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Using a Visual Onset-Rime Strategy to Teach Rhyming to Preschoolers: Preliminary Findings

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Abstract

Early literacy skills, specifically phonological awareness skills, are essential to literacy skills beyond preschool. Rhyming, a phonological awareness skill, has been linked to growth in other phonological awareness skills and later reading abilities. Therefore, effective interventions in rhyming are necessary to ensure later success in literacy skills. The current study examined the effectiveness of using a visual onset and rime strategy to teach rhyming and the effects on early literacy skills (e.g., phonological awareness skills, alphabet knowledge). Results of the study indicate that using a visual onset-rime strategy is more effective than using traditional teaching methods (i.e., rhyming puzzles) when teaching receptive and expressive rhyming. Additionally, using a visual onset-rime strategy resulted in greater gains in phonemic awareness skills, letter knowledge, and single word decoding.

Keywords: Phonological awareness skills; rhyming instruction; phonological awareness instruction; preschool literacy intervention; early literacy skills

Using a Visual Onset-Rime Strategy to Teach Rhyming to Preschoolers: Preliminary Findings

Rhyming is the changing of a word's onset in order to form a new, similar sounding word. Rhyming is thought to be the simplest and most foundational element of phonological awareness skills (Chard & Dickson, 1999; Schuele & Boudreau, 2008). For the purposes of this paper, phonological awareness is acknowledged as an umbrella term that encompasses several subcomponents including syllable awareness, alliteration, rhyming, onset-rime awareness, and phonemic awareness skills. An ongoing debate concerning mostly the complexity of and contribution of rhyme and phonemic awareness skills to reading remains unresolved.

In Hoffman and Norris's Situation Discourse Semantics (SDS) model of phonemic awareness, each source (e.g., alphabet knowledge, rhyming) of phonemic awareness is portrayed on a continuum of complexity. In this model, it is proposed that rhyming skills exist on a continuum of complexity with reciting nursery rhymes being the least complex and forming rhyming words being more complex (Hoffman & Norris, 2002). Furthermore, this model depicts rhyming as a contributor to phonemic awareness and other phonological awareness skills. This review provides evidence that rhyming skills can be as complex as other phonological awareness skills. Due to the increasing complexity of rhyming skills, instruction in this area of phonological awareness may prove to be beneficial to preschoolers. Furthermore, prior studies have suggested that rhyme awareness predicts later reading abilities (Macmillan, 2002) and is causally linked to reading (Goswami & Bryant, 1990).

Learning to rhyme has substantial implications for a child's development in early literacy skills including rhyming, alliteration, and phonemic awareness. Instruction in rhyming prior to the entering kindergarten is critical. According to the National Early Literacy Panel (2008),

children's type and extent of educational experiences received prior to kindergarten has a significant impact on their reading performance in kindergarten and beyond (National Early Literacy Panel, 2008). Data from the Early Childhood Longitudinal Study-Kindergarten (ECLS-K) revealed that some first-time kindergarteners were proficient in some reading skills with 66 percent being proficient in recognizing their letters, 29 percent were proficient in understanding beginning sounds (i.e., alliteration), and about 17 percent were proficient in understanding ending sounds, a phonemic awareness skill. The lower percentages in the area of phonological awareness skills (e.g., understanding beginning and ending sounds) may be indicative of a lack of or minimal instruction in this area prior to entering kindergarten. Because of the variation in early literacy skills, students entering kindergarten may not be able to access the reading curriculum similarly. Therefore, teaching early reading or literacy skills (e.g., rhyming) prior to the entrance of kindergarten may prove beneficial and allow similar access to reading curricula.

The National Early Literacy Panel (NELP) has identified six domains of early literacy skills that are correlated with later literacy development, even when the intelligence quotient and socioeconomic status were accounted for. These domains include alphabet knowledge, phonological awareness, rapid automatic naming, writing or name writing, and phonological memory (2008). Additionally, the NELP identified instruction in phonological awareness as an effective instructional practice that can be used to enhance early literacy skills. Phonological awareness instruction may include teaching any or a combination of phonological awareness skills including rhyming, alliteration, or phonemic awareness. The current study will compare the effectiveness of two phonological awareness interventions aimed to teach rhyming skills. One intervention uses a visual onset-rime strategy and the other consists of a traditional teaching method (i.e., rhyming puzzles). It is proposed that using a visual onset-rime strategy will have a

greater impact on the learning of rhyming and other early literacy skills (e.g., alphabet knowledge, decoding, phonemic awareness skills).

Review of Literature

A rhyme consists of an onset and a rime; the onset consists of prevocalic consonant singletons or clusters and the rime consists of a nucleus (typically a vowel or vowel like consonant) and postvocalic consonant singletons or clusters. Consequently, using a visual onset-rime strategy to teach rhyme should have a positive effect on the learning of rhyming or onset-rime skills. However, some studies and reviews have suggested that phonological skills are learned in a hierarchical manner (Chad & Dickson, 1999; Schuele & Boudreau, 2008) implicating a complex skill such as onset and rime would be more difficult to learn than rhyming. Thus, once a child begins to rhyme, other phonological skills may continue to develop in the sequence of the phonological awareness continuum of complexity. Due to this hierarchical development of phonological awareness skills, a review of literature by Schuele and Dayton (2000) suggests that rhyming should be taught before onset and rime. In contrast, research by Anthony, Lonigan, Driscoll, Phillips, and Burgess (2003) and Hoffman and Norris (2002) suggest phonological awareness skills develop simultaneously. Anthony et al. (2003) offer a different perspective on the hierarchal learning of phonological awareness skills and suggest that as the level of one phonological awareness skill increases, it boosts the level of a different phonological awareness skill.

