A Comparison of Word Learning in 3-Year-Old Children At-Risk for Language and Literacy Difficulties in Two Conditions: Dialogic Reading and Activity-Based Intervention

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Dedication

This dissertation is dedicated to Jack, whose memory inspires me.

Abstract

Existing research suggests a need for an intervention that can accelerate vocabulary acquisition for young children at-risk due to poverty. An adapted alternating treatments design was used to examine the effects of Dialogic Reading and Activity-Based Intervention (ABI) on participants' production of target words. Participants were three 3-year-olds considered at risk due to poverty and limited expressive language who attended a preschool program for at-risk families in a large urban school district. Ten words, randomly assigned to each condition (Dialogic Reading, ABI, control), were taught during alternating 10-min intervention sessions three times per week. Data were analyzed using visual analysis and descriptive statistics. Results suggest ABI was more efficacious and efficient than Dialogic Reading for two of three participants. Maintenance data suggest Dialogic Reading was superior at 1 week post-intervention, while ABI was superior at 2 weeks post-intervention for two of three participants. There were no differences in generalization.

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Chapter 1

Introduction

A large and persistent gap in vocabulary knowledge exists between preschool children living in poverty and their peers from middle- and upper-class homes (Hart & Risley, 1995). This gap continues to widen throughout the school years, substantially impacting reading achievement (Dickinson, Golinkoff, & Hirsch-Pasek, 2010; NICHD, 2005; Walker, Greenwood, Hart, & Carta, 1994) and making early intervention critical (Stanovich, 1986).

Research suggests that current interventions may not be sufficient to close this gap (Marulis & Neuman, 2010). Marulis and Neuman (2010) conducted a comprehensive meta-analysis of 67 preschool and kindergarten vocabulary intervention studies and 216 effect sizes. The authors obtained an overall effect size of .88 for preschool and kindergarten vocabulary interventions, suggesting these interventions have a significant and large effect on word learning (Marulis & Neuman, 2010). Moderator analyses, however, indicated that outcomes were more favorable for middle- and upper-middle-class children identified as at-risk, than for children living in poverty and at-risk (Marulis & Neuman, 2010). Children with poverty as a risk factor made fewer gains than children with other risk factors. In addition, among children having multiple risk factors, those with poverty as one risk factor made poorer gains than did children without poverty as a risk factor. Evidence therefore suggests that children having poverty as a risk factor are least likely to benefit from existing vocabulary interventions, thus underscoring the need

for the development of interventions that will accelerate language learning for this

population (Marulis & Neuman, 2010).

Given the impact of early experiences on language and literacy development, and

the challenge of developing interventions that work for children living in poverty and at-

risk, it is essential that vocabulary interventions be carefully designed. The approach

most commonly used to address vocabulary deficits in preschool children at risk for

language and literacy delays is shared storybook reading (Biemiller & Boote, 2006;

Marulis & Neuman, 2010), perhaps because most vocabulary intervention research has

been conducted in elementary settings (Pollard-Durodola et al., 2011), where read-alouds

may provide the best opportunity for directly teaching words. In shared storybook

approaches, children are taught words during interactive book reading sessions. Examples

of shared storybook reading methods include Dialogic Reading (Whitehurst et al., 1994;

Whitehurst & Lonigan, 1998) and Interactive Shared Book Reading (Justice & Ezell,

2002). While several studies suggest that shared book reading positively affects

expressive oral language (e.g., Lonigan, Purpura, Wilson, Walker, & Clancy-Menchetti,

2013; NELP, 2008; Whitehurst et al, 1994), studies in which researchers measured

acquisition of particular words taught within the interventions suggest that learning of

specific vocabulary within storybook reading is limited (Biemiller & Boote, 2006;

Neuman, 2011). This holds true even for children from middle- and upper-middle class

homes (see for example Hargrave & Senechal, 2000). Given the modest gains observed

in studies of shared book reading, and the more general lack of favorable outcomes in

vocabulary interventions for children living in poverty (Marulis & Neuman, 2010), it

seems logical to examine intervention methods that have been effective for children with more significant needs, including children with identified disabilities.

