ABSTRACT

Title of Document: PRESCHOOLERS' WORD LEARNING
                      DURING SHARED STORYBOOK READING
                      INTERACTIONS AND CLINICAL
                      IMPLICATIONS FOR EARLY
                      INTERVENTION

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Previous research shows that shared storybook reading interactions can function as effective speech and language interventions for young children, helping to improve a variety of skills—including word learning. This study sought to investigate the potential benefits of elaboration of new words during a single storybook reading with preschoolers. Children were read a storybook containing novel words that were either elaborated with a definition, repeated twice, or only said once. Their word learning for these novel words was then evaluated, and compared across levels of elaboration. Results showed that preschoolers could successfully learn new words during a single storybook reading interaction with an adult. Further analyses found that their learning was most robust when words were repeated twice, rather than elaborated or only said once. These results support the use of storybook reading with children during language interventions, and highlight the importance of repeated exposure to novel material.

PRESCHOOLERS' WORD LEARNING DURING SHARED STORYBOOK
READING INTERACTIONS AND CLINICAL IMPLICATIONS FOR EARLY
INTERVENTION

By

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In many homes, reading books at bedtime is a nightly ritual shared by parents and children that is almost as regular as singing lullabies, brushing teeth, or changing into pajamas. Recent survey data shows that 83% of children between the ages three to five years old who were not yet enrolled in kindergarten were read to by a family member at least three times a week (Federal Interagency Forum on Child and Family Statistics, 2013). Aside from the fact that most children tend to enjoy reading books with parents, research shows that exposure to print materials from an early age can be beneficial for children's later academic success (Mol & Bus, 2011). Storybook reading provides children with a focused environment and rich context in which they can be exposed to a multitude of new sounds, words and sentence structures. Due to the enjoyable nature of shared reading and its potential benefits for children, many clinicians have begun to implement reading into therapy activities as a natural way to promote literacy and language development (Kaderavek & Justice, 2002). Given the importance of acquiring strong language skills early in life (Neuman & Dickinson, 2001), further investigation is warranted regarding effective interventions with children, particularly in the preschool years.

Word learning in young children

Children are remarkably effective word learners. From a very young age, children are able to match spoken words with referents in the environment to learn new words. This ability to acquire labels for objects in their environment with only a single and brief exposure to the label is known as "fast-mapping" (Carey & Bartlett, 1987) and has been shown in both monolingual and bilingual children (Kan & Kohnert, 2008). Even more interestingly, and despite the common belief that things

quickly learned are quickly forgotten, there is evidence that children are able to retain labels that they acquire via fast-mapping in a delayed recall task (Waxman & Booth, 2001). Here, a group of preschool children were taught labels for novel objects through a brief training task and were able to retain these labels in two different recall tests that took place a week after the initial training.

Other research shows that children's knowledge of new words that have been learned through an indirect teaching method, as with fast-mapping, is similar to their knowledge of words that have been learned through an explicit teaching method (Jaswal & Markman, 2003). This shows that children are able to acquire new words even when there is no explicit naming paradigm, such as a parent saying, "This is a ladle" while pointing to a ladle. Rather, children could glean the same knowledge from overhearing a parent say, "Pass me the ladle" and observing their eye-gaze toward the desired object. Furthermore, children's representation of that word would be similar regardless of the method through which they learned the new word. Young children's performance on a simple labeling task and on a delayed recall task requiring generalization of a newly-learned word, is similar for both direct and indirect learning methods (Jaswal & Markman, 2003).

Since children are able to acquire labels for objects in their environment without an adult directly labeling these objects, it is clear that they rely on other clues to map labels onto their appropriate referents. Children must integrate and sift through a multitude of information sources in order to successfully gain new words. Although many specific models have been proposed to account for children's language development, recent research suggests that rather than relying on one source

of information for word learning, children integrate various types of cues in the environment (Hollich, et al., 2000). Following this line of thought, known as the Emergentist Coalition theory of word learning, children rely on "attentional, social and linguistic factors" to acquire new words (Hollich et al., 2000, p. 18). As children develop and become more sophisticated word learners and language users, they use these various types of cues differentially. Attentional cues to word learning are domain-general and refer to how salient or novel an object is in the environment: children will tend to map novel words to novel objects in the environment or to objects that "stand out" from the background (Golinkoff, Hirsh-Pasek, Bailey, & Wenger, 1992). Social cues can include a speaker's eye gaze or pointing. For example, from infancy children can follow a speaker's eye gaze to a referent (Scaife & Bruner, 1975), and this ability may even be correlated with measures of receptive and expressive vocabulary at 12 and 18 months, respectively (Morales, Mundy, & Rojas, 1998). Children will also use gaze cues when learning new words (Baldwin, 1993); for example, they will avoid matching a new word to a novel object that the speaker is not attending to. Linguistic cues require that children are able to identify and segment a speech stream, and could include morphological or syntactic cues that a speaker uses when labeling objects. For example, children are sensitive to words such as "the" that would denote a common versus proper noun for an object that is named (Gelman & Taylor, 1984). Clearly, word learning is a multi-faceted and complex process during which children rely on a variety of different sources of input to match a new word to the appropriate referent in the world.

Shared Storybook Reading as a Language Intervention

Since children rely on multiple cues in the environment to learn new words and acquire language, it seems logical that effective interventions would include ample sources of input for all of these types of cues. Shared storybook reading between an adult and child can be an effective intervention that provides a rich context for language learning because children's storybooks tend to include new words that are made salient in the text, and that are often times paired with a picture of a novel object that stands out from the background. Children also receive the added benefit of joint attention during shared storybook reading interactions, because an adult is reading the book to them. Increasingly, speech-language pathologists have reported using books during shared reading activities when addressing speech and language goals for young clients with speech and language delays. Clinicians reported using children's books to target a wide range of goal areas including vocabulary, literacy, reading and writing, and articulation (Ukrainetz & Trujillo, 1999). There are many reasons for the appeal of shared book reading as an intervention with young clients. This intervention is easily adaptable for a variety of goals in speech and language therapy, and would function well in a group setting (Kaderavek & Justice, 2002).

Shared book reading also represents a naturalistic intervention, thereby allowing therapists to address skills in an environment similar to that in which children would be performing these skills. Such naturalistic interventions are beneficial for acquisition of therapy goals, as well as maintenance and generalization of these skills (Hengst & Duff, 2007; Norris & Hoffman, 1990). Another benefit of

this therapy is that it allows children to be active participants in the therapy interaction, which may help to create a more optimal learning environment (Kwiatowski & Shriberg, 1998). More practically, books represent a relatively widely available and inexpensive therapy material that is portable. Young children also tend to enjoy reading with adults (McKenna, Kear, & Ellsworth, 1995), making this intervention relatively fun for children, which bodes well for promoting a positive client-clinician relationship—one of the most important prognostic indicators for success in therapy (Horvath & Symonds, 1991; Martin, Garske, & Davis, 2000).

Furthermore, shared book reading has been shown to be an effective intervention in a number of investigations. There is evidence that shared reading activities can increase vocabulary in preschool age children who are typically developing (Sénéchal, 1997) and those with communication disorders (Ezell, Justice & Parsons, 2000). In addition to helping children to acquire new vocabulary, shared book reading also has benefits for many other areas of language development. Through a shared reading intervention that involved a clinician's expansion of a child's utterances (for example, a clinician saying "The cow is jumping" in response to a child's comment "cow jump") as well as cloze procedures for eliciting language (for example, a clinician allowing a child to fill in the end of the sentence "The cow is taking a bath because…"), two four-year-old children with language delays showed improvement in their use of syntactically complex sentences (Bradshaw, Hoffman, Norris, 1998). Specifically, these children used more sentences with multiple clauses, more noun phrases, and more verbs in both the past and modal tense. There is also evidence that young children who received a shared reading intervention that

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included expansions increased their overall mean length of utterance (Yoder, Spruytenburg, Edwards & Davies, 1995).

Some evidence also shows that shared book reading interactions can improve children's frequency of responses to adult utterances. When parents were taught to use a more interactive style of reading to their young children, the children increased frequency of their utterances to parents, participated more in the shared reading experience, and also showed improved lexical diversity (Crain-Thoreson & Dale, 1999). So, the use of a shared reading intervention may help children not only to refine aspects of their speech, but also to increase their overall responsiveness and participation in conversational turn-taking.

