a word, a characteristic leading Ehri (1995) to term these attempts "phonetic cue reading." These characteristics are seen for both word recognition and for invented spelling at this stage, as children spell words using only the salient letters, typically leaving out medial letters.

To demonstrate the difference between pre-alphabetic and partial-alphabetic phases, Ehri and Wilce (1985) presented words with either salient visual shapes (uHo for "mask") or partial letter-sound spellings (MSK for "mask"). Kindergarteners were categorized as either pre-readers (those who read no words), novices (those who read few words), and veterans (those who read several words). Pre-alphabetic phase readers learned to read the visually salient words faster, while those who knew the alphabet learned the partial letter-sound words more easily, indicating they were able to use their knowledge of letters and sounds to remember the words. On the other hand, the novices and veterans, who had experienced some prior success in phonetic decoding, no longer relied on the facilitation of visual cues but rather learned to read the phonetic spellings with greater ease. The results of this study suggest that a conversion in cognitive processing occurs as a child begins to experience reading successes. The child moves from simply processing the visual features of a word to actual recognizing and remembering the sound-symbol associations between the letter and pronunciations of words

(Ehri & Wilce, 1985). To further test this relationship, Stuart, Masterson and Dixon (2000) separated 5-year-old beginning readers, similar in age and visual memory skills, into two groups based on those with and without phonological awareness and alphabetic knowledge. The children were then exposed to a set of words and provided feedback. Following 36 exposures and again one month later, children with phonological awareness were far better at recalling the targeted words. Further, visual memory abilities were only significant to children in the pre-alphabetic phase, for which there was a strong correlation between visual memory and performance (.79) compared to the partial alphabetic phase readers for whom visual memory was unrelated to word recognition (-.11).

Roberts (2003) examined the effects of letter naming instruction on word reading in 4 year old pre-alphabetic children. Children were assigned to either a letter-name learning group or a comprehension group. Children were then asked to read words that were either phonetically spelled with letters (LFNT for "elephant"), phonetically spelled by sounds (elefunt), or spelled with visually distinct letters (KsN). Results indicated that children who received letter-name instruction performed significantly better for words spelled with letter-names, while those instructed in comprehension performed better for visually distinct words. Ehri and Wilce (1985) also included words characterized by letter-name spelling and found those words were recognized by children in the pre-alphabetic phase but not the pre-alphabetic phase. Words are also better recognized by children if the letter name is in the beginning of the word. For example, the letter-name for "b" is heard in the word "beat" versus the word "bait" where the letter-name cannot be heard. Other researchers have shown word reading improves when children are encouraged to use invented spelling, often consisting of letter-name attempts (Chomsky, 1994; Treiman, 1998). While Ehri sites these studies as evidence of the partial-alphabetic phase of reading, Norris (2007) views letter-name attempts as a lower level of word reading attempts in the continuum of word recognition. It is more sophisticated than attending to a visual cue on a letter, but involves merely understanding that the visual letters have names.

This level of naming and using names is simpler than understanding letters as a symbolic representation of sound.

Although the relationship between the shape of a letter, its name, and its associated pronunciation are fairly arbitrary, the letter name is often related to its sound in print (Treiman & Kessler, 2003). Since most letter names contain the sound associated with its corresponding letter, it is commonly assumed that knowing the name of each letter facilitates the learning of the associated sound-symbol relationship. In two studies, Share (2004) demonstrated this relationship. After forty-five kindergarteners learned the letter names for six "letter-like" symbols, some of which included the letter sounds, they were then taught the sounds of the letter-like symbols. The children in the control group learned the same letter-like symbols but with meaningful "real-word" labels which had no sound relationship with the symbols. The significant outcome differences between the experimental and control groups demonstrated that letter-name knowledge has a beneficial effect on sound-symbol (grapheme-phoneme) learning, as letters with names that include the corresponding sound facilitated the learning of the sound-symbol association. The same results were not present for letters with unrelated names. In a second experiment with 20 kindergarteners, Share (2004) further replicated the results of this study.

Gradually children master phonemic awareness and gain a full understanding of the alphabet, resulting in the necessary structure to form the connections between letters and phonemes in the full alphabetic phase. Both aspects of development are necessary, as several studies have shown that training in letter-names and letter-sounds without phonemic awareness training is not sufficient to improve word recognition or developmental spelling skills (Ball & Blachman, 1991).

Full Alphabetic Phase. During the full alphabetic phase, readers form complete connections between letters in spellings and phonemes in pronunciations. Once words can be segmented, children are able to assign letters to the sounds they hear in the order in which they

are pronounced. While there may not be a one-to-one match between letters and sounds, sufficient connections can be made to result in rapid word recognition, especially for regularly spelled words. These grapheme-phoneme connections provide the means to bond letters in printed words to their pronunciations, along with their meanings, in memory. Children now have a powerful system for rapidly learning sight words and retrieving them from memory. Since sight words are represented completely in memory, reading words becomes much more accurate, and confusions between similarly spelled words are minimized. Further, the same structure provides a means for new words to be decoded and read by blending the pronunciations.

Ehri and Wilce (1987) used similarly spelled words to determine if kindergarteners could be guided into the full alphabet phase. The treatment group practiced similarly spelled words that required them to process all of the grapheme-phoneme relations in the words to accurately differentiate between the words. Those children who received the training were able to read most of the contrasting words accurately, while the control group who practiced isolated letter-sounds remained partial alphabetic readers who frequently confused similarly spelled words.

While knowing phoneme-grapheme relationships contributes greatly to word recognition, English is not a language where there is a one-to-one relationship between letters and sounds. Further, spelling occurs in units larger than single sounds, and children who can recognize these larger units (such as the "and" within "hand" "band" "strand") have a great advantage in rapidly recognizing words not yet known by sight. This orthographic knowledge is characteristic of Ehri's consolidated alphabetic phase of word recognition.

Consolidated Alphabetic Phase. Learning a greater number of sight words results in increasingly more words in memory. The same spelling patterns begin to recur within the same and different words as the number of known words increases. As this occurs, the grapheme-phoneme connections within these words become consolidated into larger units. These units include rimes (d-*og*), syllables (-ble), morphemes (-ing), and whole words. Thus, as a young

reader transitions to this phase, he begins to actually read sight words as a unit. According to

Ehri (1995), this consolidation effectively reduces the memory load of the reader. A reader in

this phase for example, might see the word, "sweet," and process it as two units, "sw" and "eet."

This is in contrast to the processing of the same word by a reader in the Full Alphabetic Phase,

as four units (*s, w, ee, t).* Recognizing units also enables multisyllabic words to be read more

easily, because if connections can be made in units or chunks for syllables, morphemes, rimes,

and/or root words, then fewer connections are required to enter the words in memory.

Ehri (1994) associated her phases with school ages, recognizing that there would be

considerable variation depending upon individual differences and experience. The pre-

alphabetic phase begins during the preschool years for those who have sufficient literacy

experiences or at the start of schooling. By late kindergarten most children are minimally

demonstrating a partial alphabetic phase, and full alphabetic is expected at beginning first grade

as children begin to decode and learn sight words. The alphabetic phase continues for

approximately two years as children gradually build up the connections needed to recognize an

increasing number of words using consolidated patterns. Ehri does not refer to the use of

"strategies" for word recognition, stating instead that the connections occur automatically and

without conscious effort. While the consolidated phase is the final achievement in her theory,

others argue that while it might look similar to adult reading, the reading of a fluent second

grader is not the same as mature adult reading (van Orden, 1987).

If entering different phases of reading is at least partially experientially determined, then

there should be evidence of the emergence of this knowledge in the behavior of young children

before they are directly instructed in reading. Preschoolers with enriched literacy experience

should have more knowledge than peers with impoverished experiences, and a developmental

progression should be evident.   In fact, many studies have been conducted to determine what

young children know about reading and what factors promote development prior to school entry.

This development begins in infancy for children whose parents encourage literacy.

Early Literacy Experiences

Research shows that parents engage children in parent-child book reading from an early

age. This field of research has been termed "emergent literacy" (Teale & Sulzby, 1986).

Research in emergent literacy has shown that reading books with infants and young children

provides them with the knowledge about books needed to guide their path to literacy because it

familiarizes them with the representational function of pictures, written symbols, and the

characteristics of literate language (Bus, van Ijzendoorn, & Pellegrini, 1995). The importance to

later literacy is evidenced by higher scores in language, emergent literacy, and reading

achievement for children who have been read to regularly during the preschool years (Bus et

al., 1995). In homes that value literacy, reading with children begins early. Picture books are

typically read with infants between 7 and 24 months, as mothers encourage the child to look at

the pictures and make sounds (animal noises, baby cries) associated with the pictures. Infants

in turn hit, touch, and reach for the pictures in early stages, gradually shifting toward higher

levels of referencing including pointing and vocalizing (Murphy, 1978; Senechal, Cornell, &

Broda, 1995). During these early stages, infants are learning the function of symbols, using

picture representations that directly depict an image of its referent, referred to as protosymbols

by Werner and Kaplan (1963). Learning to interpret these symbols is an important step toward

understanding the true symbols represented by print. Murphy (1978) showed that 9 month old

infants actively engage with pictures as they discover the difference between pictures and other

objects. They hit the pictures and scratched at them, as if trying to remove them from the page,

as they discovered the pictures weren't real objects but rather representations.

Children change the manner in which they interact with books as they gain experience

and maturity. Bus and van Ijzendoorn (1997) scored the book reading behaviors of infants

along six dimensions, including the manner in which they acted upon the book (banging,

touching, grabbing, random pointing, focused pointing), book handling (page turning,

opening/closing the book), verbal and nonverbal referencing (petting an animal or making an

animal noise), looking, pointing, or gesturing in response to mothers' questions and comments, attention to the book aside from a response (visual attention directed at the pages of the book), and physical attention (quietly attending, crawling off mother's lap, wiggling) during the reading experience. Their findings showed at 12-13 months, infants grasped, touched, reached, and tried to eat the book. By 13-14 months, infants engaged in more referential behaviors such as attending to pictures, making sounds and gestures in response to pictures, and responding more to comments and questions by their mothers. By 14 to 15 months, infants were interested in acting upon the book, turning the pages and manipulating it as an object. They also make sounds or gestures and look or laugh at the pictures (Bus & van Ijzendoorn, 1995). Parents are equally invested in talking about the objects pictured on the page during this phase. As infants grow older, acting upon the book decreased so that by 17 months infants begin to attend to the picture and point to things named by parents (Senechal et al., 1995). By 18 months, more talk about the book occurs, both by the parent and the infant as parents ask questions and children initiate comments. By 20-24 months of age, pointing coordinated with vocal activity is well established.

Parents are very actively involved in engaging their infant in book reading. DeMendoza (1987) showed that at 12 months parents emphasized naming the objects shown in the picture. The amount of pointing by the adult was shown to be closely correlated with the sophistication of the book reading behaviors of the infant (Murphy, 1978). By 15 months, parents name the object and then attempt to introduce additional information, such as an action or some characteristic of the object. Senechal, Cornell, and Broda, (1995) showed that when infants initiated looking at a book, parents immediately followed by pointing to something on the page and naming it. They further showed that the information on which parents attempt to focus their infant's attention changes across time. The children in the 12 parent-infant dyads in this study were aged 9-, 17-, and 27-months-old and were videotaped during two book readings at each of three sessions. The books were either wordless or contained sentences describing the

pictures. The parents of younger infants used frequent attention-gaining verbalizations (e.g.,

"Look at this!") and elaborations (e.g., "That's her favorite toy.") whenever the infant did

respond. Parents of the older 27 month old infants asked more questions (e.g., "What's that?")

and provided more feedback (e.g., "Yes, that's right.") Parents of the 17 month olds used all

four behaviors frequently to both attract the attention of the infants and then to encourage the

infants to respond. They also found that children who were encouraged to respond through

questions and feedback vocalized more than children who were not asked questions.

The parents in this study were highly attuned to their infants. Across all age groups,

parent's monitored their child's response to the book and consistently responded to a child's

gaze on a page with a point within one second. They also attempted to increase their child's

attention by pointing and commenting to something observable on the page. Parent's

comments increased in sophistication as their child's attention and response matured, from

labeling comments, to sequences of labeling questions, and finally longer dialogs that focused

on actions and attributes consistent with the child's linguistic abilities.   In turn, the infants

attended to the books for longer durations with age, with attention to 55%, 73%, and 88% of the

reading episode for the 9-, 17-, and 27-month olds, respectively. Their study showed that more

verbal behaviors were produced by both parents and infants at this age if the book contained

pictures without sentences.

Not all parents were equally successful in engaging their child in storybook reading.

Shared book reading is a social activity between the parent and child and is influenced by the

parent-child relationship. Bus and van Ijzendoorn (1988) engaged parent-child dyads in 3 tasks,

including watching brief *Sesame Street* clips about letters and words, reading a picture book

with flaps with a single word on each page, and reading an alphabet book. Mother-child

attachment in the youngest group (1 ½ year olds) was measured using the Strange Situation

procedure where the response of the child was observed when the mother left and returned

twice. The dyads were categorized as exhibiting anxiously avoidant attachment, secure

attachment, or anxiously resistant attachment. It was expected that mother-child dyads with higher degrees of security and appropriate attachment would have a more pleasant relationship that would result in more shared book experiences, less disciplining during reading, and more reading instruction. Results indicated that children who scored higher on attachment and security were more attentive during the literacy activities and engaged more with the pictures and the story. These children also engaged in more pretend reading behaviors than the less secure children. In addition, the mothers of the secure children were observed to provide more explicit reading instruction (Bus & van Ijzendoorn, 1988).   In a follow-up study, Bus & van Ijzendoorn (1995) showed that in homes where book reading was not encouraged between parents and infants, 18 month to 5 year old children were less likely to initiate book reading with their mothers, showed less interest during book reading, and received more disciplining during the book reading. These children scored lower on measures of security and attachment than their peers who actively engaged in book reading.