Interventions for young children with identified language delays have historically been delivered via naturalistic instruction (Hepting & Goldstein, 1996; Rule, Losardo, Dinnebeil, Kaiser, & Rowland, 1998). A primary component of naturalistic instruction is that it "refers to an instructional *context* such as routine events and everyday activities that occur in a variety of settings including homes, preschools, and child care" (Rule et al., 1998, p. 284). Examples of naturalistic instruction include Activity-Based Intervention (ABI; Pretti-Frontczak & Bricker, 2004) and milieu teaching (Kaiser, Yoder, & Keetz, 1992). Research suggests that ABI can be used to address a variety of skills across developmental domains (see Pretti-Frontczak, Barr, Macy, & Carter, 2003) and that naturalistic language instruction is effective for increasing language and vocabulary for young children with special needs (see for example Kaiser et al., 1992; Warren, 1992). Because of its widespread use in early childhood special education practice, and its compatibility with naturalistic language intervention strategies, ABI serves as a logical framework for implementing naturalistic vocabulary instruction.

Some researchers have combined storybook reading and naturalistic instruction to maximize word learning. For example, Spencer, Goldstein, and Kaminski (2012) recommend that teachers provide multiple exposures to words "during the storybook reading as well as in other classroom contexts" (p. 21). Other researchers (Roskos & Burstein, 2011; Stanton-Chapman, Kaiser, Vijay, & Chapman, 2008; Wasik & Bond, 2001; Wasik, Bond, & Hindman, 2006) have examined the effects of instruction provided

within the context of interactive book reading and other classroom activities (e.g., play, art) as part of intervention packages. Results suggest that such intervention packages are effective for teaching children specific words (Roskos & Burstein, 2011; Stanton-Chapman et al., 2008; Wasik & Bond, 2001), and can impact language development beyond specific words taught in the intervention (Roskos & Burstein, 2011; Wasik & Bond, 2001; Wasik et al., 2006).

While results of these studies are promising, in each case it is impossible to discern if gains were due to storybook reading, naturalistic instruction provided during classroom activities, or the combination of methods. Stanton-Chapman and colleagues (2008) suggest that researchers examine the effects of intervention components separately to assess their individual contributions. Similarly, Justice, Meier, and Walpole (2005) suggest that researchers examine "the exact contributions of book reading relative to exposures in other activities (e.g., dramatic play)" (p. 29).

The purpose of this study, therefore, was to examine the effects of Dialogic Reading, a method of interactive storybook reading, and Activity-Based Intervention, a method of naturalistic instruction, on word learning in 3- and 4-year-old children at-risk due to poverty and limited expressive language. This study addressed the following research questions:

1. Efficacy: Do 3 and 4-year-old children at-risk for later language and literacy delays due to low socioeconomic status and limited expressive oral language show differences in the number of target vocabulary words learned in Dialogic Reading and ABI conditions?

2. Efficiency: Do participants show differences in the number of sessions to criterion for learning new vocabulary words in Dialogic Reading and ABI conditions?

3. Maintenance: Do participants show differences in maintenance of words learned in Dialogic Reading and ABI conditions?

4. Generalization across settings and people: Do participants show differences in their use of words learned in Dialogic Reading and ABI conditions when interacting in the classroom with peers and staff given the same books and toys used during intervention?

Chapter 2

Literature Review

Given the purpose of this study, I will review three areas of literature: vocabulary acquisition, Dialogic Reading, and Activity-Based Intervention.

Vocabulary Acquisition

Learning to read is often considered the most essential skill for success in school and in life (Moats, 1999; National Early Literacy Panel, 2008; Snow, Burns, & Griffin, 1998). The foundation for reading is formed during the early childhood period through the development of language and early literacy skills (Dickinson, Cote, & Smith, 1993). This developmental continuum of skills is termed "emergent literacy" (Lonigan, 2007; Teale & Sulzby, 1986; Whitehurst & Lonigan, 1998). Proponents of an emergent literacy framework suggest there is no definite boundary between prereading and formal reading, with skills that develop during early childhood considered an integral part of the developmental continuum (Lonigan, 2007). Whitehurst and Lonigan posit that emergent literacy consists of two related sets of skills: inside-out and outside-in skills. Inside-out skills involve the rules for translating print into sounds and vice versa. They are found within the print itself. Examples include letter knowledge, phonological awareness, and letter-sound correspondence. Outside-in skills are related to understanding the context in which reading and writing occurs. These skills are developed outside of the print experience. Conventions of print (e.g. reading left to right) and language development, including vocabulary, are examples of outside-in skills.