Perhaps unsurprisingly, there is also evidence that shared reading with young children helps improve their early literacy skills. In one study, two groups of parents completed a reading intervention program with their four-year old children (Justice & Ezell, 2000). One group was instructed to use print-referencing behaviors (for example, commenting "This word says 'house'", asking a child what a word says, or running a finger beneath text while reading) during the reading interaction, while the other group was not trained on these behaviors. Children who received the more interactive print-referencing style of reading showed improved scores on measures of emergent literacy over the children who did not receive this particular style of reading. This suggests that through an interactive shared reading intervention, children are able to improve their early literacy skills.

While it has been widely demonstrated that shared reading interventions are helpful for improving a variety of language outcomes for young children, the exact

mechanisms underlying what makes the intervention effective are less clear. Different studies seem to use many variations on the basic theme of an interactive reading experience that involves rich language input from an adult that is attuned to a child's attention or utterances. One attempt to further investigate what helps children benefit from shared storybook reading examined the role of elaboration of novel words (Justice, Meier & Walpole, 2005). The researchers were interested in whether at-risk kindergartners would be able to acquire new vocabulary words from a storybook intervention, how much of this acquisition could be accounted for by vocabulary ability at study onset, as well as the degree to which elaborated exposure to novel words aids in vocabulary development.

One group of children, the treatment group, participated in 20 storybook reading intervention sessions over a 10-week time period. During this time they were exposed to 10 different books with 60 target words that were used to measure word learning, such that six words of various grammatical classes came from each book. Children heard each storybook four times throughout the intervention. A comparison group also participated in the study, and did not receive the intervention. The target words in each book were further subdivided as to whether they would be elaborated or not—half of all words were elaborated, and half were not. For words that were elaborated during the intervention, researchers followed an "elaboration sequence" (Justice et al., 2005, p. 23) that involved reading the text in which the word appeared, providing a definition of the word, then using the word in a supportive context. Definitions were taken from two dictionaries for children, and a supportive context consisted of using the new word in a sentence in such a way that the context of the

sentence provides a meaning of the word. So, the elaboration sequence contained three potentially helpful mechanisms for word learning: repeated exposure to the target word, a definition of the target word, and use of the word in an additional supportive context. Children's knowledge of all 60 target words was assessed at the end of the 10-week time period.

Results from this study showed that children who received the storybook intervention had a greater knowledge of target words than the children in the comparison group—demonstrating that the vocabulary acquisition observed cannot be accounted for by maturation or another variable. There was also an effect of vocabulary ability at time of intervention onset, such that children in the treatment group who were designated as having lower vocabularies gained significantly more target words than did children in the same group who were designated as having a higher vocabulary. The remaining findings relate to potential differences in word learning for elaborated or non-elaborated words. When word learning of non-elaborated words only was examined (excluding learning for elaborated words), there were no significant differences between word knowledge pre- and post-intervention. However, these differences did exist when word learning for elaborated words was examined. Children from the treatment group also had significantly better word learning for elaborated words than non-elaborated words. The elaboration of words was also important for the impact of vocabulary ability at the time of intervention onset. Children with low vocabularies who received the intervention showed significantly more word learning for elaborated words than did children with low vocabularies who did not receive the treatment. However, this effect did not hold for

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word learning of non-elaborated words. This suggests that the elaboration of words in a storybook reading intervention is important for all children, and perhaps even more so for children that have a lower vocabulary ability to begin with.

Despite these promising findings, it is important to consider the task that researchers used to assess word learning. For both pre- and post-test evaluations of children's word learning, experimenters asked kindergartners to define the target word. Children were asked, "Do you know what (target word) means?" and were prompted to provide a synonym ("Tell me another word that means the same as (target word).") if they were unable to provide an answer initially. During the reading interventions, children in the treatment group received additional experience with word definitions. They were provided with explicit definitions of words, and also sentences containing an amount of supportive context that functioned as an effective substitute for a definition. The fact that the methodology of this study relied so heavily on young children's definition skills is somewhat problematic, given that the ability to define a word is a later-developing skill that children are generally not exposed to until they enter school (Nippold, 1995), and is even targeted explicitly by some teachers (Kurland & Snow, 1997). To define a word, children must have a "knowledge that words are symbolic, and separable from the things they refer to" (Kurland & Snow, 1997, p. 604). Creating a definition of a word requires not only understanding of the word itself, but also that children are proficient enough language users to explain one word using other words (Benelli, Belacchi, Gini, & Lucangeli 2006). There is also evidence that children's ability to give formal definitions is

improved with exposure to other formal definitions and opportunities to practice making their own definitions (Kurland & Snow, 1997).

These findings regarding the requisite skills and awareness needed to give a formal definition point to a potential problem with the assessment of word learning used by Justice et al. in 2005. Since the children who received the storybook reading intervention also received exposure to formal definitions with each reading, they had an advantage over children in the control group on the basis of definitional skill alone. It is possible that these children showed better word learning, than children in the control group not because they received the storybook reading intervention, but because they had extra practice with and exposure to formal definitions. Perhaps children in the control group did have some knowledge of meaning for the target words, but they were unable to express this knowledge through formal definitions.

These results point to the idea that providing children with elaboration of new vocabulary words during shared reading is important for vocabulary acquisition. However, given that an elaboration procedure with multiple components was used, it is less clear exactly how or why elaboration was so beneficial. Also, given the potential confound of using definitions to assess children's word learning, the results are less convincing. Further research is warranted to investigate which component of the process aided word learning —whether it was simply repeated exposure, hearing a word's definition, or hearing that word in a supportive context (Justice et al., 2005). Future research should also assess children's word learning in a way that is more developmentally appropriate, and does not rely on the acquisition of another skill to demonstrate knowledge.

Impact of Early Language Skills on Later Outcomes

Early language skills in general are necessary for young children to be able to acquire more language and access classroom curriculum, and word learning is a particularly important component of these early language skills. Vocabulary size is closely linked to children's reading comprehension abilities and overall academic achievement (Dickinson, Cote, & Smith, 1993). Children's expressive vocabulary, as measured by a parent-report checklist, along with reaction times during a language processing task, were both found to be a predictor of later language and cognitive abilities (Marchman & Fernald, 2008). Here, children's vocabulary at two years of age was compared to their performance on standardized tests of expressive language and IQ at eight years of age. The fact that early vocabulary is a predictor of not only later language ability but also broader cognitive measures supports the idea that early vocabulary is an important factor in determining future academic success.

Young children are often exposed to new vocabulary words through books or other reading interactions (Dickinson, Cote, & Smith, 1993). The importance of early exposure to print materials and books has been widely studied. A recent meta-analysis of the topic cited early exposure to print and early literacy skills as contributing to an "upward spiral of causality" (Mol & Bus, 2011, p. 267) wherein children who are exposed to books more tend to enjoy reading, which leads them to seek out reading experiences more, which in turn helps to improve literacy skills. In fact, for children in preschool and kindergarten print exposure is accountable for 12% of students' variance in oral language ability; by middle school this percentage grows to 19%, then to 30% in the high school years, and to 34% when students are in

college (Mol & Bus, 2011). Clearly, early exposure to print and engaging in reading experiences are an important factor in later language proficiency.

Longitudinal studies of children who are identified as "late-talkers", or toddlers who have low expressive vocabularies without any other known delay or disorder, have revealed a variety of adverse outcomes for these children (Desmarais, Sylvestre, Meyer, Bairati, & Rouleau, 2008). These outcomes reach across domains, from greater difficulties in academics (Durkin, Simkin, Knox & Conti-Ramsden, 2009) to less successful social interactions and even a greater risk for psychiatric disorders (Toppelberg & Shapiro, 1999). This myriad of problems related to early language skills highlight the importance of early intervention with young children with delayed language ability.