Bus and van Ijzendoorn (1997) showed that there were large differences between parent-child dyads. Those children whom they identified as less secure in the parent-child relationship were uninterested in the book reading and engaged in behaviors such as crawling off the parent's lap to avoid the interaction. In these dyads, the parents easily gave up if the child showed disinterest, and in turn, the child was unfamiliar with the book reading routine and less able to participate. Bus, Belsky, and van Ijzendoom (1997) studied book reading exchanges for firstborn sons in 138 families. Book readings were videotaped at 12, 13, 18, and 20 months of age and included wordless picture books and those accompanied by sentences. Consistent with other studies, the infants pointed and labeled pictures in the books at 18 and 20 months, and parents worked to elicit these behaviors with questions, points, and other attention-eliciting strategies. Greater attention was paid to wordless books. However, dyads in which the parent was over-controlling and / or over-stimulating had children who were less inclined to respond to the book and more distracted. These patterns were not observed when fathers

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engaged the child in book reading, suggesting the established parent-child bond is an important factor in book reading interactions.

Infants and toddlers, at least those from print-rich homes wherein literacy is highly encouraged, have early experiences with book reading that involve considerable efforts on the part of parents to engage and maintain their attention. Infants at this age appear to be more interested in pictures than print, and levels of interaction in fact decrease when picture books are accompanied by sentences. This suggests that picture book reading is not a rich source of written word awareness for infants, although the experience with the protosymbols provided by pictures may be an important first step toward later reading written symbols. Through the pictures, children become aware that important information is contained in books that can be named and talked about (Bus & van Ijzendoorn, 1988, 1997; Lawhon & Cobb, 2002; Senechal, Cornell, & Broda, 1995). These experiences also teach children how to attend and participate during the book reading routine that will enable them to listen and learn from books with print that are read to them at an older age. However, the focus on pictures during infant parent-child reading does not mean children in this age group do not have rich and varied experiences with print in other contexts.

Environmental Print

Books are not the only source of experience with print for young children. In homes where literacy is valued, children have blocks and other toys that feature the alphabet, their own collection of books, writing materials such as markers and paper, music including the alphabet song, and DVDs or other media with characters and visuals presenting the alphabet. Numerous television shows are designed to interest and familiarize young children with the alphabet. In addition, many preschool programs and day care centers have curricula and toys focusing on alphabet learning (Lawhon & Cobb, 2002; Roberts, Jurgen, & Burchinal, 2005; Weinberger, 1996, 1998). Children are also exposed to nursery rhymes, songs, finger plays, and other

games that enable them to develop an awareness of words and the sounds within words (Lawhon & Cobb, 2002).

Weinberger, (1996, 1997) conducted a longitudinal study of children's literacy development at home and school. The study used parent report to describe the literacy experiences of 60 three-year old children, 34 from working class and 26 from middle-class homes. Results showed that parents and children shared numerous literacy learning experiences in the home. These included letting children use labels to select items while shopping, writing shopping lists, following a recipe together, filling in bank slips, operating the washing machine, sorting laundry, writing cards to friends and relatives, writing names on drawings, writing and drawing in steam on a window, engaging in reading and writing activities alongside parents, reading items from the television while watching together, following up on ideas from children's television programs, using a home computer, saying and singing nursery rhymes, listening to music, and looking at pictures and photo albums. Parents gave numerous examples of including children in daily chores, such as letting children set the dials on the washing machine while reading the words on the dial and pushing the buttons. While the frequency and diversity of literacy experiences varied between homes, at least some experience was present in all homes. In fact, between packages, clothing, television, street signs and billboards, shops, buses and other environmental stimuli, it was impossible for a preschooler to avoid print. Parents indicated that they naturally talked about print in the environment, in the same way that they talked about colors or numbers. In turn, children frequently pointed out things they could read.

Parents in the Weinberger study directly engaged their children in rhyming activities. They read, recited, and played music with their children that had rhymes. Most of the children could recite at least one nursery rhyme, and parents reported facilitating this by leaving off the final word as the rhyme was read to see if the child could complete it. The majority of the

parents indicated their child could distinguish words that rhymed and were able to recognize, say, or invent rhyming words. Oral storytelling also was common.

A variety of writing materials were available to all of the children in Weinberger's study. Children had pencils, crayons, pens, paints, markers, chalk, magnets, stencils, blackboard or white board, easel, desks, paper, coloring books, magic slates, and writing pads. Parents reported that children wanted writing materials when they saw the adult engaged in writing, and would pretend to write using their own materials. Parents encouraged this by giving children props, such as a bank slip, and letting the children complete their own.   Parents regarded drawing, coloring, and scribbling as natural everyday activities for their children.

The homes of the children in the Weinberger study were filled with items designed to explicitly teach literacy, including the alphabet. These included games for matching, listening, and sorting, flash cards with the alphabet and other alphabet cards, pictures with words underneath, jigsaws with words or letters, alphabet blocks, magnetic letters, post-office sets, computers, and household items decorated with the alphabet, often on the walls of children's rooms and on the refrigerator. Many other toys and games played by the child had print as a critical element even though not specifically designed to teach the alphabet or print.

A wide range of books were in the homes. These included fairy tales and other traditional stories, books of nursery rhymes, comics, bath books, cloth books, color books, lift-the-flap books, books with cassettes, books with videos, and books that featured television characters. The range of different types of books was often more varied than that found in the children's preschool or day care settings. In addition, the children saw their parent read a wide range of materials, including daily newspapers, computers, advertising brochures, mail, magazines, books, catalogs, hobby materials such as knitting patterns, crossword puzzles books, and professional journals and papers. The parents also reported writing lists, notes, letters, cards, filling in forms, coupons, and other daily activities. Some parents wrote extensively at home while others reported only one or two activities, but every child had some

exposure to parental reading and writing. Siblings were another rich source of literacy modeling and direct interactions with the preschool child.

Differences between the literacy experiences at home and school were noted by Weinberger (1996), including more explicit teaching and fewer opportunities to engage in incidental reading experiences at school. Nursery schools made efforts to transfer literacy learning to the home by sending worksheets to complete, samples of work completed at school, books, and other curriculum-related materials to parents. Marsh (2003) examined the discontinuities between preschool and home literacy experiences for 3 and 4 year old children. All of the children were from a white working class community in England. Her conclusions were that the exchange of information is largely "one-way traffic," with reading and writing activities frequently carried over into the home, but few home literacy practices reinforced at preschool. The result is that young children are exposed daily to two different types of literacy experiences involving different books, concepts, vocabulary, and syntactic complexity with no cohesion or coordination between the settings. One difference was the books found in each setting. In the home, the books were primarily traditional books such as fairy tales or Disney books, or books related to pop culture (e.g., Barney ®, Dora the Explorer ®). The pop culture logos also could be found on toys, clothing, and food items throughout the home, none of which were addressed in the preschool setting. School was more likely to present books related to emergent reading development designed by educators.

Parents reported that their children did bring school literacy into the home, including re-enacting activities and concepts from school. Parents also began to engage in more formal print instruction at home, based on school exposure and materials sent home. Parents encouraged this school-to-home carryover, but the reverse was rarely initiated by parents or requested by preschool teachers. The literacy experiences that occurred most frequently and naturally at home, such as recipes, newspapers, games, and toys were the least likely to be included in print experiences at school. Some attempts have been made to bridge the home-to-

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school gap, including creating pretend play centers for home living, shopping, and other environmental experiences, and stocking them with props to support everyday literacy (Whitehurst & Lonigan, 1998; Lawhon & Cobb, 2002; Marsh, 2003). Neuman and Roskos (1993) found that children in Head Start classrooms that were provided with an office play center equipped with functional print such as calendars, phone books, and writing materials, scored higher than control classrooms on environmental print tasks. Their performance was further enhanced following modeling by an adult volunteer of behaviors such as how to take an order or read a menu. They concluded that activities that establish a bridge between home and school literacy enhance children's learning.

This research suggests that first experiences with print occur both at home and at preschool or day care settings for young children. While preschools often have a curriculum designed to explicitly teach literacy skills, including the alphabet, the daily activities of home also provide important insights into literacy. Bus and van Ijzendoorn (1988) report that while parents did not consider that they were providing reading instruction to their children, their analyses showed that parents did name and talk about letters and draw connections between words and letters without realizing it through a variety of activities. Parents would follow the child's interest and talk about letters and words if the child pointed to or commented on print during reading or other activities. Perhaps surprisingly, less talk about letters and print occurred while both watched television programs specifically designed to teach letters, probably because the rapid rate of presentation left no time for comments. Not surprisingly, one of the richest contexts for talking about the alphabet occurred within alphabet book reading.

Alphabet Book Reading

Alphabet books differ from storybooks in many important dimensions. Storybooks follow a narrative discourse style, with characters that find themselves in a situation and engage in situation-driven actions across the pages of the story. The plot can range from minimal (a

collection of animals) to elaborate (e.g., plots with protagonists and antagonists who have opposing goals and parallel storylines within the book). The text serves to progress the story forward, either maintaining a close relationship to the picture, or communicating information not provided by the illustration (Golden, 1990). On the other hand, alphabet books are designed to help children learn the names for letters and to make appropriate letter-sound associations with pictured words on the page. Therefore, the pictures within a page are unrelated to each other except by initial sound, and continuity of character or plot is absent across pages. Words typically are minimal, consisting of labels for pictured items and perhaps an introductory sentence. It would be expected that alphabet books would elicit a different parent-child reading style than storybooks.

van Kleeck (1998) compared the parent-child reading interactions for three types of books; a storybook, a rhyming book, and an alphabet book. The subjects were 14 mother-child dyads who were videotaped reading the three books when the children were two, three, and four years of age. Results showed that only the alphabet books elicited any talk about the letters or letter sounds. At 2 years, approximately 24% of parent utterances referred to print information, but the majority of the talk was devoted to naming the items pictured. Mothers did point to the words, indicating that it is the word which is read rather than the picture, but were not specifically talking about the letters. Thus, at this level the interactions did not differ greatly from the storybook interactions where objects also were labeled and the talk focused on meaning. However, by 3 years, more than half of the parent's utterances referred to print, and at 4 more than 60% of the talk focused on alphabet information. The talk about the alphabet included letter names, letter sounds, and letter shapes, and parents indicated they were intentionally teaching their children about letters. Parents made judgments about the amount of alphabet talk their children were ready for and adjusted their reading style accordingly. Particularly for the 4 year olds, parents were concerned that their children knew their alphabet and letter-sounds as they neared kindergarten. She also found that the talk that did occur about

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the meaning during alphabet book reading was very low level, usually naming, compared to inference making and other more abstract talk that occurred during their reading of the storybook. It is apparent that parents have very different goals when reading the two types of books.

Stadler and McEvoy (2003) compared readings of storybooks and alphabet books with 72 parent-child dyads. All of the children were between 4;6 and 5;6 years of age, and included 55 children with typical development and 17 with language delays. Parents were instructed to read the books as they would do at home. The sessions were video-recorded, and later analyzed for the relative percentage of comments directed at print (i.e., alphabet, letter-sound, phonological awareness, or book concepts) and those focused on meaning, including comments about the characters or plot of the story, as well as comments made about personal experiences that were related to the book. Consistent with van Kleeck, they found parents made more content-related comments when reading the storybook and more form-related comments when reading the alphabet books. The majority of the form-related comments were directed at alphabet information and phonological awareness. The duration of the book readings were significantly different, with nearly twice as much time spent reading the alphabet books compared to the storybook (i.e., mean of 10.62 versus 5.54 minutes). The alphabet book elicited almost as much talk about the content, particularly the depicted objects and actions they perform, even though there was no plot and the illustration was not action-based. But the parents spent additional time talking about the letter names, letter sounds, and letter shapes, so that the talk shifted between meaning and form throughout the book reading.

This study also found a difference in the patterns of interaction between dyads of children with typical development versus those with language delays. Parents made fewer comments directed at phonological awareness and provided fewer prompts related to print than did the parents of typically developing children (Stadler & McEvoy, 2003). They conjectured that children with language delays recognized fewer letters of the alphabet and were less

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attentive to this information, and that the parents interacted with their children more like younger

peers, with a greater focus on meaning. Additionally, the children with delays did not ask

questions or initiate other talk about the print, compared to typically developing subjects. This

finding suggests that what is talked about during alphabet book reading is created through the

reciprocal responses of the parent and the child.

Justice and Ezell (2000) taught parents of 4 year olds to reference print through verbal

comments, questions, and requests about print, as well as through nonverbal references such

as pointing to print or running the finger under each word or sentence as it was read. Eight

books were read across four weeks. A control group read the same books to their children but

without print-referencing training. Results showed that the parents who were trained engaged in

significantly more print referencing behaviors, both in number of different behaviors and

frequency of use.   The children in the print-referencing condition improved more than the

control group on all measures except alphabet knowledge including words in print, print

concepts, and word segmentation.

Justice and Ezell (2001) attempted to increase parent's print-referencing behaviors in

the context of storybook reading. The books read contained 8 to 10 words per page, with one

or two words embedded into the illustrations on the page. Thus, print was highlighted in an

obvious manner throughout the story. The participants were 15 parent-child dyads comprised of

typically developing children between the ages of 4;1 and 4; 5. The parents were trained in 6

sessions to engage in print-referencing behaviors during storybook reading. These behaviors

included asking questions, and making comments and requests about print. All interactions

were video recorded and parent turns were judged to be either print referencing (remarks about

the alphabet, punctuation, or use of words such as "letter," "print," or "spell") or other (comments

about the pictures or story). Print Referencing behaviors were further coded as being either a

prompt (statements or questions that obligated the child to respond) or a comment (low or no

demand to respond). The behaviors were also coded for their specific category of print

referencing, including identifying letters, letter-sound, work awareness, phonological awareness, and word reading. The children's responses were coded as verbal, nonverbal, both, or neither. Results indicated that children responded to 60% of the parent's verbal print references, and responded more frequently following prompts than comments, as would be expected. There were no differences in the category of print behavior children responded to, being equally as likely to respond to a prompt for a letter name and word reading. Parents structured the book reading and their prompts in a manner that was consistent with the responses they believed their child could produce.