Caregivers are typically the first individuals to expose a child to rhyme through the reciting and singing of nursery rhymes and songs. A child's rhyming skills are further developed during his preschool years using mostly implicit teaching strategies. These strategies may include singing songs, reading books, and playing games (Phillips, Clancy-Menchetti, &

Lonigan, 2008). Explicit and implicit teaching methods are used to teach many skills in the classroom setting. Implicit teaching is described as a passive, unsystematic, and naturalistic teaching process, whereas explicit teaching is an active, highly structured, and purposeful teaching process. Singing nursery rhymes and listening to poems are examples of implicit teaching of rhyming, whereas giving a definition of rhyme and explaining why two words rhyme are examples of explicit teaching of rhyming. Although implicit teaching strategies may be used to develop rhyming skills, there is evidence that explicit instruction of phonological awareness skills is more effective (Cunningham, 1990). Furthermore, children who explicitly learn rhyme are more efficient at rhyming than those who do not learn how to rhyme (Majsterek, Shore, & Erion, 2000; Mitchell & Fox, 2001; van Kleeck, Gillam, & McFadden, 1998; Walton, Bowden, Kurtz, & Angus, 2001). As a child ages, he is expected by parents and educators to engage in increasingly complex rhyming tasks such as rhyme cloze procedures, reciting nursery rhymes, identifying rhyme pairs, and creating rhyme pairs. Therefore, effective rhyming interventions are a necessity to ensure children are proficient in rhyming and other early literacy skills.

Rhyming as a Foundation for Early Literacy Skills

The role of rhyming underlies the learning of other phonological awareness, reading, and spelling skills (Chard & Dickson, 1999; Schuele & Boudreau, 2008). Macmillan (2002) found that rhyme awareness is a predictor for later reading abilities. Despite findings from Castles and Coltheartin (2004) review that no causal relationships existed between phonological awareness and reading, Goswami and Bryant's (1990) causal connection theory suggests otherwise. This theory implies that a direct causal link exists between reading acquisition and rime, a component of rhyme (Goswami, 1999). Goswami (1999) states that rhyme may contribute to reading in two different ways. First, rhyme awareness is able to predict which children will find development of

phonemic awareness simpler. Secondly, the consistent spelling sequences used in rhyme may facilitate reading (Goswami, 1999). Children will begin to detect patterns learned from rhyming and apply it to reading and spelling tasks. The positive relationship between phonological awareness skills and reading is mediated by letter knowledge (Blaiklock, 2004; Foy & Mann, 2006) and further contributes to children's reading and spelling abilities. This shared relationship between phonological awareness skills, reading, and letter knowledge may play a role in the reciprocal relationship between phonological awareness and letter knowledge skills (Frost, 2001; Web, Schwanenflugel, & Kim, 2004), which facilitate decoding abilities (Hindson et al., 2005). Yeh and Connell's (2008) research refutes the aforementioned statement suggesting that instruction in rhyming has little effect on learning phonemic segmentation and blending skills. The above studies provide evidence in addition to the ECLS-K report concerning the importance of phonological awareness instruction.

Although there is a definite relationship between reading and phonological awareness skills, the specific contribution of each phonological awareness skill to reading is often debated. Bryant et al. (1990) composed three models that summarized the ongoing debates between the relationship of phonological awareness skills and reading. The first model depicts a disconnect between rhyme and alliteration and reading success. Conversely, phoneme detection is shown to lead to reading success. The second model attributes rhyme and alliteration to the success of phonemic detection, which eventually leads to reading success. The third model depicts rhyme and alliteration as having a direct effect in reading success separate from the direct effect of phoneme detection (Bryant et al. 1990). Direct or indirect, these models confirm the role of rhyme in successful reading.

Rhyming Instruction

Phonological awareness skills do not occur naturally, but develop most effectively if children are engaged in organized, developmentally appropriate activities (Hindson et al., 2005). Research shows that children respond positively to the teaching of phonological awareness skills within well-designed early literacy instruction. Preschoolers, kindergarteners, and children with disabilities can be taught and learn rhyming (O'Connor, Jenkins, & Leicester, 1992; Schuele & Boudreau, 2008). Previous studies have taught rhyming using various strategies, including teaching rhyming in the context of story reading (Reynolds, Callihan, &Browning, 2003), using manipulatives that rhyme during circle time activities (O'Connor et al., 1992), using preschool curriculum materials (Yeh & Connell, 2008), and utilizing rhyme oddity tasks (Bradley & Bryant, 1985).

Rhyming instruction can include identifying rhymes, matching rhymes, generating rhymes, and finding the odd word that does not rhyme when given a trio of words (i.e., rhyme oddity) (Schuele & Dayton, 2000). Rhyming instruction may involve several phonological awareness skills such as blending onsets and rimes, segmenting syllables, and alliteration depending on how rhyming tasks are presented. The rhyming instruction used in the current study will utilize a visual onset-rime strategy. Teaching using this strategy will be facilitated using Spuzzles (Norris, 2001). Spuzzles (see Figure 1) are a set of instructional cards that utilize visual strategies to teach meta-awareness of onset and rime. It is proposed that using this strategy will subsequently have an effect on learning expressive and receptive rhyming as well.