Early interventions may be able to act as an effective measure to prevent such negative outcomes later in school and even into adulthood. Research has shown that while young children with language impairments are at a higher-risk for difficulties in school later in life, those children who improve their language skills before late elementary school have better outcomes in reading than those whose language impairments have remained stable (Catts, Fey, Tomblin & Zhang, 2002). This suggests that perhaps by improving language at an early age, children with language impairments may be able to attain the same level of achievement as their typically developing peers. There is also evidence that a relatively low-cost and easy to implement early intervention program that places emphasis on reading in kindergarten does have benefits for children who received the treatment (Justice et al., 2010). Here, children from 14 different publicly funded preschools participated in a

30-week intervention wherein teachers implemented a supplemental language and literacy program that included reading a storybook and completing activities and lesson plans that pertained to the book. At the end of this 30-week period, children's language and emergent literacy skills were measured. Children who received this intervention had significantly higher scores in both areas than children from comparable preschools who did not. These findings show that successful early intervention programs are possible, and that these programs are feasible in a real school setting.

Clinical Implications for Speech-Language Pathologists

According to the American Speech-Language-Hearing Association (ASHA), provision of services to young children, including infants and toddlers, is within a speech-language pathologist's scope of practice (American Speech-Language-Hearing Association [ASHA], 2007). Furthermore, ASHA places a strong emphasis on intervention that is grounded with a strong evidence base. In their document regarding the knowledge and skills required of a speech-language pathologist in early intervention, ASHA also cites that clinicians should promote "prevention" activities and strategies with clients and families (American-Speech-Language-Hearing Association [ASHA], 2008). More research is needed to thoroughly develop early intervention practices that are evidence-based and that can aid in the prevention of future deficits.

In recent years, clinicians and educators have been re-examining the role of speech-language pathologists in schools. There has been an increase in collaboration among speech-language pathologists and teachers, and research indicates that services

provided in the classroom can be an effective service delivery model (Throneburg, Calvert, Sturm, Paramboukas, & Paul, 2000). In a position statement on the role of speech-language pathologists in the schools, ASHA stated that clinicians should work with other school professionals to provide services that promote language and literacy for students (American Speech-Language-Hearing Association [ASHA], 2010). This is relevant to the present study, because it offers support for the idea that clinicians are stakeholders in students' vocabulary acquisition. In their position statement, ASHA states that one of the roles of speech-language pathologists in schools is to help students with learning difficulties access curriculum. Given that vocabulary deficits can be a major barrier to students' reading comprehension and therefore academic success (Ehren, 2002), clinicians need to incorporate word learning strategies in their interventions.

The present study seeks to add to the evidence base of speech-language pathology interventions both in schools and in early intervention environments, with shared book reading interactions as a focus. Although storybook reading has been shown to be effective in a number of studies, there are still questions regarding what exactly makes this shared reading experience beneficial for the language development of young children (Justice et al., 2005). Specifically, the role of elaboration of novel words is still somewhat unclear. While children do show better learning for words that are elaborated over those that are not elaborated (Justice et al., 2005), the question of which part of the elaboration is particularly helpful is not known. The potential factors that could explain the importance of elaboration in children's word learning are: repeated exposure to a new word, the provision of a definition, or

hearing a word in a supportive context (a sentence whose context provides the definition of a word).

This study investigated the mechanisms behind preschoolers' word learning during storybook reading interactions with preschool children. Specifically, we investigate whether or not new words must be elaborated for children to successfully learn them. Children were presented with novel words that were either elaborated with a definition, repeated multiple times, or only mentioned once—their word learning across these different levels was then compared to answer the question of what exactly is facilitating vocabulary acquisition.

In the context of a storybook reading interaction, children were exposed to six different nonwords, with each nonword receiving a different level of mention or elaboration. The three conditions that were used were: elaboration with a definition, multiple repetitions (two times), or a single mention. Children only heard extra information about the word in the elaboration condition; the other two conditions did not give any additional information about the word. After reading the story, children's novel word learning was assessed using a preferential-looking paradigm. This type of assessment was selected principally for its ability to assess children's word knowledge without requiring them to express that knowledge explicitly (Golinkoff, Ma, Song, & Hirsh-Pasek, 2013). This paradigm uses children's visual fixation on one of two objects presented on a screen as a way to infer word knowledge. Using this method to measure word learning eliminates the possibility that children will give incorrect or incomplete answers due to inadequate expressive language skills. Furthermore, successful performance with this method does not require that children

have prior experience with the mode of assessment, as with creating formal definitions.

It was predicted that children would show the most robust word learning when words were elaborated, as compared to words that were repeated twice or only mentioned once. This effect was predicted because elaboration with a definition is the only condition that provided children with extra semantic information about the item. When words were repeated twice or only mentioned once, no additional information about the function, appearance, or location of the object was included. When words were elaborated, children were provided with additional information that pertained to an object's function, location, or category—depending on the object that was being defined. Previous research has shown that children's word learning is better when they are provided with additional semantic information about a word (Blachowicz, Fisher, Ogle, & Watts-Taffe, 2006). With additional semantic information, children can create categories of meaning or establish connections between novel words and already known concepts—which may benefit their word learning (Pittelman, Heimlich, Berglund, & French, 1991). However, it is also possible that providing additional information could be overwhelming, and thus could overload children's memory skills (resulting in poorer memory). Although that is not the current prediction, the study design would allow for evaluation of this alternative.

Method

Participants

Twenty-five children, with a mean age of 36.02 months, participated in this study. One child was not included in the final analysis due to hearing impairment,

another child was not included due to noncompliance during the book reading and word learning assessment. 23 participants were included in the final analysis (8 males, 15 females), they had a mean age of 36 months. All participants were recruited from the University of Maryland's Infant and Child Studies database. Children were offered a small toy for participation in the study. All participants were English monolinguals, as judged by parental report of exposure to at least 80% English. Participants had no receptive or expressive language delays as judged by parental report and completion of the MacArthur-Bates Communicative Development Inventory III (Fenson et al., 2006). Participants had no known hearing impairments and no ear infections at the time of the experiment, as per parental report.

Materials

Participants were given a color storybook including both pictures and text. The storybook centered around the theme of a child working in a garden for the day, and was 16 pages long. The book contained six nonwords (needoke, koopa, snirk, zoop, yosh, tydo), which were used to label common nouns in the story. This number of novel words was chosen because it allows for multiple instances of each type of elaboration without being too large, which can be overwhelming for young learners (Christ & Wang, 2012). The words were integrated into the narrative of the story. Within the story, two nonwords were elaborated with a definition (for example, "I need to get my tydo! A tydo is a tool that I use when I need to dig in the dirt before I plant seeds"), two nonwords were repeated twice but did not contain any specific definitional information (for example, "I also need to bring a koopa! I use my koopa all the time! My mom has one of these that she uses, too"), and two nonwords were

only said once (for example, "I have to get a zoop, too! This one looks pretty good! My younger brother really likes these!").

The pairing of words with objects, and therefore their order of appearance in the storybook, was randomized using a modified Latin squares design. The order of elaboration types was counterbalanced across orders using ABBA counterbalancing. To eliminate primacy or recency effects, each storybook contained at least three pages of narrative (that included neither the pictures of objects nor the nonwords used to label them) at the beginning and end of the story. A sample of a complete storybook is included in Appendix A.

While viewing the storybooks, participants listened to a previously recorded reading of the story. The recording was created by a female native speaker of English, using child-directed speech to maintain participants' interest and attention to the story (Fernald, 1985). Recordings were created using a Shure SM81 microphone and Mackie Microseries 1202-VLZ mixer. They were then edited with Syntrillium CoolEdit Pro computer software so that peak intensity was uniform across all sentences. The recordings also contained tones that signaled when a page should be turned; these were included so that all participants were exposed to each page for an equal amount of time. All pages that contained nonwords were presented for an equal amount of time, so that participants were not exposed to one object more than another. The recorded reading was presented to children via loudspeaker from a laptop computer that was set at a predetermined volume level.

During the preferential-looking portion of the study, participants viewed a short movie that contained pictures of two items previously labeled in the storybook.

These two images were presented side-by-side on the screen, such that one was on the left and the other was on the right. Images of objects were paired according to the type of elaboration that they received; for example, items that had been elaborated with a definition were always paired together. This was done to ensure that children could not use a process of elimination to look at a correct item if the two items were elaborated differently. For example, if an item that had been elaborated is paired with an item that was only said once, and participants had actually only learned elaborated items, they might still look correctly on a trial asking for the item said once. This would not be because they successfully learned the label for that item but because they know that it is not the item that was elaborated, for which they learned the label successfully.