Similar results were obtained by Justice and Ezell (2002). Low-income children participating in Head Start were read storybooks, half by teachers who had been trained in print referencing and half who had not. Both the experimental and control groups improved following instruction, but the group who received the print-referencing scored significantly better on four out of seven measures of emergent literacy, including print recognition, words in print, alphabet knowledge, and print awareness.

Teachers in prekindergarten and kindergarten read aloud three different types of alphabet books to their students (Bradley & Jones, 2007). These included the conventional alphabet book with example words, alphabet books without example words, and storybooks with words containing targeted letters occurring throughout the text. Results indicated that teachers emphasized the alphabet letter-names while reading but devoted little attention to letter-sounds. The different types of text also had an effect, with the traditional book eliciting the most talk about the alphabet, and the storybook eliciting almost none.

Brazier-Carter, Norris, and Hoffman (2004) video recorded teachers in Head Start reading storybooks from an emergent reading series and researcher-designed alphabet-storybooks. These books, termed Phonic Faces alphabet-storybooks are designed to elicit letter-sound associations as a natural part of reading the book. For example, in Peter Pops Popcorn (Norris, 2002), the letter "p" is depicted as the top lip of the character in the book who

is popping popcorn. On each page of the story, he pops his lips making the /p/ sound as he sees, hears, feels, and tastes the popcorn popping. Results showed that Head Start teachers referred to letters and sounds more frequently when reading Phonic Faces books than traditional storybooks, and children responded with more comments and questions about letters and sounds.

Norris and Hoffman (2004) followed the same procedure, video recording parent-child storybook reading using either the emergent reading series books or the Phonic Faces alphabet storybooks. During the 5-6 minute training session, parents were shown five print referencing behaviors they could engage in while reading the books, including pointing to and naming letters, producing the letter-sound, identifying words in the story containing that letter, and rhyme. Parents read one story from an emergent reading series and one Phonic Faces book immediately prior to a short training session. The findings of this study showed that parents engaged in print-referencing behaviors before training at least once per page prior to training for the Phonic Faces book and none for the emergent reader. Following training, parents initially referred to print in the emergent reader as well, but discontinued after a few pages, while they increased throughout the Phonic Faces book, with more than twice as many total behaviors. These included more references to rhyme, letter sounds, and letter location within words. Children in turn referred more often to print and letter-sounds under the Phonic Faces condition.

While it has been shown that parents can be trained to engage in print referencing behaviors while reading with their preschool-age children, it is not clear how much effect these behaviors have on facilitating the development of phonological awareness for preschool-aged children. The ability to become aware of the sound structure of words appears to be a skill important to developing alphabetic principles and subsequently fluent word recognition.

Phonological Awareness in Preschoolers

Phonological awareness is highly predictive of reading ability in first grade and beyond (Adams, 1990). Many different tasks, such as providing rhyming words (Ellis & Large, 1987; Goswami & Bryant, 1990; Stanovich, Cunningham, & Cramer, 1984; Yopp, 1988), identifying the initial sound of words (Stanovich, Cunningham, & Cramer, 1984; Yopp, 1988), parsing a sentence into words, words into syllables, and syllables into sounds (Sawyer, 1987), and counting or indicating the number of sounds in a word (Sawyer, 1987; Yopp, 1988) have been used to measure phonemic awareness. Many of these tasks are at different levels of difficulty, with some easily performed by preschoolers, while others remain challenging to children in grade school. The results of these studies have led many to claim a causal relationship between phonological awareness and reading (Brady & Shankweiler, 1991; Goswami & Bryant, 1990; Stanovich, 1991; Wagner & Torgesen, 1987). Others view the relationship as more reciprocal, in that awareness of print creates a visual representation for sound and thus prompts sound awareness; greater sound awareness in turn leads to better print knowledge (Perfetti, Beck, Bell, & Hughes, 1987). The range of skills under the umbrella of phonological awareness suggests that it is not a unitary ability, and that many of the tasks have different cognitive or linguistic requirements (Backman, 1983; Lewkowicz, 1980, Stanovich, Cunningham, & Cramer, 1984; Yopp, 1988).

Perfetti, Beck, Bell, and Hughes (1987) suggest that the various tasks that measure phonemic awareness form a constellation of abilities, each which depend on the child's ability to segment language. While not unitary in form or requirements, each of the tasks is based on the presence or absence of phonemic awareness, or the ability to separate the form of a word from the meaning and function, and to manipulate the form of the word. Phonemic awareness is performed with the sounds of the language, but evidence suggests that the ability develops along with a growing awareness of print and alphabet knowledge. Burgess and Lonigan (1998) conducted a one-year longitudinal study of 97 preschoolers, between the ages of four and five

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years. After accounting for the children's ages and oral language abilities, analyses revealed that phonological sensitivity determined growth in letter knowledge in preschoolers, and the reciprocal was also true, letter knowledge was directly correlated with growth in phonological sensitivity. These results further suggest that the reciprocal relationship between reading and phonological sensitivity is apparent in early reading development, even before formal reading instruction has commenced.

Murray, Stahl, and Ivey (1996) explored the role of alphabet books in facilitating phonological awareness for preschool aged children. They conjectured that alphabet books provide opportunities for parents to talk about both letter names and information about the first sounds in words (e.g., "*B* is for bear"), a characteristic that could heighten children's awareness of initial sounds. Children were assigned to one of three conditions, a) the teacher read conventional alphabet books, b) the teacher read books that contained the letter-names only with no pictures of items beginning with that letter, or c) the teacher read storybooks with no focus on sounds. Results indicated that all three groups made gains in print concept and letter knowledge. However, the group read the conventional alphabet books made significantly more progress in phonological awareness than the group read books without examples or the controls. Murray et al. concluded that alphabet books comprise a forum for acquiring phonemic awareness.

Banajee (2007) found that nonverbal / non-literate 5-8 year old children using AAC devices learned the letter-sound relationship better using Phonic Faces alphabet-storybooks compared to alphabet books. Although only 2 letters were directly taught, once the alphabetic principle was understood using Phonic Faces the learning generalized to other letters, even without the faces. All three subjects showed greater improvements on letter/sound identification, sound to letter identification, identification of letter names, and identification of location of letters and sounds in all word positions during the Phonic Faces Storybook phases of the ABAB design. In addition, all three subjects improved performance on seven subtests (rhyming,

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deletion, substitution, isolation, segmentation, blending and graphemes) of The Phonological

Awareness Test (Roberson & Salter, 1997). Preliminary analysis of a current study (Brazier-

Carter, in progress) indicates that children made greater gains in phonological awareness and

print awareness following 6 weeks of book reading in the Head Start classroom using the

Phonic Faces books compared to traditional emergent reader storybooks.

As with print awareness, phonological awareness can be seen to emerge

developmentally. In a longitudinal study, Lonigan, Burgess, Anthony, and Barker (1998)

examined the phonological awareness of 238 children from middle-to upper-income homes and

118 children from low income families. Children ranged in age from 2 to 5 years. Comparisons

showed that with increases in age, children showed increases in phonological awareness, both

in terms of the number and types of skills they could perform and in the stability of their

responses. The results showed significant effects for social class at each age, with higher

income children performing better on tasks requiring segmenting of words into syllables and

phonemes than lower income children. Performance on these phonological awareness tasks

predicted word reading at older ages independently of language skills and letter knowledge.

They proposed that lower level phonological awareness skills may serve as developmental

precursors to higher levels abilities.

Carol, Snowling, Hulme, and Stevenson (2003) conducted a short-term longitudinal

study of 12 months with 67 preschool children, most less than four years old at the beginning of

the study. Subjects were tested each six months for syllable, rime, phoneme awareness,

speech and language, and letter knowledge. Results showed that children tended to develop

syllable and rime awareness at the same time, and both emerged before phoneme awareness.

Thus, the trend in development was from larger segments to smaller. They also found that

vocabulary was highly correlated with large segment awareness, suggesting that as patterns of

similarity form across a large corpus of words, implicit phonological awareness is a natural

consequence. Finally, their data showed that articulatory skills and syllable and rime awareness predicted later phoneme awareness.

Phonological awareness has not been studied extensively at the preschool level. However, the studies to date suggest that phonological awareness and alphabet knowledge emerge early and apparently reciprocally for children who have early experiences with print. These skills in turn have been shown to be important for the development of word recognition.

Precocious Reading

In an early study of reading in young children, Mason (1980) investigated the development of children's conceptual knowledge of letters and printed words to determine if preschool children could learn to read, and if so, under what conditions and how. In this study, Mason (1980) assessed 38 four-year-old preschoolers for nine months to determine if there was a hierarchy of skills that develops in emerging readers who do not receive formal reading instruction. Their parents had completed questionnaires which described the students' level of interest and knowledge about letters and words and what they did at home to help facilitate their child's learning to read. While the students had not been specifically identified as precocious readers, they demonstrated emergent behaviors by naming and printing letters, reading signs and labels, and reading words. The latter was the most advanced skill, as it was dependent upon sound-symbol knowledge. This study supported the existence of a natural hierarchy of knowledge development in learning to read. With parental assistance, the preschoolers were able learn to discriminate letter patterns, to recognize that letters offer clues to reading, and to understand that letters have a direct relationship with the sounds that compose words. Achievement of these emergent reading skills yielded a more efficient approach to learning to read (Mason, 1980).   As the students' understanding of sound-symbol relationships increased, they became better at decoding words and used more effective strategies for learning and remembering those words. Mason concluded that as children are directed to attend to print in

the environment, such as letters, signs, labels, and logos, and are provided opportunities to experience print via reading, spelling, and writing or copying, they learn some of the fundamental, first elements of reading, even prior to formal instruction in kindergarten.

Jackson, Donaldson, and Cleland (1988) examined the acquisition of the sound-symbol relationship of letters prior to formal reading instruction. Subjects were 87 children between kindergarten and first grade. According to the parent's reports, most of the students could recite the alphabet and identify capital letters even through they had never received formal reading instruction. Their findings reported that sixty-eight percent (68%) of the students recognized words by age 3, eighty-five percent (85%) of the students began reading pre-primer books by age 4, and ninety-two percent (92%) had developed knowledge of the sound-symbol relationship of letters and could thereby "sound-out" unknown words by the age of five.

While some children learn to read precociously and spontaneously, most children first begin to read when formal instruction is begun. Attempts have been made to facilitate word learning in beginning readers, including using pictures to provide a cue to word recognition.

The Effects of Pictures on Teaching Word Recognition

Learning to recognize words is a difficult process for most children and for reading fluency to occur a large vocabulary of words must be committed to memory, including those that lack phonetic regularity in their spellings. Attempts have been made to facilitate this process using pictures.

Lang and Solman (1979) compared the ability of kindergartners to learn noun words under conditions of print only, words accompanied by related pictures, and words accompanied by unrelated pictures. Their findings showed that words were learned more quickly if the child was made aware of the relationship between the word and the picture. Likewise, Arlin, Scott, and Webster (1978) presented 72 kindergarten students 4 novel words under each of three conditions: printed word with accompanying picture, printed word accompanied by the verbal

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word, and printed word alone. Their findings showed the most words learned for the printed words accompanied by pictures. However, this finding was not generally replicated in successive studies.

Solman and Wu (1995) presented conditions including print only, pictures and print, pictures and print with instructions on associating the print with the picture, and presenting printed words prior to presenting pictures (feedback condition). None of the picture conditions enhanced learning, and children learned more words that had been taught using print alone.

Singh and Solman (1991) taught words to low ability students under conditions of a) picture only followed by picture with print; b) print only; c) print only followed by picture with print; and d) a word printed in enhanced size. Six of 8 students learned more words under the print only conditions. All students remembered the fewest words when the picture was presented alone and then followed by the picture with accompanying print.

Solman, Singh, and Kehoe (1992) taught 16 nonreaders to name 12 words, six with print only and six accompanied by pictures. Pictures and print were also varied (large picture with small print, small picture with large print, large print alone, small print alone). Three words were taught under each condition. Results indicated that more than twice as many words were recognized in the print only conditions, with no difference attributed to size of print or pictures. They concluded that since the association between the picture and the verbal word was already well established, the presence of the picture "blocked" the new association between the printed word and the verbal word from forming.

Wu and Solman (1995) presented words to 12 kindergarten children under conditions of print only, print with pictures, and print with pictures presented afterwards as feedback. The best learning occurred when the print was presented alone, including the print only condition and the print only with picture feedback. However, the picture feedback provided no advantage compared to the print alone condition.

Tabe and Jackson (1989) assigned 16 intellectually disabled nonreaders ranging from 9;0 to 13;8 years old to one of four training conditions: manipulation of pictorial stimulus (faded versus nonfaded) and word position (word superimposed on the picture versus juxtaposed). Within one week, participants were trained to read two words using the assigned conditions during four consecutive 20 to 25 minute sessions after which, testing probe consisting of cards with only words were presented to the participants for analysis. Results indicated that picture and word position contributed significantly to success in sight word learning when the word was superimposed on the picture. They concluded that the superimposed position of the word in the picture forced the learner's attention to the word in the teaching phase of the study. Moreover, the researchers indicated that the oral label attached to the picture when the stimulus was presented further conditioned the printed word.