There is very little evidence of effective strategies used to teach rhyme explicitly (O'Connor et al., 1992; Reynolds et al., 2003; Majsterek et al., 2000; van Kleeck, Gillam, & McFadden, 1998; Ziolkowski & Goldstein, 2008), but it is usually included as a sublevel in

phonological awareness interventions (Lonigan et al., 1999). Strategies used to teach rhyme within phonological awareness interventions usually involve auditory awareness. Auditory awareness is used in activities such as nursery rhymes, finger plays, and songs. In some instances, auditory awareness is paired with visual aids to assist in teaching rhyme. Children may be shown a picture of the nursery rhyme they are asked to recite or they may be asked to match two pictures together that rhyme. These preschool whole-group activities utilize implicit instruction as opposed to explicit instruction in which the child has a clear understanding of what they are being asked to do and what the results look like when accomplished. A study by Ehri, Nunes, Stahl, and Willows (2001) suggests the use of tangible materials to make oral phonological awareness tasks more concrete for young children. The Spuzzles used in the current study provide a tangible visual to facilitate the learning of rhyming skills.

Multiple studies suggest that teaching rhyming should follow a developmental course teaching larger units first (Schuele & Boudreau, 2008; Ziolkowski & Goldstein, 2008). In fact, children may find it easier to organize larger units of sounds when compared to adults (Snowling & Hulme, 1994). For example, children's initial reading skills consist of decoding words by blending the onset and rime of a word or reading by analogy (Goswami & Mead, 1992). Reading by analogy may be attributable to children's development of rhyming skills that occur alongside development of reading skills. Accordingly, phonological awareness instruction should begin with teaching larger sound units and implementing explicit teaching methods that result in greater gains (Justice, Chow, Capellini, Flanigan, & Colton, 2003). In a recent study, Philips, Clancy, and Lonigan (2008) suggested that no empirical evidence existed that teaching phonological awareness should be matched to a child's current skill. However, Vygotsky (1978)

would have argued that phonological awareness skills taught should be within a child's zone of proximal development.

Many may believe existing rhyming activities (e.g., singing nursery rhymes) are sufficient and that rhyming is the easiest phonological awareness skills to learn. Yet in order to complete a rhyme oddity task, a child must know what it means to rhyme, attend to the structure of all three words presented, mentally segment the rime from the onset, and compare the three rimes and conclude that *pig* has a different rime than *cat* and *bat* (Phillips et al., 2008). There may be confusion if two of the words share an onset (Phillips et al., 2008) or if phonetic features differ by more than two (Snowling & Hulme, 1994). This type of confusion could have a lasting effect on rhyming and other phonological awareness skills. Therefore, effective strategies that can be used to teach rhyming are necessary.

Visual Onset-Rime Strategy

Rhyming abilities require that a child is able to process and organize conceptual knowledge. When rhyming, many skills occur on symbolic and logical levels. Hoffman and Norris (2002) proposed that beginning rhyming skills only require a child to listen and recite nursery rhymes. More complex rhyming skills requires a child to be aware or have meta-knowledge that rhymes have the same rime but different onsets. Processing, organizing, and manipulating words and phonemes in words can be very difficult to a three or four year old who is learning how to rhyme. A rhyming task that is taught explicitly can become increasingly difficult without the use of visual aids. The child has to know that manipulating the onset by replacing it with a different onset will form a different rhyming word. Using a visual onset-rime strategy may prove to facilitate the acquisition of rhyming skills more so than other traditional methods (e.g., rhyming puzzles).

A visual analogy is a tool that is used to aid in the understanding and memory of key concepts by using visuals such as pictures to teach abstract ideas. Visual analogies are thought to be powerful communication aids and are often seen in advertisements as visual images that penetrate our memories and leave a lasting impression. Research has shown that visual analogies can facilitate adult learning (Alesandrini, 1984). Spuzzles (Norris, 2001) is a set of colorful and visually engaging cards that teach meta-awareness of onsets and rimes. These puzzle cards can be used to teach spelling and rhyming skills to children of all ages who have typical or atypical (e.g., literacy or language impairments) development. Spuzzles utilize visual analogy to teach children the concept of rhyme by providing a tangible manipulative as suggested by Ehri, Nunes, Stahl, and Willows (2001). Although there are no previous studies that have explored the efficacy of Spuzzles, previous studies have explored the efficacy of using visual representations (i.e., Phonic Faces, MorphoPhonic Faces) to teach literacy skills (Banajee, 2007; Brazier-Carter, 2008; Terrell, 2007) and have been shown to be effective.