Researchers in diverse areas of study (e.g., special education, communication disorders, cognitive science, linguistics) have considered how children learn words and have developed associated theories and definitions of vocabulary acquisition. In a behavioral-ecological framework, vocabulary acquisition can be defined as "the generalized use of unique lexical items across settings and people in both obligatory and nonobligatory contexts" (Warren, 1992, p. 236). This definition will be adopted for purposes of this review.

Vocabulary acquisition is critical for at least five reasons. First, vocabulary knowledge is more than just knowing the definitions of words. Vocabulary is a representation of knowledge about the world (Stahl, 1999). Having a large vocabulary allows an individual to think, talk and write about the world in more precise ways (Stahl, 1999; Stahl & Nagy, 2006). Second, vocabulary size is a significant predictor of reading comprehension, the ultimate goal of reading (Dickinson et al., 1993; Stahl, 1999; Stahl & Nagy, 2006). Children are more likely to have difficulties learning to read when they come to school with less background knowledge and limited verbal skills (Snow et al., 1998). Third, the size of the gap between the oral language skills of children who are at-risk and their more advantaged peers is large (Hart & Risley, 1995) and predictive of early, and likely persistent, differences in reading, decoding, and comprehension (Walker et al., 1994). Fourth, vocabulary acquisition is cumulative (Stanovich, 1986). Vocabulary is a prime example of the "Matthew Effect:" children who know more words read and talk more frequently, thereby learning more words, whereas children who know fewer words read less frequently, thereby learning fewer words (Stanovich, 1986). This large

and cumulative difference in vocabulary knowledge substantially impacts reading achievement, making early intervention critical (Stanovich, 1986). Fifth, vocabulary is an unconstrained skill (Paris, 2011). Constrained skills (i.e., phonological awareness, alphabetic knowledge, and print knowledge) are relatively narrow and discrete, can be taught directly, and are generally mastered by age 9 (Paris, 2011). Unconstrained skills (e.g., vocabulary and comprehension), however, are generally broad in scope, more difficult to teach directly, and develop across an individual's lifetime (Paris, 2011). While there is ample evidence to suggest that differences in vocabulary knowledge affect later reading comprehension (Dickinson et al., 1993; Stahl, 1999; Stahl & Nagy, 2006), evidence also suggests that vocabulary plays a role in beginning reading (Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003; National Early Literacy Panel [NELP], 2008; NICHD, 2005). For example, the National Early Literacy Panel (2008) found a moderate correlation between oral language and decoding in kindergarten, and between oral language, measured in preschool or kindergarten, and reading comprehension. Thus, existing evidence suggests that vocabulary knowledge is likely important in all stages of reading development, and that an early, intensive, and continual focus on vocabulary is critical to positively impact word learning, and ultimately reading achievement, for preschool children living in poverty.

Much variation exists in how many words children know and learn during the early childhood period. While the distinction between vocabulary comprehension and vocabulary production is an important one, in the body of literature reviewed for this paper, authors generally used the terms *know* and *learn* without specific reference to

comprehension or production. To follow convention in the field, and to avoid inaccurate characterizations of others' work, the terms *know* and *learn* will be adopted in summarizing this body of literature. By the time children enter preschool they typically know about 5,000 words (Bloom, 2000) and learn two to four new words each day (Roskos et al., 2008). Some children, however, begin kindergarten knowing significantly fewer words than their peers, thus putting them at risk for later reading difficulties (Biemiller, 2009; Hart & Risley, 1995; Stahl & Nagy, 2006). Biemiller investigated children's knowledge of root words. A root word is the most simple form of a word (e.g., walk) from which other forms (e.g., walked, walking) are derived by phonetic changes or extensions (Merriam-Webster, 2012, para.6). Biemiller (2009) estimates that at the beginning of kindergarten, children with limited vocabularies know an average of 2,300 root words, whereas children with large vocabularies know an average of 4,700 root words.

Factors associated with individual variation in vocabulary knowledge and growth include child characteristics and the quality of the early literacy and language environment. In a study examining differences between preschoolers with specific language impairment (SLI) and typical preschoolers, Gray (2004) found that existing lexical knowledge and fast-mapping ability predicted the number of words learned and learning rate for children with SLI. Fast-mapping occurs when a child hears a new word for the first time and stores enough information about the word to be able to retrieve it and build on existing knowledge at future exposures (Gray, 2004).