Blischak and McDaniel (1995) investigated the effects of line drawings on learning written words. Kindergarten-aged children were presented written words under four conditions: printed words only, enhanced-words (printed words with the meaning pictured on the letters, such as making eyes out of the o's in the word "look"), standard-size line drawings with accompanying written words, and small line drawing with accompanying written words. Participants were shown stimuli for four consecutive days and recognition was assessed on the fifth. Results indicated that there was a superior performance for the enhanced words over conditions in which line drawings were accompanied by written words. Blischak and McDaniel (1995) stated that enhancement of words is limited to use with concrete words and may not necessarily teach decoding skills, however, these types of words are commonly present in the spoken vocabularies of preschoolers and used as functional vocabulary for AAC users, their target population.

Levy and Lysynchuck,1997) found that typically developing kindergarten and first grade children learned to recognize more words when the print was enhanced by color coding the letters associated with the onsets and rimes of the words. They suggested that highlighting

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different parts of the word made children explicitly aware of the alphabetic patterns within the words.

Highlighting patterns within words, alphabetic principles, and superimposing pictures on words are all incorporated into pictured MorphoPhonic Face words. Powell, Hartman, Hoffman, and Norris (2007) taught Morphophonic Face words and plain words to low ability readers. Results indicated that more words were learned for the MorphoPhonic Face condition, but the words also served as a scaffold. Once words were learned using the MorphoPhonic structure, plain words began to be learned with equal accuracy. They suggested that the Phonic Face component of the MorphoPhonic words highlighted the first sound and established the needed connections to the alphabetic properties of the word (visuo-phonetic), while the picture component established the connections to the meaning and pronunciation of the word. In this manner, a feedback loop is established. That is, as the alphabetic information is being processed, the meaning is already recognized and sending feedback to the letters, which in turn establish connections to the meaning.

The MorphoPhonic Face words may be particularly useful to very young children who have not yet established the alphabetic principle. Recall that during the pre-alphabetic phase (Ehri, 195, 2007), children recognize words that "look like" their meaning, as in the humps of the word "camel" (Gates & Bocker, 1923; Gough, Juel, & Griffith, 1992). While these specific words were recognized, there is no evidence that recognition of these words led to earlier or improved word recognition skills in general since they do not orient the child to the alphabetic principle. The MorphoPhonic Face word exploits this iconic principle, but with several differences. First, the initial image in the word is a Phonic Face, comprised of the letter shown in the character's mouth producing the associated sound. Thus, the connection is not from the printed word to the picture and thereby the pronunciation as in the pre-alphabetic stage (see Figure 2), but rather from the initial letter of the printed word to a representation of the related sound (see Figure 3). The sound is thus parsed from the whole word, and sets up internal connections between the

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letter-sound and the pronunciation of the word. With repeated experiences with MorphoPhonic Face words, this connection would become a generic slot-filler category (e.g., fill in the slot with the relevant letter-sound), thereby bootstrapping development into Ehri's partial alphabetic phase. Secondly, the remaining letters are drawn into the meaningful picture of the word in orthographic chunks, rather than as a continuous string of letters. All of the letters are therefore salient, unlike the patterns established in Figure 2. This parsing sets up additional internal connections that are not linked to sounds at this point, but letter patterns that later will become associated with sounds. Finally, the picture provides the link to the vocabulary word and thus the pronunciation of the word. The pronunciation provides feedback to the internal orthographic chucks, establishing one route to eventually associating the related sounds.

Terrell (2007) provided support for the alphabetic bootstrapping provided by the Phonic Faces in children with no alphabetic knowledge. Phonic Faces alphabet picture books were read to 20-24 month-old toddlers three times weekly for six weeks. The control group received no treatment, but engaged in individual play activities for comparable time. Following six-weeks the groups alternated so the former control group now received the alphabet book reading treatment and vice versa. Results indicated that children were able to identify letters and phonemes, with differences between the two groups significant for both phases of the study. Awareness of sounds was measured by pointing to the letter in the mouth of a Phonic Faces character when given a sound, and producing a correct sound when shown a Phonic Face Specific gains were shown in letter identification, letter discrimination with PF, and sound production; these were maintained after a six-week period without intervention. These results indicate that the use of Phonic Faces was successful in prompting letter-sound production for very young children in a short time period, suggesting that the letter cues in the faces were effective in enabling the children to associate related sounds.
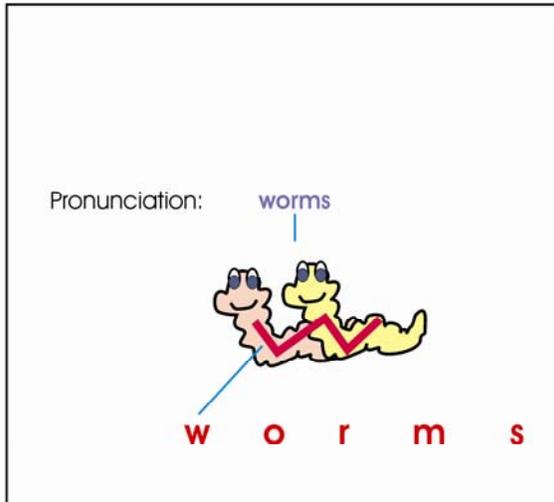
Figure 2. The shape of the worms suggests the shape of the "w" and so connections form from one visual shape to another and then to the pronunciation of the pictured word. No internal connections to alphabetic or orthographic patterns.
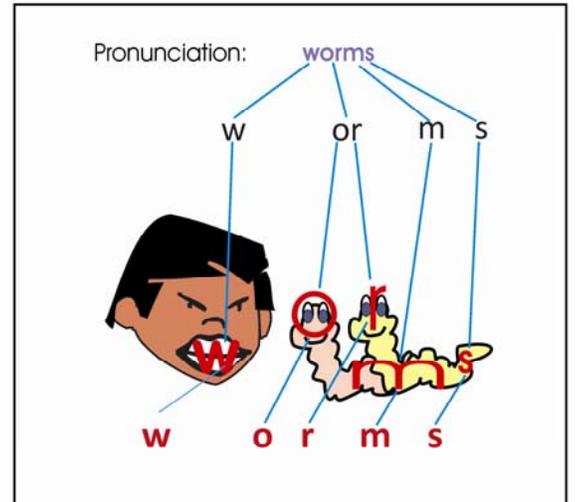
Figure 3. The shape of the "w" suggests the moving lips of the Phonic Face character that produces the sound, thus setting up an internal alphabet slot-filler category. Likewise, the patterns within the drawing set-up slots for orthographic patterns in the network, and the picture provides a route to meaning and pronunciation

Purpose of Study

The question then becomes whether the MorphoPhonic Faces could similarly prompt word recognition in toddlers. To prompt word recognition, toddlers would need to pay attention not only to the initial sound, but also the patterns of letters in the remainder of the words. Hence, this study is designed to answer the following questions:

1. Will two-year-old toddlers improve in phonological awareness as a result of instruction in word recognition?

2. Will two-year-old toddlers improve in emergent literacy skills as a result of instruction in word recognition?

3. Can two-year-old toddlers learn sight words presented in plain print format following 18 treatment sessions?

4. Do words pictured to represent initial sounds and word meaning (MorphoPhonic Face words) result in better word learning than print only words for two-year-old toddlers?

METHODS

This study investigated emerging phonemic awareness skills and word recognition abilities in toddlers. It was proposed that young children would be able to learn to read words sooner than current models of word recognition would predict, and that picturing important features of words would enhance word learning for this age group. Two year old toddlers were recruited from a day care center for participation. Following a pretest battery, 16 matched subjects were assigned to alternate treatment groups. Treatment was administered in small groups of 3 to 5 children. All participants were exposed to both printed words and MorphoPhonic pictured words on flash cards and within games and activities. Subjects were compared for pre and posttest measures of emergent literacy and phonological awareness, as well as word recognition under print only and pictured conditions.

Participants

The participants in the study were 16 toddlers recruited from a local preschool in Kennesaw, Georgia. The preschool supported its middle class patrons by providing clean, brightly colored classrooms as print rich environments for learning. Each child's chair, cubby, and coat hanging hook was labeled with his or her name. The letters of the alphabet were displayed in each room as well as the numbers 1 – 10 and posters related to various themes for discussion, such as "Parts of the Body" and "Children Around the World." In addition, the walls of each classroom included labels of items in the room, such as "window," "sink," "door," "bathroom," and so forth.

Several of the classrooms had blocks with letters on them, letter puzzles, and electronic letter toys such as LeapFrog ®-type toys. Each classroom was divided into play centers, such as a book center, home living center, blocks center, and science discovery center. All of the toys were age-appropriate and well maintained. There was also a large centralized toy room available to teachers so that they could regularly change toys in the classrooms in an effort to

expose the children to novel playthings. Further, a library of children's books was also available so that the teachers could reinforce their thematic units via storybook readings.

Upon observation, the teachers were noted to frequently engage the children in craft activities incorporating crayons, markers, and paint. The children participated in circle time, listened to storybooks, sang children's songs, and played outside twice a day. Occasionally background music, both instrumental and vocal, was provided while the children were engaged in "center time" and "circle time." This daycare was classified as a High Literacy (HL) environment due to the plethora of print-rich materials located throughout and presented within the environment.

The participants were between the ages of 2;1 and 2;10 at the beginning of the study. All participants demonstrated typical language development as measured via the Preschool Language Scale-3 (Zimmerman, Steiner, & Pond, 1992) (PLS-3).   The Preschool Language Scale (PLS-3) evaluates receptive and expressive language skills using eight language tasks for each 6 month interval between birth and 7 years. The total PLS-3 language scores were used (see Table 1 for subject characteristics). Children who had been referred for speech-language therapy services and those currently receiving speech-language therapy services were not included in the study. Mothers completed questionnaires indicating family structure, parental education level, child's language development history, and home literacy experience.

Subjects were matched for age (2;0 to 2;5 versus 2;6 to 2;11 years) and then randomly assigned (every other one as they agreed to participate) to one of the two experimental groups. The resulting groups each had a total of eight subjects. At pretests, subjects were compared for chronological age, phonological awareness, and Dynamic Indicators of Basic Literacy Skills (DIBELS) scores (see instrument descriptions below). Group average data are shown in Table 2. Mean differences between the groups on these measures were small compared to the group standard deviations. The group means were compared using t-statistics. All of these differences were non-significant at the $p < .05$ level of confidence.

Table 1

Profile of Subject Characteristics Including Group, Gender, Race, Age, Number of Sessions, PLS-3 Score, Direct and Indirect Literacy Experiences, and Maternal Education.

Sub	Grp	Gndr	Race[a]	Age Mos	# of Sessions	PLS-3	Literacy Direct	Experience Indirect	Mat-Edu[b]
1	G1	M	A	25	18	87	31	19	MA
2	G1	F	W	26	15	90	23	12	HS
3	G1	F	W	26	18	101	35	17	B
4	G2	F	W	29	18	110	61	49	B
5	G2	M	W	26	17	107	36	32	B
6	G2	M	B	25	15	101	42	35	B
7	G2	F	W	26	18	107	42	37	MA
8	G1	F	W	34	18	125	70	60	B
9	G1	F	W	33	18	111	64	55	B
10	G1	F	B	31	18	102	46	40	MA+
11	G1	F	W	30	17	80	27	27	HS+
12	G1	F	W	31	15	116	59	34	B
13	G2	M	W	32	18	103	44	34	B
14	G2	F	B	30	18	82	38	38	MA
15	G2	M	W	33	18	87	31	37	MA
16	G2	M	W	31	17	94	45	31	B
		Mean		29	17.25	100.19	43.4	34.81	
		S.D.		3.1	1.18	12.68	13.8	12.81	

[a]Race Classified by A – Asian, B – Black, W – White. [b]Maternal education was labeled by HS – High School, HS+ - for high school with some college, BA – graduate of 4yr college, MA – completed graduate degree, MA+ - completed graduate degree as PhD

Table 2

Comparison of Experimental Groups Prior to Intervention for Age in Months, and Scores on Phonological Awareness, TALS, and DIBELS Measures.

_____

	Group 1		Group 2			
	Mean	S.D.	Mean	S.D.	t	prob
Age	29.50	3.42	29.0	3.02	.310	.761
PA total	7.38	5.68	7.25	2.25	.058	.955
TALS	2.00	2.82	1.75	2.49	.188	.854
DIBELS	10.50	7.13	9.88	4.16	.214	.834

_____

The groups were also compared for level of maternal education. As seen in Table 3, group 1 has more parents with a high school education and fewer parents with either bachelors or graduate degrees. However, a chi square of 2.311 indicates that this is a nonsignificant difference (P < .315).

Table 3

Comparison of Parent Education Level for Experimental Groups.

_____

	High School	Bachelor	Graduate
Group 1	2	4	2
Group 2	0	5	3

_____

All subjects were tested in a small room, separate from the classroom to assure a quiet, distraction free environment. Those who qualified on the basis of the PLS-3 were administered a full battery of pretests. These tests also were individually administered in the small room. In

addition, a Home Literacy Questionnaire was completed via phone by parents of qualifying participants. This questionnaire was designed to assess each child's direct and indirect literacy experiences in the home environment.

Measures of Phonemic Awareness and Early Literacy

Three instruments were administered at pretest and posttest to assess early literacy skills (i.e., vocabulary, alphabet knowledge, and phonemic awareness). This battery included the Ten Sources Profile (TSP) which assesses critical phonemic awareness skills along a continuum (Norris & Hoffman, 2002), a phoneme segmentation task (Test of Awareness of Language Segments), and subtests of the Preschool Assessment of Individual Growth and Development for Infants and Toddlers (IGDI). The IGDI is an extension of the DIBELS, and included measures of language, alphabet knowledge, and phonemic awareness.

1. *Ten Sources Profile (TSP).* The TSP was used as the measure of phonemic awareness (PA) in this study. This tool is a modified version of the Louisiana Literacy Profile (LLP) for early childhood which was reorganized according to a developmental profile for Sources of Phonemic Awareness (Norris & Hoffman, 2002). The LLP is a criterion-referenced instrument that was originally designed to be a comprehensive checklist for early literacy skills shown to be related to success in reading. Each item on the checklist provides specific materials and instructions used to elicit item responses. Items on this instrument were matched to the continua of phonemic awareness skills on the Ten Sources of Phonemic Awareness table, which profiles the emergence of each of nine skills along a continuum from ages three through seven years. Items on the Ten Sources profile not included in the LLP were added to complete the profile. This modification allowed for each of the nine skills to be assessed along a continuum from the earliest emergence to mastery (see Appendix A). This instrument thus provided a developmental view of phonemic awareness.