Because few kindergarteners enter school with minimal to no knowledge in phonological awareness skills (e.g., rhyme awareness), it is essential to provide instruction in this area prior to entering kindergarten. To ensure phonological awareness practices are effective and evidence-based, it is necessary to study strategies used to teach phonological awareness skills (e.g., visual onset-rime strategy) and to investigate if these strategies help facilitate the learning of these and other early literacy skills. Teaching rhyming to preschoolers is an important component in preschool lessons, which influences rhyming, other phonological awareness skills, and possibly letter knowledge. Existing literature proposes that rhyme contributes, directly or indirectly, to the learning of other phonological skills and, perhaps, even reading; however, there is very little literature on the effectiveness of rhyme intervention and strategies used to teach rhyme

(Majsterek et al., 2000; Reynolds et al., 2003; Yeh & Connell, 2008). Previous studies have shown that four-year-olds are capable of identifying rhymes (Lenel & Cantor, 1981; Majsterek et al., 2000). However, only one study was found that indicated rhyming abilities in three-year-olds (Reynolds et al., 2003). Furthermore, teaching the meta-awareness of onset and rime (e.g., Spuzzles, Norris, 2001) may prove more effective in teaching receptive and expressive rhyming than puzzle sets depicting rhyming words.

Many studies have found correlational relationships between phonological awareness skills and letter knowledge (e.g., Frost, 2001; Webb, Schwanenflugel, & Kim, 2004) and between phonological awareness skills and reading (Blaiklock, 2004), but few of these have indicated causal relationships (e.g., Goswami, 1999), thus dispelling suggestions from Castles & Coltheart's (2004) review. Furthermore, the previous studies have not examined if implementing particular interventions (e.g., onset-rime strategies versus traditional strategies) would have a greater effect on the relationship between phonological awareness and letter knowledge skills. The current study examined if teaching rhyming using a visual onset-rime strategy (i.e., Spuzzles) versus using traditional rhyming puzzles would contribute more to preschoolers' knowledge of rhyme and other early literacy skills including alphabet knowledge, phonemic awareness skills, and single word decoding. Several hypotheses were developed based on extant literature:

H1: The Spuzzles Group will show significant improvement in expressive and receptive rhyming skills when compared to the Traditional Puzzles Group.

H2: The Spuzzles Group will show significant improvement in phonemic awareness skills when compared to the Traditional Puzzles Group.

H3: The Spuzzles Group will show significant improvement in letter knowledge skills when compared to the Traditional Puzzles Group.

H4: The Spuzzles Group will show significant improvement in decoding one-syllable consonant-vowel-consonant (CVC) words when compared to the Traditional Puzzles Group.

To examine the above hypotheses, two groups received an intervention using Spuzzles (i.e., an onset-rime strategy) or traditional rhyming puzzles.

Method

Participants

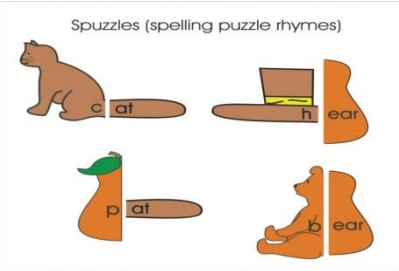
The institutional review board approved and oversaw the current research. Thirty-seven 3- to 4-year-old children from local childcare centers and a Head Start program were chosen to participate; 20 participants in the Spuzzles Group (M_{age} = 4.06, *SD* = 5.81) and 17 participants in the Traditional Puzzles Group (M_{age} = 3.83, *SD* = 7.31). A t-test was used to test if the groups differed significantly by age. The results revealed there was not a significant difference in groups by age, $t(35) = 1.30$, $p = .20$. Participants were reported to be typically developing (i.e., no cognitive, visual, hearing, speech/language impairments), nonreaders (per teacher and parent reports) and had not mastered receptive and expressive rhyming. Although reports revealed that the participants had not mastered rhyming skills, they were exposed to rhyming during story time and when participating in finger plays and singing songs per the researcher's observations. There were 13 females and 7 males were in the Spuzzles Group, and 9 females and 8 males were in the Traditional Puzzles Group. One participant in the Spuzzles Group was an English language learner and spoke Ukrainian as her first language. The participant was mostly fluent and proficient in her first language but was observed using both languages.

Setting

The study took place at four sites: a university-affiliated childcare center, two church-affiliated childcare centers, and a Head Start center. The university-affiliated and one of the church-affiliated sites provide childcare services mostly to persons associated with the university and to persons within the community. The remaining two sites, a church-affiliated childcare center and a Head Start center, provide services mostly to persons with low socioeconomic backgrounds. Before the study began, time was spent observing each site in order to observe daily routines, procedures, and teachers of children that would possibly participate in the study. An average of one hour was spent observing at each site. A standard curriculum was not used at any of the sites; however, the university-affiliated site and the Head Start center had to adhere to a thematic unit and conduct storybook time, center time, which included a reading center, and circle time. The display of the alphabet was required at both sites. Labels were attached to main objects in the classrooms such as chair, table, window, door, and wall.

Materials

Materials used for the study included: a) Spuzzle cards (Norris, 2001) and b) Read and Rhyme Short Vowels Puzzles (Carson-Dellosa). Spuzzles (Norris, 2001), which were used in the Spuzzles condition, are spelling puzzle rhyme sets that have color pictures with black outlines printed on cardstock. The Spuzzle cards are divided into seven rime families (e.g., -at, -it, -ot). In each set, one card contains a rime and five corresponding cards contain an onset so that when the onset is combined with the rime, a meaningful picture is formed. If an onset picture card is combined with the rime family picture in which it does not belong, then a meaningful picture will not be formed.