All test trials were six seconds long, and used the same carrier phrase "Where's the ….? Look at the …?" to instruct the participants where to look. In all test trials, the target word onset was presented at the same time (2.85 seconds from the start of the trial). Carrier phrases were recorded in child-directed speech by the same female speaker of native English as recorded the storybook, using the same recording equipment previously mentioned above. The order of presentation of test trials was randomized based on the nonword that was asked for. Since the pairing of nonwords with types of elaboration was randomized in each storybook, this ensured that types of elaboration were tested randomly in the test trials. To avoid a possible looking bias to one side or another, the side of the screen on which the correct image appeared was also pseudo-randomized such that no more no more than three test trials in a row had the correct item on the same side.

Equipment

To play the recorded storybook readings to participants, a loudspeaker was set at a predetermined volume level, and connected to a laptop computer. For the preferential looking portion of the study, children were seated in front of a 58-inch Samsung television screen that played videos and speech samples for participants. A Canon SLIK SH-705E digital camcorder was mounted above the screen to record participant looking behaviors. All children were seated on their parents' laps in a chair approximately 5 feet away from the television screen. Participants' parents listened to masking music through supra-aural headphones.

Procedure

Before initiation of the experiment, parents were asked if their children knew the names for the objects that would be labeled with nonwords during the experiment. After obtaining informed consent from participants' parents and verifying that children had no knowledge of objects that were included in the story, participants and their parents were led to a testing room. There, participants were given the option to either sit on their parents' lap for the entire study, or to sit on the floor with the researcher while listening to the book and then sitting on a parent's lap while watching the movie. Parents sat on a chair listening to masking music during the entirety of the study, so as not to give any extra input about the story or influence their children's behavior. When the participants and parents were settled, the researcher explained to participants that they would hear a new story, and that they needed to listen closely during the reading and wait to ask any questions. The researcher then began the recorded reading of the storybook, and positioned the book

in front of the participant, as would be done during a normal joint reading interaction. While the recorded reading was playing, the researcher flipped pages of the book to match the pace of the tones that were included between pages. When new words (nonwords) were highlighted, the researcher pointed to the corresponding picture in the book so that participants could associate the new word with its referent.

At the end of the story, the researcher informed participants that they would now watch a short movie. If sitting on the floor, participants were seated on their parents' laps in front of the television screen in the testing room. Eprime software was used to present both practice and test trials to participants (Psychology Software Tools, Pittsburgh, PA). The study began with two initial practice trials to familiarize participants with the format of the task. During practice trials, participants heard a voice that directed them to look at one of two familiar objects that were on either the left or right side of the television screen. After these trials were completed, test trials for knowledge of the new words introduced in the story began. There were three test trials for each novel word that was presented, such that there were 18 test trials total. Participants' eye gaze during practice and test trials was recorded via a camera above the television monitor.

Design

A single factor repeated measure design with three levels was used to analyze participants' looking behavior during test trials. The factor was the level of elaboration for a nonword, and the three levels were: definition, repeated twice, and said once. The independent variable was the type of elaboration used to define a nonword, and the dependent variable was the proportion of time that children spent

looking at the correct item following target word onset during test trials. A two-way repeated measures analysis of variance was used to compare the proportions of time that children spent looking at correct (target) or incorrect items across different types of elaboration.

Test trials in which a participant did not look at the screen for at least 15 frames, or approximately 16% of the total test trial time after target word onset, were counted as "no look" trials. Data from participants who have all "no look" trials for four or more words, such that they have no eligible data from any of the three test trials for a given word, were not included in the final analysis.

Coding

Participant videos were coded frame-by-frame by the researcher to record looking times during test trials. The computer program SuperCoder Universal (Hollich, 2008) was used to calculate looking times. The researcher, who had been extensively trained in use of the program and passed a lab standardized reliability check, coded all videos to ensure consistency in data collection. All coding of videos was done with no volume, so that the coder was blind to the word or type of elaboration that had been used for a given trial.

Results

Participants' looking times to correct or incorrect items on the screen were used to measure their word learning during the preferential-looking portion of the study. After coding videos frame-by-frame, proportion of time spent looking to the correct (target) or incorrect item in each trial after target word onset was calculated. These proportions were determined by first calculating the total number of frames

participants spent looking at either the target or incorrect item after target word onset. Then, the number of frames spent looking at the target item and the incorrect item were both divided by this aggregated number of frames to create a proportion value. These proportions were then averaged across words, so that each child had averaged accuracy rates for each level of elaboration. These averages were used for further analyses.

Word Learning with Different Levels of Elaboration

To explore possible differences in children's word learning with various levels of elaboration or repetition, a two-way repeated measures analysis of variance (3 x 2) was used to compare the proportions of time that children spent looking at correct (target) or incorrect items across different types of elaboration. This analysis revealed a significant main effect of accuracy, $F(1,22)= 6.913$, $p = .015$. Participants' mean proportion of time spent looking at the target item (M = .540) was higher than the mean time spent looking at the incorrect item (M = .450); thus, there was a higher proportion of looking-time to the correct rather than incorrect item across all types of elaboration. The main effect of type of elaboration was not significant, $F(2,44)= .324$, $p = .725$. The interaction effect of type of elaboration and accuracy was approaching significance, $F(2,44)= 2.644$, $p = .082$.

A series of follow-up paired-samples t-tests were completed to determine if one particular level of elaboration was driving the main effect of accuracy in looking behavior to the correct item. There were no significant differences in the proportion of time participants spent looking at the target or incorrect item when words were either elaborated, $t(22) = .642$, $p = .527$, or only said once, $t(22) = 1.307$, $p = .205$.

However, there was a significant difference in the proportions of looking time when words were repeated twice, $t(22) = 3.316$, $p = .003$—such that the proportion of time participants spent looking at the target item ($M = .583$) was higher than the proportion of time spent looking at the incorrect item ($M = .41$). This trend can be observed in Figure 1.
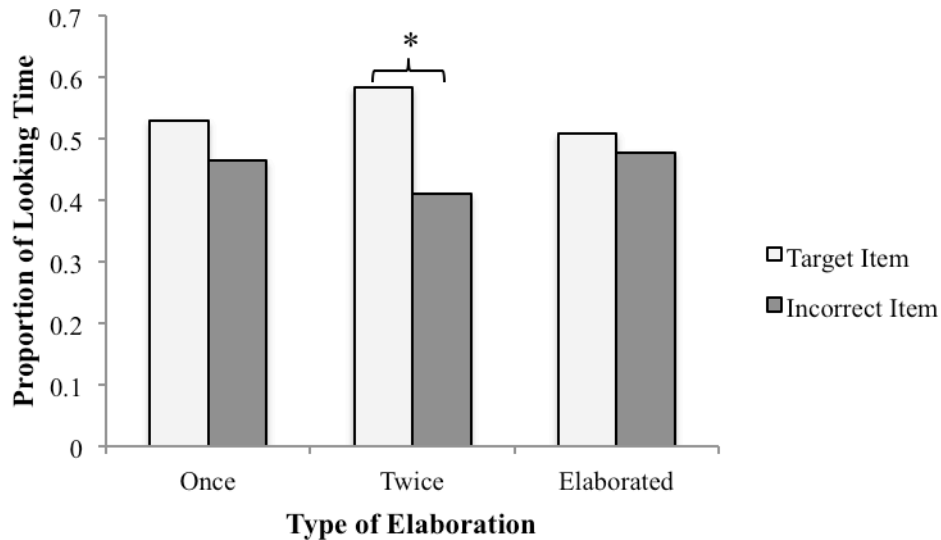
Figure 1. Proportion of looking times to correct or incorrect item across different types of elaboration.

The interaction across types of elaboration approached significance, but did not quite reach it. That said, this trend toward significance, combined with the fact that participants only showed significantly appropriate looking in one of the three conditions, suggests that this type of elaboration is driving much of the main effect of accuracy.