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The TSP was administered by a Preschool Speech-Language Pathologist (SLP). All items were scored as correct (1 pt) or incorrect (0 pt). A ceiling for each section of the TSP was reached after 3 consecutive incorrect items for each subscale. The subscale areas assessed included Alphabet Knowledge (AK) (e.g., recites alphabet; identifies letters of alphabet); Concept of Wordness (CW) (e.g., associates the word "letter" with symbols; segments sentences into words); Separation of Form and Meaning (SF) (e.g., identifies word as its meaning; associates letter name with an object beginning with the sound); Rhyme (R) (e.g., recites nursery rhyme; selects rhyming words from choice of 2-3 words); Whole-to-Part (W-P) (e.g., no separation between word and it meaning or function; recognizes that words are arbitrary – can call a "dog" a "cat"); Sound in Word Position (S-WP) (e.g., predicts a word using a picture; determines whether initial consonants are same/different); Print Conventions (PC) (e.g., locates words in an illustrated book; knows that print is read from left-to-right and top-to-bottom); Word Recognition (WR) (e.g., uses generic words to read environmental print –"gum"; uses specific word to read environmental print – "Bubble Yum"); and Developmental Spelling (DS) (e.g., draws pictures to represent written words; demonstrates an interest in writing for real purposes, using scribbles and lines).

2. *Test of Awareness of Language Segments (TALS).* The Test of Awareness of Language Segments (Caldwell, 1988) is a criterion-referenced screening test designed to assess a child's ability to segment the stream of spoken language into words, syllables, and phonemes. This task is viewed as the hallmark of true phonemic awareness (Sawyer, 1987). The TALS assess three levels of phonological segmentation: Segmenting sentences into words (e.g., "Use the blocks to show me, 'Grandma called.'"); segmenting words into syllables (e.g., "Use the blocks to show me, 'baseball [base-ball].'"), and segmenting words into phonemes (e.g., "Use blocks to

show me, 'bat [b-ae-t].'") The child responds to verbal instructions by using manipulatives (e.g., blocks) to represent each isolated segment of the sentence or word. Item administration is discontinued when a ceiling is reached. This instrument provides a measure of a specific phonological awareness skill shown to be closely related to letter-sound association.

3.   *Preschool Assessment of Individual Growth and Development for Infants and Toddlers (IGDI).* The Preschool Assessment of Individual Growth and Development for Infants and Toddlers (IGDI) is an extension of the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) (Good, Gruba, & Kaminski, 2001). The IGDI is a criterion-referenced test designed for use with children younger than Kindergarten (Greenwood, Carta, & Walker, 2004; Greenwood, Walker, Carta, & Higgins, 2006), and measures emergent literacy skills across a variety of developmental domains (Deno, 1997). The battery of subtests administered included Picture Naming (vocabulary), Alliteration (initial sound recognition), Rhyming, and Letter Naming Fluency (this subtest is found on the kindergarten level of the DIBELS rather than the IGDI).

- Picture Naming. This indicator presents images, full-color photographs and line drawings on 8" x 5" cards, of objects commonly found in the preschoolers' natural environment. Categories of objects include animals, food, people, games, clothing, and so forth. After providing a set of sample items, the examiner asks the child to look at each card (one at a time) and name it as quickly as possible. After one minute, the examiner stops the activity and counts the total number of pictures named correctly.

- Alliteration Subtest. Using pictures of words commonly know by preschoolers, each stimulus card of this subtest includes one image at the top of each 8"x5" card and a set of three images in a row at the bottom of each card, one of which begins with the same sound as the target picture (at the top). After providing a

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set of sample items the SLP asked the child to look at each card and point to or name (say) one of the three pictures at the bottom of the card with the same initial sound as the target picture. The task continues for two minutes. The number of pictures the child correctly identifies within two minutes is the score for this subtest.

- Rhyming Subtest. This subtest presents stimulus cards with target images (full-color photos or line drawings) at the top of each 8"x5" card and a set of three images in a row at the bottom, one of which rhymes with the target image. After the SLP provides a set of sample items, the child is then asked to look at each card and point to or name (say) one of the three pictures at the bottom of the card that sounds the same as (or rhymes with) the target image. The score generated from this task is the number of pictures the child correctly identifies within two minutes.

- Letter Naming Fluency (LNF). The letter naming fluency measures a student's ability to recognize upper- and lower- case letters with automaticity, or fluency. This is important to language-literacy development as it is often used as an indicator of early reading skills and a child's future ability to read (Speece et. al, 2003). For this standardized test, the child is presented with a page of upper- and lower-case letters arranged in a random sequence. The child is asked to name as many letters as he can and informed that if a letter is not known, it will be shared. For example instructions might read, "When I say 'start' begin here, go across the page and tell me as many letter as you can. Try to name each letter, and if you do not know one, I will tell you what it is." The child is then allowed one minute to produce as many letter names as he can, and the score is the number of letters named correctly in one minute.

Measures of Word Recognition

To assess word knowledge at pretest and posttest, four measures of word recognition were administered. These included word recognition (print only), word identification (print only), word identification with initial Phonic Face prompt, and word identification using the pictured MorphoPhonic Face words. Word recognition measures were obtained at the beginning of the study and at six weeks post-treatment. Each assessment lasted approximately 10-15 minutes. The MorphoPhonic and Phonic Faces pictures used during assessment tasks were in full color. Print-Only words were in black and white.

- Word Recognition (Print Only). Printed word cards (4"x5 ½") were displayed horizontally in sets of three at a time. Each set included a target word which would be taught using a MorphPhonic Cards, a target word which would be taught using printed cards, and a control word not used in intervention. The child was asked to point to a specific word. Prompts included, "Point to /Show me the word, 'fell.' This continued until a total of 24 words had been presented. The child was given three seconds to respond. A correct response of one (1) was recorded each time the child pointed to the correct card. A zero (0) was recorded for every incorrect answer or for no response. The score on this task was the total number of correct responses.

- Word Identification (Print Only).   A total of 24 printed word cards (4"x5 ½") were randomly presented one at a time. These cards included 8 target words which would be taught using a MorphPhonic Card, 8 target words which would be taught using printed cards, and 8 control words not used in intervention. The child was asked to say the word on the card. Prompts included, "Say the word on this card," or "Tell me this word." The child was given approximately three seconds to answer per card. A correct response of one (1) was recorded for

every word correctly recognized. A zero (0) was recorded for every incorrect response. The total score for this task was the total number of correct responses.

- Word Identification with Initial Phonic Face Prompt. The 16 printed word cards (4"x5 ½") used in intervention were randomly presented one at a time alongside a Phonic Face Card which corresponded to the initial letter of the target word. The child was asked to say the word on the card. Prompts included, "Look at the first letter and tell me the word." The child was given approximately three seconds to name a word. A correct response of one (1) was recorded for every word correctly identified. A zero (0) was recorded for every incorrect response. The total score for this task was the total number of correct responses.

- MorphoPhonic Word Identification. A total of 16 MorphoPhonic word cards (4"x5 ½") were randomly presented one at a time. The child was asked to say the word on the card. Prompts included, "Say the word on this card," or "Tell me this word." The child was given approximately three seconds to name a word. A correct response of one (1) was recorded for every word correctly identified. A zero (0) was recorded for every incorrect response. The total score for this task was the total number of correct responses. In an effort not to confound the results of the printed word tasks, this measure was conducted after the Word Recognition and Identification (Print Only) and the Word Identification with Phonic Faces Tasks.

<div align="center">Stimulus Words</div>

Two types of stimulus words were used in this study. Sixteen print only words were presented on 4" x 5 ½" word cards with the word printed in 1 ½" tall letters centered on the card, with a smaller ¾" print of the same word in the bottom right hand corner. In other words, the print only words included a large print of the target word and the same word printed in a smaller size at the bottom of the card. This was done to parallel the style of the MorphoPhonic word

cards. The MorphoPhonic word cards were the same 16 words, also presented on 4"x5 ½"

cards with the small word printed in the same size and font in the bottom right corner as the

print only words. The primary presentation of the word was pictured using a Phonic Face to

iconically represent the initial phoneme in the mouth of the character. The remainder of the

word is characterized with associated pictures superimposed onto the other letters in the word

(see Figure 4).

Figure 4. Examples of print only and MorphoPhonic word cards with same initial letters, distinct
initial letters, and initial letter-name pronunciations.

All of the words were selected from the Dolch word lists, comprised of words occurring

with the highest frequency in written language. Eight noun words were selected from the Dolch

high frequency noun list and eight verb words were selected from the preprimer and primer

levels of the Dolch high frequency word list. All words were single syllable, and all were highly

iconic in pictured form. Two pairs of the verb words began with the same initial letter (pull/play,

stop/sit) while the remaining 4 words began with distinct initial letters. Likewise, two pairs of the noun words began with the same initial letters (home/hill, fire, fish) while the remaining four had distinct initial sounds. Therefore, to discriminate the paired words, children would need to attend to more than the initial letters, while recognition of the distinct words could be done on the basis of the initial letter alone. Finally, two of the words ("eat" and "open") had letter-name characteristics, in that the letter name of the initial letter was the same as the initial sound of the word.

<div align="center">Procedures</div>

An intra-subject alternating treatment design was implemented, involving two experimental groups. Children were age matched (2;0 to 2;5 versus 2;6 to 2;11 years) and then randomly placed in one of the two experimental treatment groups, for a total of eight subjects in each group. The experimental groups were then further subdivided into small groups of 3 to 5 children for treatment. Prior to treatment, all subjects were administered a baseline measure across three days consisting of all of the words presented in both print only and MorphoPhonic format. Children were asked to say or tell the word and were awarded 1 point (correct identification) or 0 (incorrect) for each word. All subjects scored 0 points out of a possible 24 points for all three baseline days.

Following the baseline period, subjects were seen for treatment in small groups three times per week for six weeks, or a total of 18 sessions. Children were seated at developmentally appropriately sized furniture where all could see presentation of the cards and participate in playing games with the words. During each session, children were taught 16 words, 4 nouns and 4 verbs in print only format, and 4 nouns and 4 verbs in MorphoPhonic pictured format. Table 4 profiles the words taught to each group. Words taught using a print only format to Group 1 were taught using MorphoPhonic words to Group 2, and vice versa.

Table 4

Profile of Words Taught Using MorphoPhonic Word Cards versus Plain Word Cards to the Two Experimental Groups.

	Group 1		Group 2	
	MPh	Print	MPh	Print
Verbs	Help	sit	Sit	Help
	Pull	keep	Keep	Pull
	Eat	open	Open	Eat
	Stop	play	Play	Stop
Nouns	sheep	bed	Bed	sheep
	home	fish	Fish	home
	Day	hill	Hill	day
	Fire	milk	Milk	fire

In each15-20 minute session, the examiner talked about each word as it was presented. When a MorphoPhonic word was introduced, the examiner pointed to the initial letter on face of the Phonic Faces character and talked about the name of the character, which corresponds with the initial letter and the how the character makes the first sound. The remainder of the word was then discussed with reference to the picture (meaning) and the component letters (form). Features of the superimposed pictures were pointed to and talked about. In addition, the examiner pointed back-and-forth between the MorphoPhonic word and the printed word on the card. The print only words were introduced by pointing to the initial letter of the printed word, and discussing the name of the initial letter and the corresponding sound associated with it. The remainder of the word was then examined for component letters. For both treatment conditions (MorphoPhonic words and Print Only words), the children were asked to make/ imitate the

sound associated with the initial letter of the word. The group also discussed other words that are initialized by the same sound. In addition, for both conditions the words were acted out to reinforce the meaning. In the remaining time, age-appropriate language-literacy games were played, such as *Matching, Go Fish, Find-a-Word* and *Act-a-Word,* using the stimulus words. At the completion of each session, a daily probe was administered in a group format. Each child was presented with two MorphoPhonic cards and two Print Only cards and asked to say the words on the cards. However, this data was not used in the analysis of this study.

Analysis

Pre-/Post-test assessment measures for the TSP, TALS, and IGDI/DIBELS were scored for the number of correct responses on each test. Gain scores from pretest to posttest were compared. In addition, the number of words read at posttest was analyzed for the mode of presentation during treatment (plain words versus MorphoPhonic words) and at posttest (plain words recognized, plain words identified, words accompanied by Phonic Faces, and MorphoPhonic words).

RESULTS

The purpose of this study was to determine if 2 year old children can learn to recognize written words and if this learning process is enhanced when the words are iconically represented to show the first sound and the word's meaning (purposefully creating idiosyncratic cues) using pictures drawn into the letters. Further, since phonemic awareness has been shown to be highly predictive (and some believe causally related to) word recognition, the study examined the phonemic awareness abilities and sources of learning shown to correlate closely with phonological awareness. Pre and posttest data were analyzed to examine effects on phonological awareness, emergent literacy skills, and word recognition.

Phonemic Awareness and Literacy Skills

The first question of this study asked whether two year old toddlers would show an improvement in phonological awareness following six weeks of exposure to written words accompanied by a focus on letter-sounds as well as word meaning. If they were able to learn to recognize words, it would be expected that they would also demonstrate a corresponding increase in phonemic awareness. The second question asked whether the toddlers would demonstrate an improvement in other emergent literacy skills including vocabulary and letter knowledge.