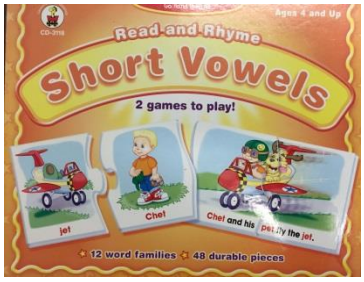


Figure 1. Spuzzles cards from eleMentory.com (left) and Read and Rhyme Short Vowels puzzle cards (Carson Dellosa, n.d.).

Read and Rhyme Short Vowels puzzles, which were used in the traditional puzzles condition, have 12 rime families. Each rime family has two puzzle sets. One puzzle set contains colored pictures of two rhyming words on the front and the other puzzle set contains three rhyming words in a sentence that depicts the color picture on the set. There are pictures on the back of each puzzle set that contains the word that matches the picture. Combining rhyming pairs correctly results in a matched puzzle set.

Measures

The participants were individually assessed one week prior to and following the intervention using a battery of measures. The measures were designed or chosen to assist in identifying the participants' abilities in the areas of receptive and expressive rhyming, letter and sound identification, decoding, and phonemic awareness skills.

The investigator-created rhyming task was used to screen each child's expressive and receptive rhyming abilities prior to participating in the study. The rhyme task consists of six stimulus items that contain black-and-white pictures and their labels. Each stimulus item contains three pictures: one picture located at the top of the page and two pictures located adjacent to each other at the bottom of the page. The child was asked to choose a picture from the two bottom pictures that rhymed with the top picture.

The investigator-created a word-decoding task that measured the ability to decode one-syllable words. The task consists of eight single words that were randomly chosen from either the Spuzzles cards or the Short Vowels puzzles and printed onto cardstock using a one-inch, bold-faced sans serif font. Four rhyme pairs were chosen from each group's activities. Each child was given the rime family from which each word was taken and was instructed to decode the words when presented. Each child was only assessed on the words taken from the materials used from his intervention sessions.

Individual Growth and Development Indicators. The IGDI (University of Minnesota, 1998) is an assessment developed to identify participants at risk and evaluate the effectiveness of intervention. The three subtests were administered prior to and following the intervention including picture naming, alliteration, and rhyming.

Letter Naming and Letter Sound Task. The letter naming and sound task assesses letter knowledge and consists of 26 letters on the sheet containing uppercase letters and 28 letters on the sheet containing lowercase letters. The two extra lowercase letters are variations of the letters "a" and "g." Each sheet was presented to the child and the child was asked to name each letter and letter sound.

Phonemic Awareness Assessment. The Phonemic Awareness Assessment (National Center on Education and the Economy and the University of Pittsburgh, 1998*)* is a criterion-referenced assessment and includes five subtests including expressive rhyming, isolating initial and ending consonants, blending onsets and rimes, and blending separately spoken phonemes.

Procedure

All activities were introduced to the participants as games. The Spuzzles Group received instruction in rhyme using Spuzzles and the Traditional Puzzles Group received instruction in

rhyme using rhyme puzzles. The participants were seen in groups of 4 to 5 individuals for six weeks. Instructional sessions occurred twice weekly for twenty minutes in a setting separate from the classroom. The intensity of the activities in both conditions increased as the participants became more independent with producing and identifying rhymes, with each session ending with a review of the rhymes targeted during the session. Intensity of the activities was increased by fading prompts and cues and requiring participants to complete rhyming tasks without visuals.

Spuzzles Group. The instructional session for the Spuzzles Group consisted of expressive and receptive rhyming activities using the Spuzzle cards (Norris, 2001). Seven rime families with five rhyming words in each family were targeted. Each session began with the investigator giving the participants a definition of rhyme (e.g. "Rhyming is when you have two or more words that have the same ending sound but a different beginning sound"). The investigator then demonstrated the concept of rhyme using the Spuzzles cards. When instructed, the participants matched the onset card to the appropriate rime card and demonstrated this skill independently after given multiple opportunities. After making an appropriate match, the participants named a word that rhymed with the picture that was formed. If the participants could not name a rhyme, then a phonemic cue would be given. If the participants could not produce a rhyme after given a phonemic cue, then a rhyme was shown to them using a different onset card from the same rime family.

Traditional Puzzles Group. The instructional session for the Traditional Puzzles Group consisted of receptive and expressive rhyming activities using the Read and Rhyme Vowels (Carson Dellosa) puzzles. Twelve rime families with three rhyming words in each family were targeted. More rime families were targeted in the Traditional Puzzles Group due to the number of rhyming words available for each rime puzzle set. This enabled participants in both groups to be

exposed to an almost equal number of rhyming words (35-Spuzzles Group; 36-Traditional Puzzles Group). Each session began with the investigator giving the participants a definition of rhyme. The investigator then demonstrated rhyme using the Short Vowels puzzles. The investigator instructed the participants on how to match the puzzle pieces that rhymed. The investigator then presented each participant with a puzzle piece and asked if the picture on the piece rhymed with one of the two target pictures on the puzzle pieces. After finding and matching the appropriate puzzle pieces together, each participant named a word that rhymed with the two pictures on the puzzle. If the participant could not produce a rhyme, then phonemic cues were given. If the participant could not produce a rhyme after being given a phonemic cue, then a visual cue was given using the puzzle pieces.