Differential Word Learning Across Levels of Elaboration

To assess whether there were significant differences in word learning accuracy across the different levels of elaboration, a series of paired-samples t-tests were conducted. For these analyses, we used difference scores of the proportion of

time participants spent looking at the correct item minus the proportion of time spent looking at the incorrect item. Difference scores were used because they represented disparities in looking behavior to the correct or incorrect item in a single number, and therefore allowed for cleaner comparisons between the different levels of elaboration. There were no significant differences between difference scores when words were said once or repeated twice ($t(22) = 1.510$, $p > .05$), or when they were said once or elaborated ($t(22) = .511$, $p > .05$). The only significant difference between levels of elaboration existed when difference scores were compared for words repeated twice or elaborated ($t(22) = 2.659$, $p < .05$). Participants' mean difference score when words were repeated twice (M = .172) was higher than their mean difference score when words were elaborated (M = .031), such that word learning when a word was repeated twice was significantly better than when the word was elaborated. See Figure 2 for a representation of these differences.
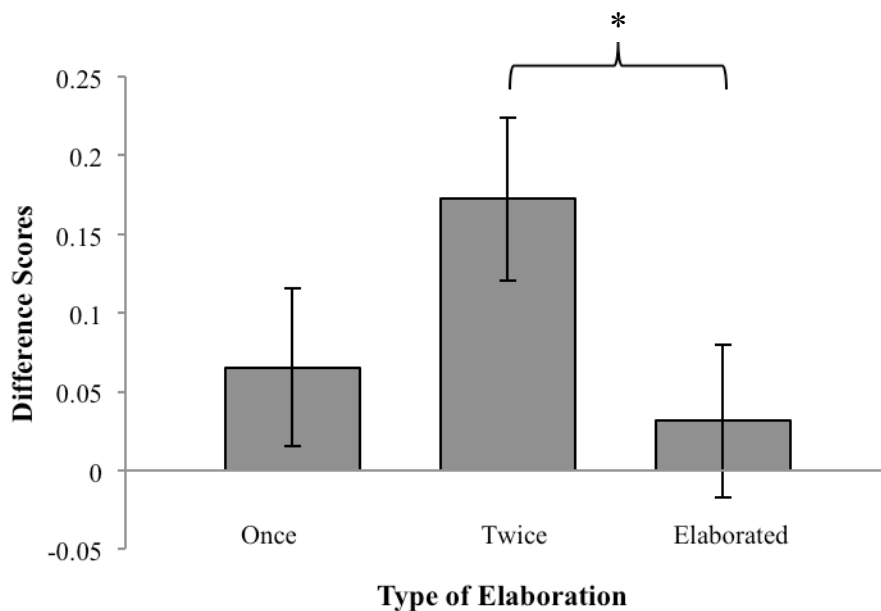

Figure 2. Participants' difference scores of proportion of time spent looking to correct object minus incorrect object across different types of elaboration. Error bars represent standard errors.

Discussion

In this study, children were taught six novel words in the context of a storybook narrative. Novel words were either elaborated with a definition, repeated twice, or only mentioned once—such that three levels of elaboration were used throughout the storybook to present the novel words, with two words elaborated with each level. After listening to the storybook, children's word learning for these words was assessed with a preferential-looking task. There was a significant main effect of accuracy—children looked longer at the correct answer, suggesting that in general, they learned the new words. Also, the interaction effect of accuracy and level of elaboration approached significance. Results showed that children were only reliably learning new words when they were repeated twice, and not when words were elaborated or only said once. When word learning with one level of elaboration was compared to learning with another level, significant differences existed only between words that were elaborated and those that were repeated twice. Here, accuracy was better for words that were repeated twice as opposed to those that were elaborated.

Overall, children's performance in the present study suggests that elaboration with a definition is not particularly helpful to children's word learning during shared storybook reading interactions for this age group. Across all the types of elaboration, it seems that children were only reliably learning new words when those words were repeated multiple times, but without any extra information included; this will be referred to as the "simple repetition" condition for the remainder of the discussion. These results may help to inform or change current practices in vocabulary instruction employed by speech-language pathologists and other educators or parents. To

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understand these findings and their implications for clinical practice more fully, it is important to consider the benefits of repeated exposure to new words, and how elaboration can impact children's word learning and language development.

Evidence of Word Learning During Shared Storybook Reading Interactions

One of the most encouraging findings from the present study is that young children were able to learn new words from a single exposure during a storybook reading interaction, provided that they heard the word repeated multiple times. This finding supports previous research showing that young children do engage in fast-mapping, and can learn labels for new objects through indirect teaching methods alone. These results also confirm the notion that storybook reading interactions are beneficial to children's language development and can be effective tools for speech and language interventions. There are currently a number of curricula and other programs that advocate the importance of reading interactions with young children, a number which is likely to grow given the American Academy of Pediatrics' recent movement to promote early literacy by encouraging parents to read aloud to infants from birth onward (American Academy of Pediatrics, 2014). The common thread between these various programs seems to be that they all advocate repeated exposures to books or material that was presented in the book.

One popular practice that has been widely adapted by educators is the use of scaffolded reading experiences with children. Scaffolding as it relates to reading experiences is very similar to the use of scaffolding in general education—the idea of providing children with instructional support such that they are able to solve problems or understand concepts that may have been unattainable on their own (Graves &

Graves, 1995). For successful learning to occur, children must be presented not only with challenges, but also with the structure or scaffolding to meet these challenges.

There are two main components of scaffolded reading experiences: initial planning of the experience, and then implementation of the lesson or activity (Graves & Graves, 1995). During the planning phase, educators take into account the needs and interests of their own students, the book that will be used and any challenges it may present with regard to themes or vocabulary, and finally what the purpose of the reading experience is for the students. The implementation phase of scaffolded reading experiences is made up of three components: prereading activities, reading activities, and postreading activities. All of these components serve a variety of different purposes and are easily adaptable to different skill profiles and texts. Generally, prereading activities serve to pique students' interest in a topic, and refresh background knowledge about that topic or teach basic concepts or vocabulary that will be included in the text. Educators can also ask students to make predictions about the story during this stage. During the reading experience, educators can choose to have students read silently, follow along to a reading, or take turns reading aloud as a class. Educators may also modify the format or length of texts depending on their students' needs. Finally, postreading activities are designed to allow students to "synthesize and organize information gleaned from the text." (Graves & Graves, 1995, p.32) These activities can take many different modalities, such as oral discussion, writing, or artistic expression. Educators may also reteach portions of the text to ensure that students have reached a predetermined level of understanding. Through these three groups of activities, students are provided with multiple

exposures to key concepts or vocabulary from a text, in a variety of contexts and modalities.

Scaffolded reading experiences require educators not only to revisit content that was presented in a book, but also to change the book reading experience with each exposure. These changes in reading experience are dependent on what a specific child or classroom needs—such that each exposure to content is different and allows children to engage with material in a new way, to enrich their understanding. This is distinct from the multiple exposures provided in the present study, where children did not have multiple repetitions over time that were different and tuned in to their specific needs.

Another promising reading program that has been proven to be effective (Justice et al., 2010) in fostering early language and literacy with preschool children is "Read It Again!" (RIA; Justice, McGinty, Beckman, & Kilday, 2006). This program was designed to be implemented by classroom teachers as a supplement to existing curriculum. The program is 30 weeks long, and children receive two lessons each week—such that there are 60 lesson plans total. All lesson plans revolve around a storybook reading interaction, and 15 different storybooks are used repeatedly throughout the course of the program. The same storybook is used for both lessons each week, and children hear the same storybook approximately once every month. Lesson plans incorporate components of scaffolded reading, in that they consist of activities before, during, and after reading interactions. Four major areas of language and literacy are targeted with this program: vocabulary, narrative, print knowledge,

and phonological awareness; each lesson plan focuses on two of these four areas (one area before reading, another area during and after reading).

Scaffolded reading experiences and the RIA program share many common themes and both seem to be rooted in the same belief that children need multiple exposures to new material, along with sufficient support to access that material. These two programs appear to value both the quantity of children's exposure, as well as the quality of the overall reading experience. In the present study, children successfully learned words during a single storybook reading interaction—but only when these words were repeated twice, and not when they were repeated twice but accompanied by elaboration. These results reinforce the importance of repeated exposure to novel words when teaching young children, as in the RIA program and scaffolded reading experiences. Furthermore, the fact that elaboration, as it was delivered in the present study—a single exposure that was uniform for all participants, was not particularly helpful for word learning lends support for the individualized and repetitive enrichment experiences offered in scaffolded reading experiences.