Table 5 profiles the group means for the three measures of phonemic awareness and emergent literacy skills. Comparison of the means and the gain scores from pretest to posttest show an increase in all three measures. However, T-tests revealed the differences from pretest to posttest for all subjects combined were statistically reliable for the *Ten Sources Profile of Phonological Awareness (TSP), and Subtests of the of Individual Growth and Development for Infants and Toddlers (IGDI/DIBELS)* scores, but not for the *Test of Awareness of Language Segments (TALS)*.

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Table 5

Comparison of Pretest and Posttest Mean Scores for All Subjects Combined for Performance on Ten Sources Profile of Phonological Awareness (TSP), Test of Awareness of Language Segments (TALS), and Subtests of the of Individual Growth and Development for Infants and Toddlers (IGDI/DIBELS).

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	Pre		Post		Gain	t	df	1- tailed probability
	Mean	SD	Mean	SD				
TSP	4.17	1.04	11.75	6.69	7.58	6.126	15	.0001*
TALS	1.88	2.58	2.50	2.78	.62	2.076	15	.055
IGDI/DIBELS	10.19	5.65	14.88	5.86	4.69	7.679	15	.0001*

_____

Word Recognition Skills

The third question of this study asked whether two year old toddlers could learn sight words presented in plain print format following 18 treatment sessions. The fourth question asked whether better learning would occur under pictured word conditions when the picture represented initial sounds and word meaning (MorphoPhonic words).   Table 6 profiles the number of times each experimental and control word was recognized at posttest. All subjects were exposed to both experimental word Sets A and B. Half of the subjects were taught Set A as MorphoPhonic words and Set B as print only words; the alternate subjects were taught the word sets under the opposite conditions. Examination of Table 6 reveals that words taught as MorphoPhonic words were recognized more frequently than words taught as print only (52 MorphoPhonic versus 28 print only words in total). Verbs did not appear to be more difficult than nouns, although differences were noted in specific words. The words "eat" and "open" were responded to correctly with the highest frequency. These words were the two letter-name words, or words where the letter-name corresponded to the initial sound of the word's pronunciation. This advantage held regardless of learning format (print-only or MorphoPhonic).

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Table 6

Frequency of Word Recognition for Experimental and Control Noun and Verb Words at Posttest
_____

Set A experimental verb and noun words

Word Learning Condition	help	pull	eat	stop	sheep	home	Day	fire
MorphoPhonic	0	5	6	4	3	4	0	2
Print Only	0	1	6	1	1	2	0	0
Word Total	0	6	12	5	4	6	0	2

Set B experimental verb and noun words

	sit	keep	open	bed	play	fish	hill	milk
Morphophonic	0	1	8	8	1	6	2	2
Print only	0	0	7	3	2	3	0	2
Word Total	0	1	15	11	3	9	2	4

MorphoPhonic Total = 52   Print Only Total = 28

Set C control verb and noun words

	ride	feet	tell	nest	sleep	pig	jump	ball
	0	0	0	0	0	0	0	1

_____

Figure 5 shows the number of words that were correctly read at the end of intervention, assessed in plain text format (i.e., no pictures). Each bar represents the average number out of 8 words that were read correctly for each of three types of words: a) control words that were not

taught during treatment, b) words that were taught using print only, and c) words taught using

the MorphoPhonic picture cards. The figure indicates that the subjects learned more of the

words in both the text only and MorphoPhonic conditions than the control words, suggesting that

exposure to written words does result in learning for two year olds. Comparison of the

MorphoPhonic words suggests that a greater number of words were learned under the

MorphoPhonic faces condition than either the control or print only condition.
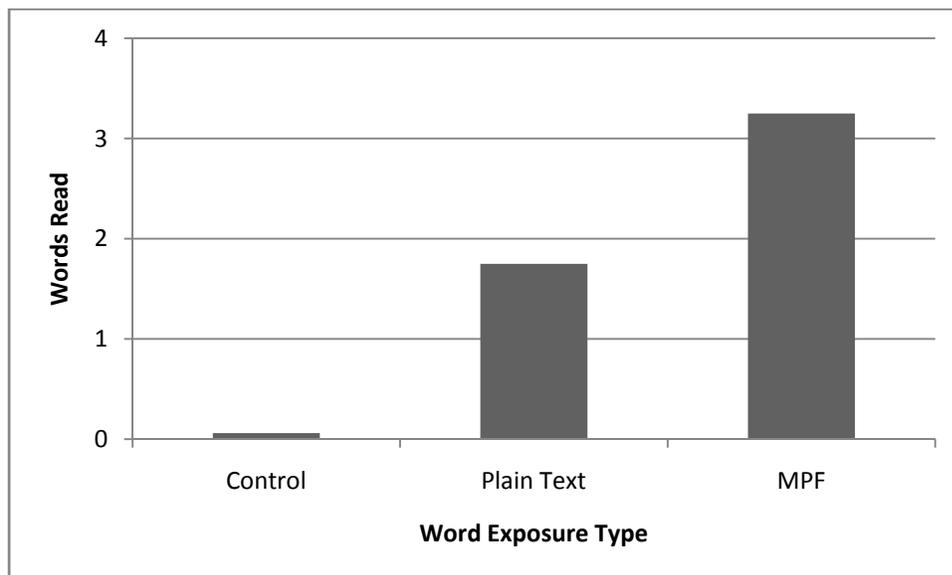
Figure 5. Comparison of the total number of words correctly identified for words not taught
(control) and words taught using print only (plain text) and with MorphoPhonic pictures.
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To determine the statistical reliability of this apparent effect a repeated measures

analysis of variance was conducted for the effect of word exposure type following a

nonsignificant Mauchly's Test of Sphericity (W = .903, p < .489). The analysis of variance

revealed a strong effect of word exposure (F = 35.945, df 2, 30, p < .0001, partial eta squared =

.706). Post hoc comparisons using paired t-tests with Bonferroni corrections showed that a

greater number of words were learned in the MorphoPhonic picture condition than either the

plain text (t = 4.243, df 15, p < .001) or control word conditions (t = 7.408, df 15, p < .0001). In

addition, a greater number of words were learned in the plain text condition compared to the

control word condition (t = 4.991, df 15, p < .0001).

Word recognition was further assessed by asking the children to read the targeted print

only and MorphPhonic words in two additional formats, resulting in a comparison between a)

print only words, b) printed words accompanied by a Phonic Face representing the initial sound,

and c) words presented as a MorphoPhonic Face, even if the word was taught as a print only

word. Figure 6 profiles the mean number of words correctly read for these three word formats

for the words that the children had learned using plain text or MorphoPhonic Faces.
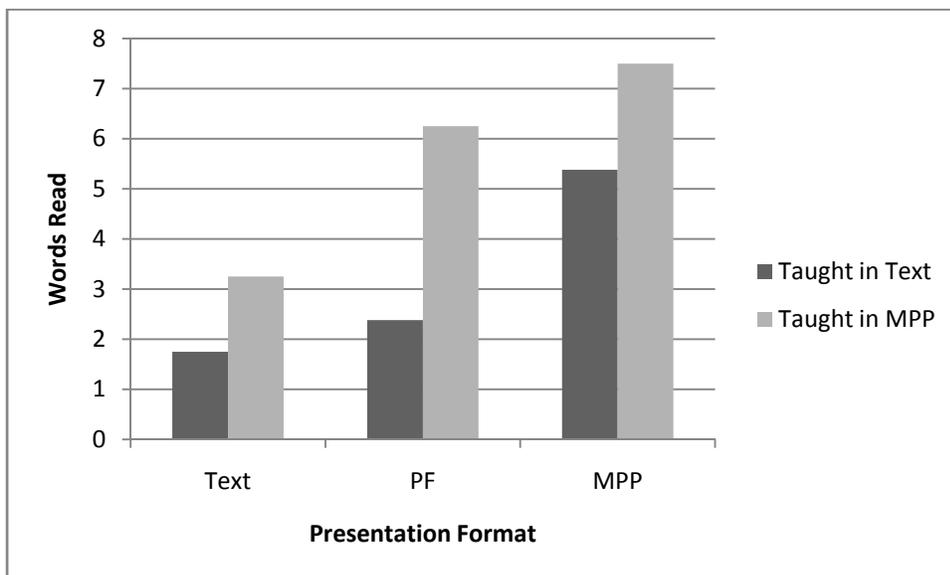
Figure 6. Number of words correctly read when the stimuli was either plain text, plain text
accompanied by a Phonic Face cuing the initial sound, or a MorphoPhonic Face cuing the initial
sound and the meaning of the word in pictures.

_____

These data were analyzed in a 3 (Word Format) by 2 (Type of Word Taught) repeated

measures ANOVA. Mauchly's Test of Sphericity was significant for the factor of Presentation

Format so degrees of freedom for this factor were adjusted using the Greehouse-Geisser

estimate of sphericity. This analysis revealed significant effects for Type of Word Taught (F =

65.534, df 1, 15, p <.0001, partial eta squared = .814), Presentation Format (F = 206.198, df

1.403, 21.044, p < .0001, partial eta squared = .932), and the interaction (F = 12.801, df 2,30, p < .0001, partial eta squared = .460).

The significant main effect for Type of Word Taught indicates that the average correct response for words taught with MorphoPhonic faces was higher than for words taught with plain text. However, the significant interaction suggests that this may not be true for all of the presentation formats. Testing for this, corrected using the Bonferroni procedure, revealed that that more words were correctly identified that had been learned with MorphoPhonic Faces compared to those learned with plain text when the words were presented as plain text (t = 4.243, df 15, p < .001), with the first sound presented as a phonic face (t = 8.040, df 15, p < .0001), and as MorphoPhonic faces (t = 5.222, df 15, p < .0001).

Paired t-tests with Bonferroni corrections were also used to determine which presentation formats were read more accurately for words taught in plain text or with MorphoPhonic Faces. This analysis revealed that all of the comparisons were significant. The words were read more accurately in MorphoPhonic Faces format than in either Phonic Face or plain text format regardless of how the words were learned. The words were also read more accurately when the first sound was represented with a Phonic Face than when presented in plain text, regardless of how the words were learned.

The children's sight word reading scores at post-treatment were correlated with child and environmental variables measured at pre-treatment. Results are displayed in Table 7. The two measures of literacy experience, direct (.743) and indirect (.682) produced the strongest significant (p < .01) correlations with sight word reading, followed by the child characteristic variables of phonemic awareness, DIBELS total, and age. The children's development of phonemic awareness skills and gains in DIBELS scores interact strongly with literacy experiences. The correlations between phonemic awareness and direct and indirect literacy were .930 and .859 respectively. The correlations between DIBELS score and direct literacy (.749) and indirect literacy (.836) were also very strong.

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Table 7

Correlations of Environmental and Child Characteristic Variables Measured at the Start of the Study with the Posttest Measure of Print Reading.

Environmental Characteristics	Correlation	Child Characteristics	Correlation
Direct Literacy Experiences	.743**	Phonemic Awareness	.646**
Indirect Literacy Experiences	.682**	DIBELS Score	.533*
Mother's Education	.204	PLS	.487
		TALS	.329
		Age	.513*

** = P< .01, *= P<.05

DISCUSSION

This study asked whether two year old toddlers could learn printed word recognition, and whether this learning process is enhanced when the words are iconically represented to show the first sound and the word's meaning (purposefully creating idiosyncratic cues) using pictures superimposed into the letters. The findings of the study were explored to determine how well they fit the model of word recognition proposed by Ehri (1995), suggesting that word recognition is achieved through the alphabetic principle rather than through a more direct connection from letters to words and their meanings (visuo-semantic connections) as proposed by Coltheart (1978) and Rayner and Polatsek (1989).

For the past two decades, discussion and research in emergent literacy and sight word learning have converged on phonological awareness and alphabet knowledge. The majority of the extant research has considered the occurrence of these skills in early childhood – that is, preschool and kindergarten aged children. This exploration is consistent with the view that understanding printed words is an ability that is secondary to learning sound-symbol associations, which is formally taught via explicit instruction during later pre-kindergarten and kindergarten (Bus & van Ijzendoorn, 1988; Justice & Ezell, 2001, 2002). From this perspective, children would acquire an understanding of printed language later in development and only after direct tutelage of sound-symbol associations (van Kleeck, 1998; Stadler & McEvoy, 2003; Justice & Ezell, 2004). In reality, we do not have studies demonstrating how early this development may actually occur or what characterizes the early stages of word recognition.

This study assessed the ability of 2-year old toddlers to learn to read sight words. If toddlers were able to demonstrate emerging knowledge of printed sight words and sound-symbol associations after a relatively short training period, the proposition would advise that this knowledge can be acquired and utilized earlier and faster than previous theories suggest. In this study, the experimental printed words were MorphoPhonic sight words, Dolch words

initialized with Phonic Faces that iconically represent the phoneme in the mouth of the character in a manner that gives clues to the primary production features of the sound related its associated phoneme. The remainder of the word is characterized with semantically related pictures as salient features superimposed onto the remaining letters in the word. The printed target word was simultaneously presented but in a smaller font. Upon exposure to such semantically salient words in print, it was proffered that 2-year old toddlers would be able to understand and acquire sight word recognition.

The results of this study were positive, in that toddlers were able to learn to recognize written words, both when words were taught as print only, and when pictured using MorphoPhonic cues. Each child was exposed to both types of words, and when tested using print alone, subjects on average could name 2 of the 8 words taught via print only and 3 of the words taught using MorphoPhonic pictured words. This finding shows that two year old children are capable of developing an understanding of the concept of a written word and can learn to recognize words by print alone in a short period of time. In fact, one child recognized the control word "ball" at posttest, indicating that the concept of word recognition was generalizing to environmental print. She was also the first to recognize a word under the print only instructional condition. Not surprisingly, this child had the highest PLS-3 score and also scored high for direct and indirect home literacy experiences. While it may be argued that toddlers who respond to sight words or begin to read as early as 12-24 months of age are particularly precocious, the toddlers of this study did not fall into that category. Although two scored in the above average range for language ability, the majority scored in the average range and four in the below average range (SS 80-87), yet all but one subject could recognize at least 1 word presented as print (that child missed 3 sessions, scored lowest in home direct and indirect literacy experiences, and had the parent with the least education). All of the subjects recognized from 2 to all 16 words when the print was accompanied by a Phonic Face, indicating

that even the lowest child was beginning to recognize words, and all recognized from 3 to all 16 words (3 subjects) when presented the MorphoPhonic Face cards (mean = 11.63).