Interrater Reliability

A second judge familiar with scoring early literacy assessments recalculated all pre- and post-test scores for the Phonemic Awareness Assessment and Letter Naming and Sound task. Level of agreement on recalculated scores was 100% accurate. Data entered into data sheets were confirmed by the investigator and one other individual who received extensive training on inputting data prior to the study. Agreement on data entered into data sheets was 100% accurate. The reliability of the participants' responses was not calculated due to lack of permission to audio- or videorecord assessment and treatment procedures.

Design of the Study

The current study utilized a matched group quasi-experimental design in which groups were randomly assigned to the Spuzzles or traditional puzzles condition. Due to the nature of the study, a control group was not included. Consequently, two types of rhyming interventions were compared, creating a lack of control for environmental and maturational learning. Dependent

variables included receptive rhyming, expressive rhyming, phonemic awareness (i.e., isolate initial and ending consonants, blend onset and rimes, and blend separately spoken phonemes, and alliteration), letter knowledge, and single-word decoding skills. Six 2x2 (Group x Time) mixed design repeated measures (RM) ANOVAs were used to analyze data (Huck, 2009).

Effect sizes are considered to represent clinical changes and were calculated for each statistical analysis. According to Cohen (1988), a partial eta squared effect size of .001 is a small effect, .06 a medium effect, and .14 a large effect.

Results

The effects of two different rhyming interventions on receptive and expressive rhyming skills, phonemic awareness abilities, and decoding one-syllable words were investigated. Descriptive statistics for each dependent variable are presented in Table 1.

Table 1

Descriptive Statistics by Group for Dependent Variables

	Spuzzles Group		Traditional Puzzles Group	
Dependent Variables	Pre *M* (*SD*)	Post *M* (*SD*)	Pre *M* (*SD*)	Post *M* (*SD*)
Receptive Rhyming	3.75 (4.12)	8.75 (6.52)	4.82 (5.88)	6.18 (5.65)
Expressive Rhyming	0.15 (0.49)	2.75 (1.68)	0.00 (0.00)	1.24 (1.68)
Phonemic Awareness Skills	0.60 (1.23)	3.70 (3.28)	1.35 (3.50)	2.41 (4.57)
Letter Sounds	4.30 (7.48)	6.90 (8.89)	4.88 (7.79)	6.47 (9.26)
Letter Names	17.75 (20.07)	24.65 (21.82)	19.76 (19.47)	23.35 (20.30)
Decoding	0.00 (0.00)	2.10 (2.36)	0.00 (0.00)	1.06 (2.30)

Receptive and Expressive Rhyming

It was hypothesized the Spuzzles Group would show significant improvement in expressive and receptive rhyming skills when compared to the Traditional Puzzles Group.

Receptive Rhyming. A mixed-design RM ANOVA revealed a significant main effect for receptive rhyming, $F(1, 35) = 22.94$, $p < .001$, $\eta_p^2 = .40$ indicating use of a visual onset-rime strategy resulted in greater gains. There was a significant Group x Time interaction, $F(1, 35) = 7.56$, $p = .009$, $\eta_p^2 = .18$, which indicated the Spuzzles Group made significantly more improvement in receptive rhyming than the Traditional Puzzles Group, thus supporting the hypothesis that the Spuzzles Group would show more improvement in receptive rhyming skills. However, there was not a significant between group difference in receptive rhyming scores, $F(1, 35) = .19$, $p = .67$, $\eta_p^2 = .01$. The significant interaction indicates significant gains for the Spuzzles Group in comparison to the Traditional Puzzles Group.

Expressive rhyming. A mixed-design RM ANOVA revealed a significant main effect for expressive rhyming scores, $F(1, 35) = 52.65$, $p < .001$, $\eta_p^2 = .60$. There was a significant Group x Time interaction, $F(1, 35) = 6.67$, $p = .014$, $\eta_p^2 = .16$ indicating an advantage for the Spuzzles Group in expressive rhyming skills and supporting the hypothesis that the Spuzzles Group would show more improvement in expressive rhyming skills. In addition, the between group difference in expressive rhyming scores was significant, $F(1, 35) = 7.63$, $p = .009$, $\eta_p^2 = .18$.

Phonemic awareness abilities. The phonemic awareness subtests scores were combined to produce one general phonemic awareness score and to avoid making Type I errors. It was hypothesized the Spuzzles Group would show significant improvement in phonemic awareness skills when compared to the Traditional Puzzles Group. A mixed-design RM ANOVA revealed a

significant main effect for phonemic awareness abilities, $F(1, 35) = 17.45$, $p = .00$, $\eta_p^2 = .33$. There was a significant Group x Time interaction, $F(1, 35) = 4.20$, $p = .048$, $\eta_p^2 = .11$, indicating an advantage for the Spuzzles Group's phonemic awareness abilities. Additionally, the between group difference for phonemic awareness abilities was significant, $F(1, 35) = 17.33$, $p = .00$, $\eta_p^2 = .33$. The above results provide support for the hypothesis that the Spuzzles Group would show greater improvement in phonemic awareness skills.