Scaffolded reading experiences and the RIA program capitalize on multiple exposures to material or vocabulary to ensure learning, a practice that is supported in the present study. A major difference between the aforementioned programs and the present study is that although both implemented repeated exposures, there are qualitative differences in these exposures, especially with regard to elaboration of new words. In scaffolded reading, children are allowed multiple opportunities and avenues to hear a word's definition before, during, and after reading interactions. Here, children only had one exposure to elaborated sentences during the reading

experience. Perhaps if they were provided with an enriched scaffolded reading experience that allowed for multiple exposures that were tailored to individual learning needs, they would have benefitted from this form of input. When attempting to teach new words to young children, it seems that both the quantity and quality of exposure is important.

Repeated Exposure to Novel Words and Salience of New Information

The existing research on vocabulary instruction has suggested that in order to maximize vocabulary gains in children, repeated exposure to novel words is important (Ehren, 2002; Sedita, 2005). The existing evidence suggests that by allowing children to hear a word multiple times, preferably in multiple contexts or usages, the likelihood that they will retain that word is increased. Here, children only showed significant differences in their word learning accuracy when the words were repeated twice, and not when they were elaborated or said once. However, when difference scores between looking to the correct or incorrect object were compared across the levels of elaboration, there were only significant differences between words that were said twice and those that were elaborated. That is to say that there were no significant differences in word learning when a word was only mentioned once and when it was repeated multiple times, either with or without extra semantic information (elaboration and multiple repetition conditions). So, although the present study did find multiple repetitions of a word to be useful for successful word learning, there were no differences in accuracy when words were repeated or only said once. The only significant difference between levels of word learning pertained to the difference between words that were elaborated or said twice. This suggests that the

results are somewhat variable, and the context in which multiple repetitions occur is important for word learning.

To understand the significant difference between children's accuracy in word learning with elaboration and multiple repetitions more fully, it is important to think about the major difference between these two conditions—namely, the extra semantic information included in the elaboration condition. Although both levels of elaboration allowed children to hear the word multiple times, the simple repetition condition can be thought of as a more pure form of repetition. When words were repeated twice, children heard sentences such as "Then, I need to remember to get a *needoke*. Here's the *needoke*! This looks like a pretty good one." In the elaboration condition, children heard sentences such as "Finally, I need my *yosh*. A *yosh* is a tool that helps me to water plants that are far away or up high." Thinking about the presentation of novel words under these two conditions, the simple repetition sentence contains fewer meaningful content words than the elaborated sentence. Presumably, under this condition the only new information children are confronted with is the target word, so they can focus their attention on its multiple repetitions. However, when the word is presented in an elaborated sentence, children must process numerous other content words in addition to the target word. Perhaps this reduces their ability to fully process the extra repetition of the target word, and therefore they do not reap the benefits of repeated exposure. In fact, there were no significant differences between children's word learning for target words when they were elaborated versus only said once. This suggests that the extra semantic information in the elaboration condition depleted

children's processing resources such that they were not able to benefit from the multiple repetitions.

The previously presented examples of sentences heard by children in the storybooks under the two levels of elaboration (elaboration and simple repetition) leads to another possible reason as to why elaboration was not beneficial to children's word learning. As previously mentioned, many of the elaborated sentences contained multiple content words (such as "vegetable", "salad", "dig", "Japan", or "growing"), whereas the simple repetition sentences contained less specific words (such as "use", "good", "take", "great", or "bring"). Knowing that children use attentional cues to map new labels to salient or novel objects in their environment (Hollich et al., 2000), it is also logical to posit that they must be able to attend to or pick out novel words in a speech stream. Children would likely have difficulty mapping a novel word to a specific object if they were presented with multiple unknown objects, just as they might have difficulty learning the meaning of a novel word if it was presented with other new words. The "given/new" contract posits that within any utterance, listeners must decipher information that is "given" versus that which is "new" (Clark & Haviland, 1977). Speakers may differentiate given and new information through a variety of cues, such as intonational stress or word order, so that new information is more salient to the listener. The ability to accurately decipher between information that is given and that which is new is a pragmatic skill that children must develop in order to acquire new information (Takahara, 1979). There is evidence to suggest that young children's use of the given/new contract in providing information to others is a skill that develops during the preschool years, with growth occurring between ages

three to five (Saylor, Baird, & Gallerani, 2006). It is likely that the children in the age range studied here do not fully possess the ability to use this contract to express information to others. So, it may be reasonable to postulate that since three-year-olds have not yet fully developed this skill in the expressive domain, they also are yet to develop it in their understanding of language.

When words were elaborated in the present study, children were presented with more content information that they had to sift through to learn the word successfully. This extra information may have made their negotiation of the given/new contract more difficult and therefore impeded their ability to encode the new lexical item. Furthermore, since the elaborated sentences contained various low frequency or perhaps unknown words (for example, "I also need a zoop. A zoop is a type of fruit from Japan that grows on trees and tastes sweet."), it is possible that children were presented with several new lexical items to encode simultaneously, perhaps overwhelming their processing abilities. Contrastively, words that were presented with simple repetition did not provide any extra information that may have competed for their attention as new information. Perhaps this enabled children to more skillfully extract "new" information (i.e. the target word) from the sentence. It would be interesting to see if words that were elaborated with less complicated syntactic and lexical sentences would be more helpful for children's word learning. This way they could more easily isolate the novel word, and may be able to benefit from the additional information provided, without overwhelming their processing capabilities.

In sum, the results from the present study suggest that children's word learning did not improve when target words were accompanied with additional semantic information. This may be because the extra information overburdened children's capacity for linguistic processing and therefore their ability to encode the novel word was diminished. Or perhaps the extra information acted as a sort of competition to the target word, which in turn made children's task of deciding which information is new (and therefore needs to be remembered) more difficult.

The Role of Working Memory in Language

Another possible explanation for the effect observed in the present study is that the elaboration of new words may have overloaded children's working memory capacity, which resulted in a diminished ability to learn new words. Working memory plays an important role in language processing and comprehension (Just & Carpenter, 1992) and has also been shown to be a predictor of academic success and fluid intelligence (Shelton, Elliott, Matthews, Hill, & Gouvier, 2010). Although several different models of working memory have been proposed, there is generally an agreement that working memory consists of the "ability to store information in the face of cognitive processing, with both functions receiving attentional resources" (Magimairaj & Montgomery, 2011, p. 669).

In their capacity theory of comprehension, Just and Carpenter posited that an individual's ability to comprehend language is constrained by their working memory capacity, with capacity being defined as the greatest amount of activation (storage and processing of new information) that an individual's working memory can contain. In this theory, processes of comprehension occur simultaneously, such that listeners

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will process "syntactic, semantic, and pragmatic" elements of a sentence at the same time (Just & Carpenter, 1992, p.123). When the total amount of activation, as caused by either storage or processing of information, exceeds the given capacity, then elements will be displaced from memory—and forgotten.

So, if a given sentence contains a large amount of semantic information, this will increase the likelihood that the demands of language comprehension will exceed an individual's working memory capacity, and therefore information will not be successfully encoded. Research on working memory has shown that children's performance on working memory span tasks was poorer when participants completed a difficult cognitive task, such as completing math problems, as compared to a task that was not cognitively taxing, such as repeating a string of syllables (Barrouillet & Camos, 2001). This effect has also been found when participants were given linguistic stimuli of varying complexity. On a variety of working memory tasks, Marton and Schwartz (2003) showed that children with typical language development and those with specific language impairment showed poorer performance with more complex stimuli (for example, longer words during a nonword repetition task). One explanation for this inverse relationship between stimulus complexity and working memory performance is that since attention is focused on the processing of information, the ability to store that information is compromised (Magimairaj & Montgomery, 2012). Therefore, less information can enter into the working memory store.

Since the elaborated sentences contained more semantic information than the simple repetition sentences, they can be thought of as more semantically complex

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stimuli. In addition to the fact that the elaborated sentences contained more semantically complex words, they were perhaps even more taxing for children's working memory systems because they were not accompanied by pictures that represented these words. Unlike many children's books that contain complex picture scenes with items in the foreground and background, the book used in this study used isolated pictures of novel items against a white background (see Appendix A). The lack of images in the background may have made children's comprehension of elaborated sentences more difficult because children had no context for information that was presented in the sentence. Since elaborated sentences lacked concrete representations of all the referents they contained, they represent a form of decontextualized language—language that goes beyond immediate surroundings. This type of language is more difficult for young children to process, partially because it requires that children rely on solely linguistic cues to gain information (Rowe, 2013). So, elaborated sentences represent complex stimuli due to their use of semantically complex and decontextualized language. Following the capacity theory's line of reasoning, the higher processing demands for these sentences may have exceeded children's available working memory capacity and therefore hindered word learning. However, the simple repetition sentences contained less new information and therefore less decontextualized language, so perhaps the demands of comprehension did not exceed their working memory capacity—which helped their word learning.