The fact that words taught using MorphoPhonic Faces but tested using print alone generated the best word learning (seven subjects learned 50% or more of the words) indicates that the word recognition for the MorphoPhonic words generalized and occurred independently of the pictures following just 18 exposures. Unlike previous studies that showed pictures either decreased word recognition (Solman & Wu, 1995) or held no advantage over printed words alone (Singh & Solman, 1991; Solman, Singh, & Kehoe, 1992) the MorphoPhonic words did have an advantageous effect for word learning. This finding was consistent with studies of enhanced words, or words with pictures superimposed into the letters but without an initial alphabetic cue (Blischak & McDaniel, 1995; Tabe & Jackson (1989). Since no words of this type were included in this study, it cannot be determined if the MorphoPhonic words provided an additional advantage.

While more words were learned under the MorphoPhonic condition, this learning took time to generalize to print only. The first MorphoPhonic word introduced to G1 during the first session was "home" and subjects began to recognize and accurately identify this MorphoPhonic Face card after the 3rd session, but not as print only.   The first word recognized from the print only training for G1 was "open" which was first recognized following the 6th session. This same word was taught as a MorphoPhonic word to G2 and it was recognized as a MorphoPhonic word by the 3rd session, but not as print only. Once again, the first word recognized as print alone was taught as a print only word (i.e., "eat") and recognition occurred following the 8th session. It was only after the 8th session that generalization of words taught using MorphoPhonic cards began to be recognized by print alone and surpass the word recognition of those taught print only when probed without pictures.

By posttest, all but two of the subjects in this study identified more words taught using the MorphoPhonic pictured words than the print only words, even though they were more

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accustomed to seeing the print only words in the test format. Seven of 16 subjects learned from 4-7 of the 8 pictured words, but only two learned 4-5 print only words. This suggests that the words taught using MorphoPhonic pictures were not learned on the basis of the pictures alone, since they were recognized without the pictures, but rather that the pictures served to facilitate word learning for letters. This outcome could have occurred if children were attending to and recognizing some visual cue in the letters of the word that had been highlighted in the MorphoPhonic picture (e.g., Ehri's pre-alphabetic stage) or if children were learning and using alphabetic cues.

To examine this further, the types of words recognized provide some clues. The words most frequently identified by all subjects, whether they were taught using print only or MorphoPhonic pictures, were the words "eat" and "open." These words were recognized by 12 (eat) and 15 (open) of the 16 subjects at posttest. These were the two words whose pronunciation fit the letter-name pattern (i.e., the letter-name is pronounced as the first sound in the word). During treatment sessions, the examiner explained the letter "o" for the word "open" and its sound emphasizing the "o-"shape of the rounded lips and the "open" lips of the mouth during production of the sound. The students who were exposed to this word under the MorphoPhonic condition had the advantage of the Phonic Face visual cue, "Omar Otto" with the letter "o" in his mouth as the initial letter of "open," as well as a picture of "Omar Otto" opening a door superimposed onto the word "open" (See Figure 4).   Similar instruction was provided for the printed sight word, "eat." Although the MorphoPhonic conditions yielded a higher success rate than the print only condition, most participants successfully identified the printed sight words "eat" and "open" at post-treatment. These successes were consistent with the findings of Ehri and Wilce (1985) and Treiman and Rodriguez (1999), who demonstrated students' greater reading success with words that are initialized by letters which sound the same as their letter names. This represents a step in the direction of understanding that specific sounds are associated with letters for reading and spelling.

Additional evidence for emerging letter-name awareness occurred when the relevant Phonic Face was placed next to the print, thus providing an alphabetic cue. With this sound production cue, the identification for the two letter-name words increased. This finding suggests that these toddlers were using alphabetic cues to recognize words and not just identifying some idiosyncratic visual feature of the word. This is further substantiated by results from the Ten Sources Profile and the IGDI/DIBELS. While the overall gain scores for both instruments showed significance at posttest, examination of the gain scores for individual subtests showed greatest changes for subtests involving alphabet skills, including alphabet knowledge, word recognition, and letter naming. Prior to training, subjects demonstrated minimal skills in alphabet knowledge and word recognition. At posttest, most children were able identify the letters which initialized the experimental sight words. They consistently identified the letters that had been presented iconically as Phonic Faces on the MorphoPhonic words at a higher rate than the letters initializing words from the Print only condition.

The transparency of the word appeared to make a difference. Only three words, "day," "help," and "sit" were not learned by any subjects, and "keep" was learned by one. "Sit" depicted a girl commanding a dog to "sit," "day" as a rising sun, and "keep" as the letters "eep" held in a cage. In these cases, the picture was too inferential to elicit the target words and instead elicited "dog" and "bird" even though those words did not match the sound in the word initial Phonic Face. Thus, the transparency of the picture cue was more important than the letter-sound cue for this age group. However, if the letter was familiar to the child, it did make a difference. For example, the two children whose name began with the letter "k" were fairly reliable in recognizing the word "keep." First name letter recognition interfered with word recognition for another child, who responded with her own name each time she saw a target word beginning with "s" such as "stop" or "sit."

Other evidence that children did attend to letters included words that were confused on the basis of first letter. The words "home" and "help" were in the same set and thus taught

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under the same condition. G1 learn these as MorphoPhonic words while G2 learned these

words in the print only condition. Typically, both groups recognized "home" first and more

accurately, while "help" was more inferential and elicited fewer correct responses throughout

training.   At posttest, the participants substituted the word "home" for "help" rather than other

random words, indicating they were making this substitution based on the first letter cue. The

same initial letter words "fire" and "fish" were presented to each group under opposite

conditions.   Both groups learned to recall each word correctly.   Yet once learned, there was

confusion, with substitution occurring when both were presented together as plain text at

posttest, the first time the children needed to discriminate between them. This also occurred for

the words "sleep" and the control word "sheep," and for "pull" and "play." Further, if children

could not remember these words they frequently produced letter-related errors, consisting of

either the letter-name "p", the letter-sound /p/, or the name of the Phonic Face character,

"Peter." Once again, first letter appeared to be an important cue to which children attended.

The degree to which letter-names influenced performance was greater than Ehri's model

would suggest, and more consistent with the argument made by Norris (2007) that this

represents a separate important phase between pre-alphabetic and partial alphabetic word

recognition. Awareness of the letter and the letter name was an important clue that the toddlers

used to begin to identify and discriminate between words, occurring at a stage when they

showed little phonemic awareness or actual letter-sound association.

Letter-Sound Knowledge

While there is evidence that children were using alphabet letter and letter-name

knowledge to recognize words, there is less evidence that they were using letter-sound

information. Nonsignificant gains on segmenting sentences into words were shown on the

TALS, suggesting that children were just beginning to gain an awareness of words. Most of the

subjects were able to segment sentences into words at the 2-3 word level (mean posttest score

of 2.5) but not beyond. When more words were added to the sentences, they were no longer

consistent in performance. This awareness of words may have been accelerated by the word

learning treatment but was not caused by it, in that subjects could also perform this task at

pretest (mean of 1.88). However, none of the subjects were able to segment words into

syllables or sounds, indicating that sound awareness in words was not yet emerging. This

finding was further supported by minimal gain scores for any of the subtests measuring sound

awareness, including Separation of Form and Meaning (SF) (e.g., identifies word as its

meaning; associates letter name with an object beginning with the sound); Rhyme (R) (e.g.,

recites nursery rhyme; selects rhyming words from choice of 2-3 words); Sound in Word

Position (S-WP) (e.g., predicts a word using a picture; determines whether initial consonants are

same/different); or the alliteration (initial sounds) or rhyming subtests of the IGDI/DIBELS.

However, none of these tasks are developmentally expected for two year olds, and these results

are not surprising. What is surprising is that despite lacking these skills which some view to be

prerequisite to word learning (Brady & Shankweiler, 1991; Goswami & Bryant, 1990; Stanovich,

1991; Wagner & Torgesen, 1987), the two year olds in this study did learn words fairly easily.

These findings lend greater support to the view of reciprocity between print awareness and

phonological awareness (Perfetti, Beck, Bell, & Hughes, 1987).

Terrell (2007) found that two year olds did show an awareness of sounds by pointing to

the letter in the mouth of a Phonic Faces character when given a sound, and producing a

correct sound when shown a Phonic Face. Although not specifically tested in this study, there is

evidence for this level of sound awareness. Following the reading of plain words at posttest,

subjects were again asked to read the words, but this time with a Phonic Face representing the

initial sound of the word placed next to the first letter. Despite never having been trained to use

this cue, word recognition went up significantly under this condition. The increase was notable

for words taught using MorphoPhonic pictures (an average gain of 3 words), but also was seen

for words taught using print only (a significant gain over print only words). While it might be

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argued that the Phonic Face cue looked similar enough to the trained MorphoPhonic Face to visually cue the word, it is not as easy to explain the gains in print only trained words. Half of the subjects (8 of 16) recognized 1-2 more words when the Phonic Face cue was provided next to a word taught print only, even though they had never seen the faces associated with those words. This finding suggests that the Phonic Face cue gave the child a sound prompt that enabled him to recall the word. This conjecture needs to be further explored in future studies.

Meaning Cues

The meaning cues provided by the MorphoPhonic Face words also appeared to provide an important scaffold to word recognition. MorphoPhonic words are pictured in a manner that superimposes important features of the meaning into salient letters of the words. For example, the double "ll" in the word "hill" is drawn as reaching the apex of the hill, thus chunking these two letters as one unit. In addition, the "i" is drawn as a lower point on the hill, so that the Phonic Face portion of the word depicts the word's onset, and the rime depicted in the hill with the distinct double "ll" pattern. Likewise, the "en" of the word "open" is drawn as a unit in the open part of the door. The dual coding present within the MorphoPhonic Face indicates that words are both letter-sound (e.g., form) and meaning. As children become aware of the alphabetic properties of written words, they also are reminded that a meaningful word must be decoded. The grouping of letters within the pictures also helps to "chunk" these units into orthographic patterns (i.e., Ehri's full alphabetic phase). The apparent importance of this coding for meaning was shown in both the significantly greater number of words learned that were taught using the MorphoPhonic pictures, and also the significantly greater number of words recognized at posttest when seen as a MorphoPhonic word for the first time. The toddlers in this study learned nearly twice as many words taught using the MorphoPhonic Faces (mean of 1.75 versus 3.25). When they were allowed to use the MorphoPhonic words at posttest, 15 of 16 subjects recognized nearly all 8 words (mean 7.5), the exception being the child with low

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language and literacy experience scores (but even that child recognized 3). Even more impressive, all of the subjects also recognized words that had been taught print only when they were presented as MorphoPhonic words for the first time at posttest. Three subjects recognized all 8 words, and all but two children recognized four or more words (mean 5.38).

This is an impressive finding for this young population and represents considerable discoveries regarding written words. The MorphoPhonic Face cards were fairly meaningless at pre-treatment, as demonstrated by the participants' lack of recognition of any of the pictured sight words. Post-treatment, they were able to generate a probable word to match the letters and meaning depicted on the MorphoPhonic card. This entails a concept of wordness (i.e., they expected the picture to be a word), meaning (i.e., they expected the word to match the depicted meaning), and alphabetic knowledge (i.e., the Phonic Face generated better word recognition, so it can be predicted that the presence of the Phonic Face within the MorphoPhonic Face word would generate similar positive results). The latter conjecture would need to be further explored by comparing words comprised of the superimposed meaning but without the Phonic Face onset. What does seem clear is that even novel meaning cues were better at eliciting word recall than the words presented in their practiced format (i.e., print only) or with an accompanying Phonic Face prompt. Consistent with oral vocabulary learning, meaning appears to be a driving force underlying word learning.

Practical and Theoretical Applications

The most important theoretical implication of this study is that toddlers as young as two years of age can learn to discriminate printed words and letters and to semantically associate oral language with printed words, resulting in a culmination of those skills required to accurately read noun and verb words. While there is extensive literature in emergent literacy, most of the studies concentrate on an older population, three and four-year-olds. Since two-year old children are merely on the cusp of development in oral language skills, the expectation of their

learning and development in printed language skills may seem unattainable. However, the

children in this study demonstrated that they have been environmentally primed and are

cognitively and linguistically prepared to learn and use printed language. They are continuing to

develop in their phonemic awareness skills and are ready to learn words.

The results of this study provided support for the use of MorphoPhonic words to increase

sources of phonemic awareness, such as alphabet knowledge, print conventions, and word

recognition. Simple alphabet knowledge forms the foundation for connections between letters in

spellings and phonemes in pronunciations, which eventually has a strong impact on future

reading success. Moreover, with an increase in alphabet knowledge afforded by the use of

MorphoPhonic words (systematically initialized by the Phonic Face), initial reading skills are

acquired and these skills facilitate the development of efficient word-recognition strategies as

the shape of the word and its associated meanings are learned simultaneously. Additionally,

since the remainder of MorphoPhonic words includes semantically related pictures

superimposed on the printed word, it follows that the use of MorphoPhonic words facilitates

children's understanding that printed words convey a meaning and a message, which can serve

multiple purposes. In other words, this study further supports that the use of MorphoPhonic

words increase children's understanding of print conventions as a source of phonemic

awareness.