Word learning has also been linked to phonological memory. Baddeley, Gathercole, and Papagno (1998) reviewed research examining the role of the phonological loop, a component of memory, in word learning and concluded that phonological loop function is related to vocabulary acquisition. These biological factors contribute to both rate and ease of word learning when considered in combination with opportunities a child has to learn new words (Biemiller, 2009).

Both home and preschool environments contribute to young children's vocabulary knowledge and growth. In a landmark study, Hart and Risley (1995) conducted monthly observations of 42 welfare, working class, and professional families across more than two years. Their findings revealed stark differences in both the quantity of language used by parents and children, and in the quality of interactions between parents and children, with professional families using significantly more words and positive affirmations than working class and welfare families. These factors were related to rate of vocabulary growth and vocabulary use at age 3 (Hart & Risley, 1995) and school performance at age 9 (Walker et al., 1994).

Language and literacy experiences in early care and education environments also play an important role in vocabulary development. Dickinson and Tabors (1991) found that exposure to rare words, extended teacher discourse (e.g., extending utterances during free play, engaging in analysis of books), and classroom curriculum variables (i.e., well-developed writing area, varied content, and planned small group activities) were related to literacy outcomes in kindergarten after controlling for home environment. During shared book reading, the proportion of teacher-child talk focused on analyzing situations

in a story, making predictions, and discussing vocabulary were associated with greater

vocabulary learning and comprehension of the story (Dickinson & Smith, 1994). As

noted by Justice and Vukelich (2007), "every moment counts in the preschool classroom"

(p. xix).

Dialogic Reading

Dialogic Reading is a method of shared storybook reading that involves children

as active participants, rather than passive listeners, in the book reading process

(Whitehurst et al., 1994; Whitehurst & Lonigan, 1998). The reader elicits active

participation by asking the child questions throughout the book reading (Whitehurst et al.,

1994). Five types of questions, represented by the acronym CROWD, form the

foundation of Dialogic Reading: completion, recall, open-ended, wh-, and distancing

prompts (Whitehurst et al., 1994). Questions are embedded into interactions between the

reader and child, and are represented by the acronym PEER: *prompt* the child to respond,

evaluate the child's response, *expand* the child's response, and encourage the child to

repeat the expanded utterance (Whitehurst et al., 1994).

Dialogic Reading intervention sessions follow a three-level framework in which

the complexity of question types increases with each level (Doing What Works, 2007).

The goal of this framework is for the child to gradually assume more responsibility for

retelling portions of the story and to relate the story to their own lives (Doing What

Works, 2007). In Level I, the adult asks simple wh- questions, models responses, and

provides feedback (Lonigan, Purpura, Wilson, Walker, & Clancy-Menchetti, 2013). The

purpose of Level I is to develop vocabulary (Doing What Works, 2007). In Level II, the

adult asks primarily open-ended questions and expands children's responses (Lonigan et al., 2013). The purpose of Level II is to increase the amount of child talk and length of responses (Doing What Works, 2007). In Level III, the adult focuses on asking higher level questions (e.g., recall and distancing prompts; Doing What Works, 2007). The purpose of Level III is to encourage children to recall the story plot (Doing What Works, 2007) and connect the story to their own experiences (Lonigan et al., 2013).

A large body of research exists regarding the efficacy of Dialogic Reading, particularly for increasing children's expressive oral language (see Mol, Bus, de Jong, & Smeets, 2008; What Works Clearinghouse, 2007; Whitehurst et al., 1994). Given the purpose of this review, I included only studies of Dialogic Reading in which researchers taught specific vocabulary words, in English, to preschool children. As noted above, while there is substantial research on Dialogic Reading and its relation to expressive language outcomes, only one study (Hargrave & Senechal, 2000) met these inclusion criteria; the overwhelming majority of studies did not meet inclusion criteria because researchers administered distal dependent measures of children's oral language skills (e.g., Peabody Picture Vocabulary Test – Revised [PPVT-R], Dunn & Dunn, 1981; Expressive One Word Picture Vocabulary Test – Revised [EOWPVT-R], Gardner, 1990) and did not include measures of specific words taught during book reading. Given that only one Dialogic Reading study was identified, I also included studies in which researchers examined word-learning during shared storybook reading interventions delivered in English to preschool participants. Three studies (Senechal, 1997; Senechal, Thomas, & Monker, 1995; Walsh & Blewitt, 2006) met these criteria. All three studies

examined active versus passive engagement during book reading, a key component of Dialogic Reading.