An individual's working memory capacity is an important factor to take into account when explaining language processing and comprehension across the lifespan, and it is particularly important when studying children. Children's performance on

working memory measures improves during early childhood (Nevo & Breznitz, 2013) and later in development (Siegel & Ryan, 1989), for both language-based and numerical tasks. Since children's working memory capacities improve as they mature, it is possible that the age-range tested in the present study did not possess sufficient working memory capacity to properly process the elaborated sentences. Perhaps only older children would be able to benefit from the extra semantic input provided in definitions, because they may have the memory resources to process and encode this information properly.

If this is the case, it implies that the literature advocating rich elaboration as an aid to learning may be overstating the case. Previous research looking at the role of elaboration in word learning suggests that elaborating new words is a beneficial, even necessary, way to teach vocabulary successfully (Justice, 2005). Here, elaboration of new words resulted in poorer word learning than when those words were repeated multiple times but with no added semantic information. Much of the literature on vocabulary instruction that supports the use of elaboration has taken place within the context of a natural classroom setting, such that children are allowed multiple exposures to the word at different times. Also, many studies looked at the role of elaboration in helping kindergarten or school-age children learn new words. In the present study, children were only given one exposure to the novel words, and all of them were preschool aged. Perhaps this difference in exposure frequency and regularity, combined with the younger age, did not allow children to benefit from the elaboration of novel words. Future work should explore this, perhaps by incorporating multiple exposures to novel words and comparing children from

different age groups, to see whether either of these factors would make elaboration a useful tool for word learning.

Also, many of the previous studies that investigated the role of storybook reading interactions in word learning used already created or published children's books, unlike the artificial books used in the present study. As such, these other books likely contained rich picture scenes that children were able to look at while hearing elaborated sentences. So, the elaboration in these books did not represent a form of decontextualized language, and therefore may have been easier for children to process. It would be helpful to replicate the current study, but with more pictures accompanying text, to support children's processing of semantically complex elaborated sentences. Perhaps this extra visual support would enable young children to benefit from elaborated input.

Children's Organization of Semantic Networks

There has been some suggestion that young children organize semantic networks differently than adults do (Brown & Berko, 1960). During word association tasks, children tend to respond with words that are of a different grammatical class than the target word, whereas adults respond with words that belong to the same grammatical class. For example, if presented with the word "dog," an adult would be more likely to respond with "cat", while a child would be more likely to respond with "bark." Throughout childhood, there is a gradual change as children become more likely to respond with words from the same grammatical class as a target (Brown & Berko, 1960). This has been referred to as the syntagmatic-paradigmatic shift, where children's responses are syntagmatic in that they could follow a target word in a

sentence (for example, "dog-bark"), and adult's responses are paradigmatic because they reflect "learned contextual similarity" (Francis, 1972, p. 950) or the understanding that the two items have a similar set of features. This shift from predominantly syntagmatic responses to paradigmatic responses during word association tests tends to occur during school-age years, somewhere between the ages of five and nine (Nelson, 1977). These findings from word association tasks have led to the suggestion that children do not organize their mental lexicons according to semantic categories of meaning, but rather by the context (or sentence) in which a word occurs (Nelson, 1977).

If children do not begin to organize their lexical networks according to the categorical or semantic features of a word until around age five at the earliest, this may account for why the three-year-old children from the present study did not benefit from elaboration. Although it was predicted that the provision of extra semantic information would aid word learning, it may be that the organization of young children's mental lexicons does not allow them to benefit from this information. It is possible that these young children do not yet have the category knowledge that enables them to create semantic networks based on shared sets of features. Perhaps older, school-age children, who would be more likely to give paradigmatic answers on a word association task, would be able to benefit from the semantic information provided with elaboration.

Clinical Implications

These findings would be of potential use to educators or parents who are attempting to facilitate language development in typically developing children, as

well as to clinicians who are providing therapy to children with language delays or deficits. When providing therapy, clinicians are often instructed to modify or reduce the complexity of their own speech (DeThorne & Channell, 2007), so that it is more accessible for a client's emerging communication skills. This idea comes from social interactionist theory, which includes the idea that children will make the most gains in learning when they are presented with materials that are just slightly above their current ability, but are not so difficult as to be out of reach (Vygotsky, 1978).

When translated into clinical practice, these theories often take the shape of delivering language therapy to children with input that is usually not as sophisticated or complex as what would be found in a typical conversation. Several established therapy approaches, such as the Hanen Program for Parents (Girolametto, & Weitzman, 2006), have supported the therapeutic benefits of simplified input for children who have language delays. However, there have been conflicting reports regarding which type of input is best for children. While there are a number of programs advocating that simplified input is most beneficial for children, there has been some suggestion that this approach is not particularly helpful for language development (Baxendale, & Hesketh, 2003; Tannock, Girolametto, & Siegel, 1992) and that children benefit from input that is semantically and syntactically complex (Beals, 2007; Hoff & Naigles, 2002).

A recent case study compared the benefits of simple and complex input for a child with expressive language delays (Wolfe & Heilmann, 2010). Here, the child was exposed to target words in either one-to-two word phrases (simple input) or in typical, conversational speech (complex input). Although the child did learn target

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words with both types of input, there were some notable differences in learning. The child learned more target words presented with the simplified input as compared to target words accompanied by complex input. However, while communicating with a clinician in the complex input condition, he produced more words and showed improved pragmatic skills. So, it seems that while the simplified input resulted in a quantitative gain in number of words learned, the complex input resulted in a qualitative improvement of overall expressive language and communication.

Given that simple repetition of novel words was found to be a reliable way to teach children new words during storybook reading interactions, the present findings provide support for the use of less complex input and repeating words multiple times when teaching new words to young children—if the goal is basic word learning. These results are in line with the differences suggested by the previously mentioned case study. In the present study, children's word learning was maximized when multiple exposures to novel words were provided with no extra semantic information. Similarly, a child with expressive language delays showed improved knowledge of target words when linguistic input was simplified. Clinicians should take into account each client's area of need when deciding which type of input to use in their communication. For increasing vocabulary, the present findings, as well as existing research, suggest that simplified input may maximize word learning gains. However, it is also important to remember the importance of quality repetitions and exposures to novel words—as in scaffolded reading experiences or the "Read It Again!" program. Individuals working with young children should take care to plan for multiple interactions with new words, providing information that may be slightly out

of a child's reach, but providing support along the way such that children are not overwhelmed with the task of processing the information.

When planning interventions for clients, clinicians must also take into account the working memory capacity of that client. There has been some evidence that children with specific language impairment have a limited capacity to process language, such that these "processing limitations" hinder their language comprehension and development (Ellis Weismer & Evans, 2002). If children with language impairments are more likely to have a reduced working memory capacity, this makes the findings from the present study all the more relevant for clinical practice. In the present study, children with no language delays seemed to have working memory capacities that were not equipped to process the elaborated input. Since children with language delays presumably have poorer working memory capacities than their typically developing peers, they would likely show even poorer performance on word learning with elaborated input. For clinicians working with this population, it is particularly important that they monitor their language input—so that children are provided with multiple exposures to a word, but still within the context of semantically simple input that is manageable with their working memory capacities.

Limitations

There were several limitations to this study that may have impacted the findings, many of which relate to the fact that the study was completed during a single visit. This presented limitations with regard to the timing of the word learning

assessment and the possibility for children to experience repeated exposures to novel words.