Another implication of the study is that a multiple sensory input approach to learning may

facilitate interest and attention as young as toddlers learn new information, such as phonemic

awareness development and sight word reading skills. Since each child is unique in personality,

cultural experience, learning style, and so forth, various learning modalities should be employed

to exploit children's unique strengths. In this study as the examiner and children looked at

each card, the examiner pointed to the initial letters of the cards and verbally set-up

interpretations of letters, letter-sounds, picture information, and meaning for the participants as

she talked about the words printed on the cards. The examiner also "acted-out" the words and

encouraged the children to do the same, engaging them in pretend-play as they learned the sight words under both MorphoPhonic and Print only conditions. This provided auditory and kinesthetic cues, as well as visual, and picture cues (under the MorphoPhonic condition), to effectively layer the information in an effort to facilitate the children's learning to recognize the sight words.

The results of this study suggest that the MorphPhonic Face cards can be effectively utilized to teach and elicit sight word recognition in toddlers. The implication is that this tool may be beneficial for young children in the home, education, and clinical settings. While the small group setting allowed the children the opportunity to hear and learn from each other, not just the adult voice of the examiner, it also afforded the participants more interaction with each other and with the cards as they played games, which assisted in their learning of the sight words. Similarly, the benefits can be attained in the home environment, as parents and children play in their natural dyadic relationship. Likewise, typical preschool and kindergarten classrooms already teach children via the use of flashcards, so adding MorphoPhonic cards to the daily routine may be more beneficial and result in faster word learning. Finally, flash cards are used in clinical settings as therapists play games to elicit correct articulation and language productions. The MorphoPhonic Faces cards can be utilized in a similar method to stimulate semantic understanding immediately via the pictured words and understanding of articulation placement via the initialized Phonic Face.

<center>Limitations</center>

The most obvious limitation of this study was the small sample size of children who are from families of very similar socio-economic status. Although the statistical analysis revealed no significant differences between the two groups, Type II errors are possible due to the small sample size.

Another limitation was that the eight words presented in the MorphoPhonic condition to each group were selected for their transparency. While these words were balanced by group

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for number of nouns, number of verbs, and number of words which began with a letter-name the words selected for the study were the Dolch words that could be semantically represented with facility as opposed to those which are more abstract. It is possible that the treatment words presented in the current study yielded better results because they were conceptually less abstract and therefore more transparently represented semantically via superimposed pictures than the more abstract sight word counter parts, such as "at," "on," "in," "the," "that," "who," and so forth.

Previous studies which examined pictured sight word recognition used pictured words without a phonic cue. To determine if the Phonic Face adds an additional cue beyond the superimposed picture, this study would have needed to compare these conditions. If the Phonic Faces cues the alphabetic principle, as this study suggests, children should learn more words and also acquire better alphabet skills and word recognition. Further, while many participants immediately produced the phoneme associated with the initial letter of words upon presentation of the Phonic Face during posttest, documentation of these occurrences was not included as a part of this study. In other words, there was no testing to determine if the Phonic Face elicited a correct initial phoneme production as an intermediate step prior to presentation word on a MorphoPhonic card.

Suggestions for Future Research

The findings of this study suggest several directions for future research. Foremost in importance, a future study should be conducted to replicate these results and to determine if the gains achieved can be maintained. For example, a study might examine the participants' sight word recognition skills on the same words 6 weeks after treatment. This information could be useful, especially in the educational setting.

Another option for future study should determine if results of this study can be generalized to other types of words, such as adjectives or prepositions which occur frequently in storybooks designed for toddlers. It is possible that the treatment words presented in the

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current study yielded positive results because they were conceptually less abstract and therefore easier to semantically represent via superimposed pictures than more abstract sight word counter parts, such as "at," "on," "in," "the," "that," "who," and so forth.

Although the use of MorphoPhonic words as flash cards was received with enthusiasm by the participants, an examination of words initialized by the same letter as found in an alphabet book reading, such as MorphoPhonic Faces Alphabet Dictionary, would be of equal importance but could provide different theoretical information. As the children are exposed to words initialized by the same letter they might learn to better differentiate between words and may realize that a word has to start with a particular sound. Further, this exposure may facilitate children's learning that there is a syllable structure to a word and that the different letters must come together to make a meaningful word.

Since it has been shown that mothers are more attuned to their children's interests and levels of understanding than most other adults, it would be interesting to see the results of this study implemented in a parent-child dyad and to compare those results with previous studies of dyadic settings. A study of this nature could demonstrate the utility of MorphoPhonic Face words in the home setting.

On the other hand with so many parents working to today's society, many toddlers spend the majority of awakened hours at a day care facility or in a classroom setting. With this in mind, a future study should replicate this study in a classroom setting, making this a practical application of the experimental tool. While it was somewhat beneficial for the children to hear and learn from each other in the small group setting as demonstrated in this study, this benefit may either be maximized or become a hindrance in a setting with two or three times that number of children.

In light of the similar socio-economic backgrounds of the participants and their families, future research might seek to replicate these results with a population that is more varied in socio-economic status (SES). Additional future studies should include children of various ages,

for example three or four years of age to chart the differences and to better compare results with that of other current research on literacy development. Finally, it would be interesting to see the results of this method when used with children who exhibit speech and/or language disorders, as this could provide support for the use of MorphoPhonic Faces in a clinical setting.

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APPENDIX A

PARENT CONSENT FOR PARTICIPATON

Project Title: Phonemic Awareness and Sight Word Reading in Toddlers

Performance site: Preschool Program, Kennesaw, GA

Investigators: (available by phone or email, Monday-Friday 9:00 am-4:00 pm)

Janet Norris, PhD.   – Phone: 225-578-3936   e-mail: jnorris@lsu.edu

Alicia McInnis, M.A.   – Phone: 404-399-0033   e-mail: adoylea1@yahoo.com

Purpose of the Study: This study will investigate what children learn from pictured word cards used in educational games and activities. We want to know if 24-35 month old children will show evidence of knowledge of the alphabet and pre-reading skills after 6 weeks.

Inclusion Criteria: Children, ages 2:0-2:11 years, who are enrolled in a preschool educational program, will be included in the study. The subjects should be developing language normally.

Exclusion Criteria: Children who have a hearing loss, language delays, cognitive delays, or significant medical, behavioral, or psychological disorders.

Description of Study: At the beginning of the study, your child will be assessed for knowledge of the alphabet and pre-reading skills. Your child will participate in daily educational activities over a 6 week period. At the end of the study, your child will be re-assessed.

Benefits: Exposure to educational games and activities provides a fun learning environment for children. The preschool environment is also an excellent context for learning early reading skills. By consenting to your child's participation in this study, you will help the researchers understand more about how young children learn. In addition, your child may improve his or her early reading skills.

Risks or Discomforts: There are no known risks associated with participation in this study.

Right to refuse: Your child will become part of the study only if you and your child agree to the child's participation. Children's assent will be verbal. At any time, you or your child may choose not to participate or to withdraw from the study at any time with no jeopardy to services provided by their preschool learning academy or other penalty at the present time or in the future. We also reserve the right to discontinue your child's participation in the study if you (or your child) share with us information during session that indicates that your child does not meet the inclusive/exclusive criteria for research participation listed above.

Privacy: This study is confidential.   All materials will be coded and children's names and personal information will be kept secure. Results of the study may be published, but no names or identifying information will be included in the publication. Subject identity will remain confidential unless disclosure is required by law.

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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 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. 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.

_____   _____

   Parent's Signature   Date

    If you would like to review the results of this study, please contact the investigator above.

LANGUAGE-LITERACY SKILLS IN PRESCHOOLERS
PARTICIPANT QUESTIONNAIRE

Please complete the information below:

Child's Name_____

Child's Date of Birth_____   Gender_____

Race_____

Highest level of mother's education:

____   9th-11th grade

____   High School Graduate

____   Bachelor's degree

____   Graduate degree

____   Professional or Post-graduate degree

Does your child have a history of hearing problems/ hearing loss?

Yes ____   No ____

Does your child receive services by a Speech Language Pathologist?

Yes____   No____

APPENDIX C

HOME LITERACY EXPERIENCE QUESTIONNAIRE

1. Direct: About how often does your child scribble with crayons, markers, chalk, pens, or pencils?

2. Indirect: About how often does your child use objects appropriately during pretend play like using a spoon to stir or eat pretend food, brushing a stuffed animal's hair, etc.

3. Unscored: About how often does your child ask to eat fruit? What fruits does he/she like most?

4. Direct: About how often does your child ask to have a favorite book read? What is the title of the book?

5. Direct: About how often does your child specifically point to print either in the environment (such as billboards, labels, mail, etc.) or in books?

6. Indirect: About how often do you talk with your child about something that he/she did earlier in the week?

7. Indirect: About how often do you talk with your child about differences between animals such as the different noises they make, different skin coverings (fur, feathers, scales), and different environments (farm, zoo, water)?

8. Indirect : About how often does your child pretend to be someone else like an animal or a baby?

9. Indirect: When watching TV or DVDs, about how often do you add additional comments and explanations to help your child understand more?

10. Direct: About how often do you notice your child holding a book and turning the pages as if reading?

11. Indirect: About how often is your child able to follow 2-part directions such as: *Pick up the napkin and put it in the trash?*

12. Direct: About how often does your child point to things in the environment and provide a verbal label such as pointing to a truck and saying, "truck?"

13. Indirect: About how often does your child attempt to sing along with music or television shows?

14. Direct: About how often does your child point to letters in books or on signs in the community?

15. Indirect: About how often do you talk to your child when putting away groceries or laundry telling him/her where different categories of food or clothing belong?

16. Direct: About how often does your child ask to see a particular children's DVD? Name of DVD?

17. Indirect: About how often does your child regularly follow requests with two parts such as: *Get the spoon and put it on the table?*

18. Direct: About how often does your child watch TV shows for preschoolers such as *Barney, Sesame Street, TeleTubbies, Dora the Explorer*, etc.?

19. Direct: About how often does your child use children's software on a computer, play simple computer games, and/or pretend to type on a computer?

20. Unscored: About how often does your child ask for a favorite food? What is this favorite food?

21. Direct: About how often does your child ask you to draw a picture?

22. Indirect: About how often do you describe to your child hat you are doing when you are cooking or preparing food?

23. Unscored: About how often would your child need to be disciplined? What sort of discipline have you most recently used?

24. Indirect: About how often does your child sing along with the radio in the car or while watching singers on television?

25. Direct: About how often do you point out and read road signs or signs on buildings or walls when you are driving, shopping, or walking with your child? What sign have you most recently pointed out to your child?

26. Indirect: About how often do you and your child look at pictures of him/her and you talk to him /her about what was happening and where she/he was when the picture was taken?

27. Unscored: About how often does your child attempt to dress himself/herself?

28. Direct: About how often doyo go to the library for children's books or get a new children's book in the store or through a book club? What is the title of the most recent book your child has received from either the library, a store, or book club?

29. Direct: About how often does your child seem to be interested in having storybooks read to him/her?

30. Indirect: About how often do you ask your child to bring a certain package to you such as a certain brand of cereal or soft drink where she/he would have to recognize the correct label to be able to get the right package?

31. Direct: About how often does your child play at home with alphabet toys such as an alphabet puzzle, plastic magnetic letters, or blocks with letters? What types of alphabet toys does your child have at home?

32. Direct: About how often does your child see computers being used or actually use a computer?

33. Indirect: About how often does your child ask you to pretend play with him/her?

34. Direct: About how often does your child make believe that he/she is reading something with print on it such as a sign, newspaper, magazine, or book?

35. About how many storybooks would you estimate to be in your home right now? _____ What are the titles of some of these books?

*Note: on the form given to the parents to complete, there was not notation of "indirect," "direct," or " unscored."

APPENDIX D

HOME LITERACY EXPERIENCE SCORE SHEET

ID # _____   Informant's relationship to child _____

Question	Direct Literacy							Indirect Literacy						
	N	M	W	W+	D	D+		N	M	W	W+	D	D+	
1. D														
2. I														
3. U														
4. D														
5. D														
6. I														
7. I														
8. I														
9. I														
10. D														
11. I														
12. D														
13. I														
14. D														
15. I														
16. D														
17. I														
18. D														
19. D														
20. U														
21. D														
22. I														
23. U														
24. I														
25. D														
26. I														
27. U														
28. D														
29. D														
30. I														
31. D														
32. D														
33. I														
34. D														
Column Totals	_x0	_x1	_x2	_x3	_x4	_x5	Dir. score	_x0	_x1	_x2	_x3	_x4	_x5	Indir. score

About how many children's story books do you have in your home right now?
Can name 3 titles? ___ Yes ___ No

Reliability check
Direct: Indirect:
1. 4 & 28   1. 8 & 32
2. 19 & 31   2. 11 & 17
3. 10 & 33   3. 13 & 24

VITA

Alicia Tonya McInnis was born in Pascagoula, Mississippi in December, 1969. After completing high school in Ocean Springs, Mississippi, she moved to Lafayette, Louisiana, where she attended the University of Southwestern Louisiana (now, University of Louisiana – Lafayette) and graduated with a Bachelor of Arts degree in communicative disorders in 1992. She continued her studies in Evanston, Illinois, at Northwestern University where she received a Master of Arts degree in audiology and hearing sciences in 1993. Upon completion, she practiced several years as a certified pediatric audiologist in New Orleans, and in Baton Rouge, Louisiana, where she worked for the State of Louisiana, Department of Health and Hospitals. Later, as an instructor at Louisiana State University and Agricultural and Mechanical College, she taught undergraduate courses in anatomy, lifespan of motor development, and neuro-motor control, and served as a clinical supervisor in audiology while taking the required courses for dual certification in audiology and speech pathology as determined by the American Speech-Language-Hearing Association (ASHA).

Currently, she is pediatric Speech-Language Pathologist for the Cobb County School District located in the metropolitan area of Atlanta, Georgia. In this position, she not only works with children who have speech-language disorders, but she also conducts research, continues educational leadership preparation and is training as a bilingual speech-language pathologist. The degree of Doctor of Philosophy will be awarded to Alicia T. McInnis on August 8, 2008.