Using a nonequivalent comparison quasi-experimental design (Shadish, Cook, & Campbell, 2002), Hargrave and Senchal (2000) compared the effects of typical book reading and Dialogic Reading on the vocabulary of 36 preschool children with limited expressive and receptive language. Children in the Dialogic Reading condition were taught 18 words from 10 books, each read twice, during 20 Dialogic Reading sessions across 4 weeks. Teachers in the control condition read the same books but using typical reading practices. Children in the Dialogic Reading condition knew significantly more words and scored higher on the EOWPVT-R (1990) at posttest than at pretest. The average number of words learned, however, was limited, and children in both groups learned new words. Limitations of this study were that children were not randomly assigned to conditions (each day care center was assigned to a condition), children in the Dialogic Reading condition had better attendance, and Dialogic Reading sessions were longer in length than control sessions.

Senechal (1997) examined word learning in single versus repeated readings, and in active versus passive listening conditions. Sixty middle-class three- and four-year-olds were randomly assigned to three conditions: single-reading (passive listening), repeated-reading (passive listening) and repeated-reading with questioning (active involvement). Ten target words (e.g., *angling*, *fang*, *fedora*) were taught. In the repeated-reading with questioning condition, the researcher asked a *what*- or *where*- question after reading each target word. Children who answered questions learned more target words than children

who only listened during repeated-readings. In addition, children in the repeated reading condition made greater gains on author-created receptive and expressive vocabulary measures than children in the single-reading condition. Expressive word learning in particular, however, was limited across conditions.

Senechal et al. (1995) conducted two experiments examining passive and active listening during repeated book reading with middle- and upper-middle class preschool children classified as having high or low word knowledge on the PPVT-R (Dunn & Dunn, 1981). Researchers selected 26 target words (e.g., *angling*, *fedora*, and *skiff*) in two books based on previous research indicating that these words were unknown to preschoolers. In the first experiment, 32 preschoolers were randomly assigned to one of two book reading conditions: passive listening or active labeling. In the second experiment, 48 preschoolers were randomly assigned to one of three conditions: passive listening, active pointing, or active labeling. Results suggest that children who were actively involved in book reading, either through labeling or pointing to pictures, produced more words at posttest than children who only listened. At immediate posttest, children who labeled pictures produced more words than children who pointed. There were no differences, however, between the groups at delayed posttest. In addition, there were no differences between children with high and low PPVT-R scores on word production. Word learning in all groups was limited, with children producing, on average, fewer than 1 out of 10 pictures at immediate posttest. Results should be considered in light of the brevity of the intervention (two book readings) and the relatively small number of participants in each study.

Walsh and Blewitt (2006) examined the effects of two types of questioning, eliciting and non-eliciting, on word acquisition during repeated book reading. In the eliciting condition, researchers asked children a question that required the child to use the target word (e.g., "What is this?" while pointing to *pagoda*). In the non-eliciting condition, researchers asked a question that contained the target word, but did not require the child to use the target word (e.g., "What color is the *pagoda*?"). Thirty-five middle- and upper-middle class preschool children were randomly assigned to one of three groups: eliciting, non-eliciting, and control. Researchers selected nine target words (e.g., *caliper*, *pagoda*, *sloop*) in three books that were established as unfamiliar to 3-year-olds in a prior study. At posttest, both questioning groups scored significantly higher than the control group on a receptive measure of words taught. Expressive production of words taught was low, however, across groups. Pairwise comparisons indicated that both types of questioning (eliciting and non-eliciting) were similarly effective.

Overall, results from these studies suggest that children learn more words when actively engaged, rather than passively engaged, in book reading. Findings also suggest, however, that while children learn words during storybook reading, gains appear to be modest, particularly when the book is read only a few times (Senechal, 1997), when words are encountered a small number of times (Hargrave & Senechal, 2000; Senechal, 1997; Senechal et al., 1995), or when expressive production, rather than comprehension, is measured (Walsh & Blewitt, 2006). These findings suggest that shared book reading may be insufficient for promoting the acquisition of the large number of vocabulary

words children living in poverty need to learn to catch up to their peers from middle- and upper-class homes.