Letter knowledge. It was hypothesized the Spuzzles Group would show significant improvement in letter knowledge (i.e., naming letters and phonics) when compared to the Traditional Puzzles Group. A mixed-design RM ANOVA revealed a significant main effect for letter naming abilities, $F(1, 35) = 16.83$, $p = .00$, $\eta_p^2 = .33$. There was not a significant Group x Time interaction, $F(1, 35) = 1.68$, $p = .20$, $\eta_p^2 = .05$. However, the between group difference for letter naming abilities was significant, $F(1, 35) = 41.54$, $p = .00$, $\eta_p^2 = .54$; thus supporting the hypothesis that the Spuzzles Group would show significant improvement in letter naming when compared to the Traditional Puzzles Group.

Analysis of naming letter sounds or phonics revealed a significant main effect, $F(1, 35) = 19.13$, $p = .00$, $\eta_p^2 = .35$. There was not a significant Group x Time interaction, $F(1, 35) = 1.12$, $p = .30$, $\eta_p^2 = .03$. However, the between group difference for naming letter sounds was significant, $F(1, 35) = 17.19$, $p = .00$, $\eta_p^2 = .33$. The hypothesis that the Spuzzles Group would show significant improvement in phonics was supported.

Decoding one-syllable words. It was hypothesized the Spuzzles Group would show significant improvement in decoding one-syllable consonant-vowel-consonant (CVC) words when compared to the Traditional Puzzles Group. A mixed-design RM ANOVA revealed a significant main effect for decoding one-syllable words, $F(1, 35) = 16.25$, $p = .00$, $\eta_p^2 = .33$.

There was not a significant Group x Time interaction, $F(1, 35) = 1.83$, $p = .19$, $\eta_p^2 = .05$. However, the between group difference for decoding one-syllable words was significant, $F(1, 35) = 16.83$, $p = .00$, $\eta_p^2 = .33$. The hypothesis that the Spuzzles Group would show significant improvement was supported.

Discussion

Rhyme can be taught using effective strategies (i.e. meta-awareness of onset and rime and rhyming puzzles) that result in an increase in early reading skills. More specifically, using a visual onset-rime strategy seems to be more effective than using a traditional strategy with puzzle sets. This finding distinguishes this study from previous studies that sought to explain the effects of rhyming (Yeh & Connell, 2008); connected rhyming to later reading abilities (Goswami & Bryant, 1990); and failed to connect rhyming to later reading abilities (Hulme et al., 2002). Few studies have focused on effective strategies that teach rhyme; current preschool curriculums give very little focus to rhyme (Yeh & Connell, 2008; Majsterek et al., 2000; Ziolkowski & Goldstein, 2008); and minimal classroom activities involve explicit instruction in rhyme. This is a concern given that several reviews of extant literature have suggested that rhyme is the foundation for other phonological awareness skills (e.g. alliteration, phonemic awareness, onset-rime) that predict and contribute to success in reading (Phillips et al., 2008; Schuele & Boudreau, 2008; Chard & Dickson, 1999). As a result, it is imperative that effective teaching strategies are used to teach early phonological skills (e.g. rhyming, phonemic awareness).

The participants in the current study made significant gains in receptive and expressive rhyming skills with the use of explicit instruction. Furthermore, participants in the Spuzzles Group outperformed participants in the Traditional Puzzles Group suggesting that using visual

analogy is an effective tool for teaching expressive and receptive rhyming skills, particularly in the case of using a visual onset-rime strategy (i.e., Spuzzles). This finding also suggests that not all rhyming interventions yield similar improvements in receptive and expressive rhyming.

As expected, the participants in the Spuzzles Group made significantly greater progress in their phonemic awareness abilities. The Traditional Puzzles Group made gains as well but they were not significant. This finding is consistent with the Situation Discourse Semantics (SDS) model of phonemic awareness that proposes rhyme exists on a continuum with itself and with other subcomponents (e.g., rhyme, alphabet knowledge) of phonemic awareness (Hoffman & Norris, 2002) and with the findings of a meta-analysis by Anthony and Lonigan (2004). The SDS phonemic awareness model suggests that the learning of one source (e.g., rhyme) of the model contributes to the learning of more complex levels of each source and to other sources (e.g., word recognition, alphabet knowledge) of the phonemic awareness continuum. Although participants did not receive direct instruction in phonemic awareness skills, teaching rhyming facilitated phonemic awareness learning. The above finding also contradicts findings of earlier studies that found teaching rhyme had no effect on the learning of phonemic awareness skills (Martin & Byrne, 2002; Yeh & Connell, 2008).

The significant gains in letter knowledge provide further support for the SDS model of phonemic awareness. The explicit teaching of rhyming skills may be attributable to the participants' gains in naming letters and letter sounds. The participants' inherent parsing of words into their onset and rime constituents and then blending them to form a rhyming word inevitably compelled them to examine the letters and sounds in the onset and rime, thus improving letter knowledge. The significant gains in letter knowledge imply a causal relationship between learning to rhyme and increased letter knowledge and provide further support for

Goswami and Bryant's (1990) causal connection theory linking reading and rhyming. It is possible that the causal relationship between rhyming and reading is mediated by letter knowledge as suggested in prior studies (Blaiklock, 2004; Foy & Mann, 2006). However, it is important to note the findings in this study are preliminary and warrant further study.