Children's word learning was only assessed directly after the storybook reading task. There was no opportunity to gauge whether or not children retained the novel words that they were exposed to during the study. It would have been interesting to include a delayed recall task to see whether children retained any of these novel words for a longer time period after the initial exposure. Perhaps a delayed recall task would have yielded different effects of elaboration type on word learning—such that elaboration may be more beneficial for long-term recall of novel words than repetition alone. If hearing a word's definition does help children make semantic connections between a novel word and already known information (Blachowicz et al., 2006; Pittelman et al., 1991), perhaps these connections would enable children to successfully recall novel words in a later assessment of word learning. There is evidence that sleeping helps children's consolidation of information in their memory (Kopasz et al., 2010). Furthermore, there is some suggestion that allowing infants to nap after an artificial language familiarization facilitates generalization of learning (Gómez, Bootzin, & Nadel, 2006). This study found differential learning—such that infants who did not nap following the learning task showed better memory for the syllable strings they had listened to, but infants who did nap were able to generalize knowledge about those syllable strings to novel stimuli. This suggests that infants who napped may have engaged in a more abstract level of learning, which allowed them to apply principles of previously trained items to novel stimuli. These findings that sleep may aid in consolidation of information, or

even allow children to engage in higher-order thinking processes, have implications for the present study. Perhaps if the word learning task was completed after children had had a chance to sleep, and therefore consolidate the contents of their memory, there would have been different patterns of word learning. If sleep enables children to engage in higher order thinking processes such as abstraction or generalization, then that may allow them to make use of the extra semantic information provided in the elaboration condition.

Related to the idea of consolidating representations of words over time, children's word learning in the present study was measured at a single moment in time. It may be the case that simple repetition is particularly helpful for word learning initially, but that different types of elaboration are beneficial at later points in time. Perhaps when children are first learning a word, simple repetition is the most helpful, but other factors will be more important later on in subsequent learning experiences. For example, elaboration may be beneficial to later stages of word learning, after children have solidified a basic representation of a word that was gleaned through simple repetition. This may explain the discrepancy between findings in Justice's intervention study (2005) and the present study, because children's word learning in the intervention study was tested at a later time after initial exposure, whereas the present study evaluated word learning directly after exposure.

Also, children only heard the storybook read once, so they were only exposed to each novel word one or two times. Previous research that showed the benefit of elaboration on children's word learning during shared storybook reading interactions was carried out over a longer time period, with children receiving multiple exposures

to target words (Justice, 2005). It is possible that elaboration is only helpful when children are allowed to hear a word's definition multiple times, so that they can encode the extra semantic information. Thus, the advantage of simple repetition could be limited to the specific type of task used here, where children only had one instance of exposure to each novel word before being tested on word learning. Future studies could examine this prediction by providing children with multiple exposures to a word, perhaps over a longer period of time, and then evaluating their word learning.

Another factor that may have influenced the results of the study is that all participants were typically developing children with no known language delays. In her intervention study that supported the role of elaboration in increasing children's vocabularies during storybook reading interactions, Justice and her colleagues (2005) worked with at-risk kindergarteners—some of whom were classified as having low vocabularies. This discrepancy in language ability may account for why elaboration was not found to be beneficial to word learning here. It may be the case that elaboration is helpful for a clinical population, provided that the material does not overload children's processing capacities, more so than the typical population used in the present study.

Another possible limitation of this study is that it, similar to Justice's intervention study (2005), only evaluated the potential benefit of elaboration in one very specific domain of language: word learning. Although this single form of evaluation was the aim of the study, it is important to think about other, more complex domains of language development, when applying these results to clinical use. As was suggested in the case study where a child was exposed to both simple and

complex input (Wolfe & Heilmann, 2010), perhaps elaboration may have benefits

other than increasing vocabulary, and as such they were not found in the present

study.

Future Directions

More participants are currently being recruited to participate in the present

study. The current number of participants (N = 23) included in the analysis is below

the original sample size proposed for the study (N = 30). It is expected that when the

sample size is increased, the interaction effect between level of elaboration and

accuracy will become significant. All of the previously mentioned steps for

participant recruitment and study design are being continued for the continuation of

the study.

Beyond recruiting additional participants, future research is still needed to

explore young children's word learning during book reading interactions. Given the

role of working memory in language comprehension, and that this capacity increases

with age, it would be interesting to repeat this experiment with an older age group to

see if they were able to benefit from elaboration of new words. It is possible that

older children would show a different pattern of word learning than the younger

children, thereby providing evidence that the optimal type of input for word learning

changes throughout development.

It may also be interesting to take different probes or measures of word

learning after the storybook reading interaction. As mentioned previously, it may be

the case that hearing new words in elaborated sentences would benefit children's

overall expressive language abilities, although this improvement would not be
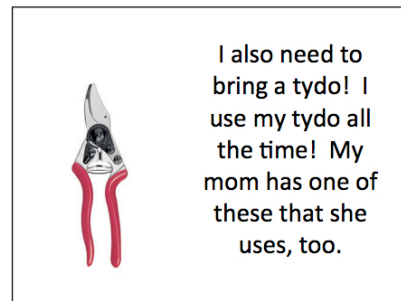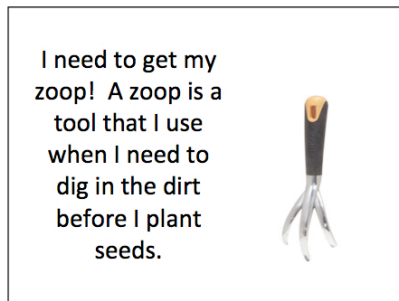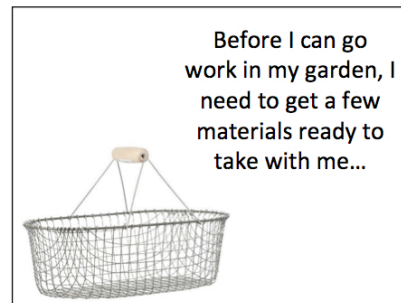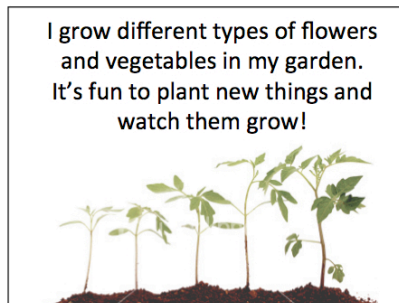
apparent on traditional vocabulary assessments. For example, perhaps if children were given the opportunity to speak freely about items that were presented in the storybook, measures of mean length of utterance or lexical diversity would be higher for words that were elaborated as opposed to words that were simply repeated. It is possible that although elaboration did not best prepare children for the word learning assessment used in the present study, it is still beneficial for language development. Perhaps different levels of elaboration are somewhat task-dependent in their utility— and that various levels of elaboration are differentially helpful for language development.

It may also be worthwhile to conduct a longitudinal study, wherein children are exposed to novel words with the different levels of elaboration multiple times over a longer time period, similar to the study conducted by Justice et al. in 2005. Their word learning could also be evaluated multiple times during the course of the study. This would show if there is differential retention of words learned depending on the level of elaboration used to define the word. Or perhaps this would show that children benefit more from certain types of elaboration at different ages.

Overall, the results from the present study show that preschoolers can learn new words from a brief exposure during a single storybook reading interaction. Children's word learning here was best facilitated when new words were repeated multiple times in the context of sentences that are not particularly complex either semantically or syntactically. Although elaboration was not found to be beneficial for children's word learning as it was assessed in the present study, this may be due to the limitations and circumstances of the experiment, and elaboration of new words

should not be ruled out for clinical practice. In sum, these findings do support the use

of storybooks, and shared reading interactions in general, to facilitate children's

language skills during early development.

Appendix A. Sample of storybook given to participants during study.

Working in the Garden

Today I am going to work in my garden!

I grow different types of flowers and vegetables in my garden. It's fun to plant new things and watch them grow!

Before I can go work in my garden, I need to get a few materials ready to take with me…

I need to get my zoop! A zoop is a tool that I use when I need to dig in the dirt before I plant seeds.

I also need to bring a tydo! I use my tydo all the time! My mom has one of these that she uses, too.

I need to remember a koopa! This is a good thing to have with me. I use one of these all the time!

Now I have everything I need to go work in the garden!

When I get to the garden, there are lots of things I need to do…

I have to get a snirk, too! This one looks pretty good! My younger brother really likes these!

Then, I need to remember to get a needoke. Here's the needoke! This looks like a pretty good one!

Finally, I need my yosh. A yosh is a tool that helps me to water plants that are far away or up high.

I've finished all my work in the garden for the day! Now I can go home!

The first thing I do when I come home is wash my hands so they're not dirty.

Then, I'm going to make a healthy snack with food from the garden!

Wow, it has been a long and busy day! I think I'll lay down so I can rest before tomorrow!

The End!

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