Significant gains were shown in decoding skills for both groups, indicating that teaching rhyme does influence single word decoding abilities. The relationship mediated by letter knowledge and phonological awareness skills may have facilitated the gains in single-word decoding skills. When rhyming, the word has to be parsed and then blended to form the new rhyming word. The inherent blending of onset and rime mimics the decoding skills needed for successful reading. The relationship between learning to rhyme and decoding skills support the model suggested by Bryant et al. (1990), in which rhyme and alliteration has a direct impact on successful reading. Although both groups made significant progress, it is noteworthy to add more participants in the Spuzzles Group were able to decode CVC words than participants in the Traditional Puzzles Group did. This finding is consistent with studies that support early readers read by analogy (Ehri & Chun, 1996; Goswami, 1990, 1993; Goswami & East, 2000). The use of a visual onset-rime strategy may explain the difference in gains between the groups.

The significant gains in phonemic awareness skills are inconsistent with findings reported by Schuele and Boudreau (2008) in an extant review of literature that states children have to learn less complex phonological awareness skills (e.g. rhyme, alliteration) before learning more complex tasks such as word decoding. Participants in the current study were able to learn phonological awareness skills simultaneously (i.e., rhyming and phonemic awareness; rhyming and decoding CVC words). Furthermore, the findings of the current study indicate that a hierarchy does not exist when children are learning phonological awareness skills (Chard &

Dickson, 1999; Phillips et al., 2008; Schuele & Boudreau, 2008). This is demonstrated by the ability of the participants in this study to simultaneously learn rhyme, isolate initial and final consonants, blend onsets and rimes, and blend separately spoken phonemes. Conceivably, instruction in early reading instruction for three- and four-year-olds should include teaching phonemic awareness as well as rhyming, given the participants' progress in this area without direct instruction. It is notable to add that participants performed better on less complex tasks (e.g., receptive rhyming) when compared to performance on more complex tasks (e.g., isolating initial consonants).

Participants in both groups made significant gains in early literacy skills confirming the findings of previous studies (Brazier-Carter, 2008; Terrell, 2007) that found visual strategies could affect significant change in early literacy skills. Participants in the Spuzzles Group consistently made greater gains on dependent variables than participants in the Traditional Puzzles Group did. The increased gains for the Spuzzles Group may be due to implementation of the visual onset-rime strategy. Furthermore, these findings coincide with a previous study that found visual analogy has a positive effect on learning (Alesandrini, 1984).

Limitations of Research

A major limitation of the current study was the lack of a treatment fidelity instrument, which ensures treatment was implemented according to procedures set before the study began. This study included two groups that received instruction in rhyming; however, a control group was not included to account for gains that were solely attributable to classroom teaching and learning. Additionally, the area in the childcare center in which the research took place was highly distracting and sometimes quite loud. This could have had an impact on the participants' ability to distinguish between sounds aurally, which is critical to completing rhyming tasks. The

inconsistent attendance of several of the participants in the Spuzzles Group may have also influenced the results of this study, affecting the consistency in which intervention was provided. Finally, random sampling could not be implemented due to the nature of the research questions that targeted a specific population and due to limited access to a population of preschool-aged children.

Clinical Implications

The current findings have implications for preschool teachers, childcare providers, early interventionists, and speech-language pathologists. Based on these preliminary findings, parents and educators are urged to include explicit rhyming instruction as part of early reading instruction. Previous studies have indicated that learning to rhyme has an impact on phonological awareness, including phonemic awareness, reading, and spelling abilities (Bradley & Bryant, 1985; Bryant et al., 1990), implicating the importance of phonological instruction. Furthermore, explicit teaching of rhyme facilitates the learning of other phonological awareness skills (Ziolkowski & Goldstein, 2008). Incorporating explicit teaching of rhyme in settings for preschoolers may increase early literacy skills that are important to later reading abilities and may have a positive effect on learning expressive and receptive rhyming in 3-4 year olds. Because greater gains were seen in the Spuzzles Group, it may be useful for the aforementioned professionals to use picture puzzles or visual onset-rime strategies that use visual analogy and have embedded words with onsets and rimes. This may facilitate enhanced learning of rhyming and other early literacy skills as indicated by the results of the current study.

Conclusions and Further Research

In conclusion, the current study provided evidence that preschoolers could learn to rhyme using explicit teaching methods especially when taught using a visual onset-rime strategy. In

addition, using visual strategies resulted in greater gains, suggesting that visual strategies should be used with preschoolers learning how to rhyme, and teaching rhyming should include visual analogy. Furthermore, teaching rhyme to preschoolers influenced the learning of other early literacy skills involving phonological awareness and decoding skills. More importantly, the current study provided evidence that the type of rhyming intervention used may result in differential gains. As a result, more studies are warranted that study the effectiveness of various rhyming interventions.

Further research is also needed to measure the long-term effects of the gains attained by the participants in this study and studies similar to the current study and the effect these gains have on later reading abilities. Because both groups received instruction in rhyme, it is difficult to discern if gains were solely related to the instruction received in rhyming intervention or if gains were partial to classroom learning. Reduplication of this study should include a control group that receives no instruction allowing the researcher to distinguish between gains attributable to rhyming instruction and gains attributable to classroom learning. Although careful consideration was given to the methods used to teach rhyme in the childcare rooms, gains could not be solely attributed to the explicit teaching methods used in this study because both rhyming interventions utilized explicit instruction. Therefore, future measures could also provide information about the effectiveness of teaching rhyme explicitly to preschoolers using visuals.

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