Activity-Based Intervention

Activity-Based Intervention (ABI) is a naturalistic teaching approach that embeds practice on young children's goals and objectives within the context of daily routines and activities (Pretti-Frontczak & Bricker, 2004). ABI is heavily influenced by behavior analytic principles and their influence can be seen throughout the approach (Pretti-Frontczak & Bricker, 2004). The application of ABI consists of four elements: (1) intervention provided within the context of child-directed, routine and planned activities; (2) multiple and varied embedded learning opportunities; (3) functional and generative child goals; and (4) timely and integral feedback or consequences.

Intervention context. In ABI, intervention is provided within several contexts to allow for "multiple and varied learning opportunities" (p.32, Pretti-Frontczak & Bricker, 2004). Research suggests that opportunities to respond are directly related to student learning (Greenwood, Delquadri, & Hall, 1989; Greer & McDonough, 1999; Sutherland, Alder, & Gunter, 2003). In an ABI approach, opportunities are embedded within the context of three different types of activities: child-directed, routine, and planned activities to promote skill acquisition and generalization (Pretti-Frontczak & Bricker, 2004). Child-directed activities are those activities in which the child chooses to engage. In the ABI approach, the interventionist capitalizes on children's interests by providing learning opportunities within these presumably high-interest, motivating activities that the child has selected (Pretti-Frontczak & Bricker, 2004). Routine activities are those that occur

daily or multiple times a day (e.g., meals, outdoor play). Routine activities provide authentic, regularly-occurring opportunities for learning, and can increase the number of opportunities for learning when used consistently by interventionists (Pretti-Frontczak & Bricker, 2004). Planned activities are those that occur only with adult guidance and planning. In ABI, planned activities are carefully designed to include multiple, varied opportunities for children to practice targeted skills (Pretti-Frontczak & Bricker, 2004).

Embedded learning opportunities. In ABI, interventionists use a variety of teaching strategies to embed antecedents throughout each of the three types of activities. It is critical that interventionists provide a sufficient number of opportunities to ensure acquisition and maintenance of skills, and sufficient opportunities across people, settings, and conditions to facilitate generalization (Pretti-Frontczak & Bricker, 2004). Teaching strategies are primarily nondirective (Pretti-Frontczak & Bricker, 2004). Examples include arranging the environment (e.g., placing an object out of reach to elicit a request), piece-by-piece (e.g., handing a child puzzle pieces one at a time after the child signs "more" rather than giving the child all pieces at once), and pause or time delay (e.g., holding up a preferred object and waiting for the child to label it before handing it to the child; Pretti-Frontczak & Bricker, 2004).

Functional and generative goals. In ABI, interventionists teach skills that are functional, or useful, to children within their everyday routines and activities. Research suggests that ABI can be used to teach a variety of functional skills to children with special needs (e.g., Fox & Hanline, 1993; Grisham-Brown, Schuster, Hemmeter, & Collins, 2000). In addition to being functional, skills should be generative. Skills that are

generative can be used, or modified for use, across settings, people, and materials (Pretti-Frontczak & Bricker, 2004). For example, initiating social interactions is a skill that can be used across environments and people. In an ABI approach, the interventionist should provide opportunities for the child to initiate social interactions at school during arrival when greeting peers and teachers, during free play when asking a peer to play, and at home when greeting a parent who comes home from work.

   Timely and integral feedback. In addition to providing multiple opportunities for children to practice functional skills within a variety of activities, in an ABI approach, interventionists provide immediate and logical consequences to reinforce desired responses (Pretti-Frontczak & Bricker, 2004). For example, if a child requests a toy, the logical consequence is that the adult will give the child the toy.

   ABI is a well-known approach in the provision of services to young children with special needs (McBride & Schwartz, 2003). ABI is considered part of a larger group of related approaches generally termed naturalistic instruction (Pretti-Frontczak et al., 2003). Early studies examining the impact of programs using ABI (e.g., Bailey & Bricker, 1985; Bricker & Gumerlock, 1988) suggest that children receiving ABI made pre-post gains on curriculum-based and norm-referenced measures of development. These early studies, however, had serious methodological flaws, particularly the absence of a control group and fidelity of implementation data (Pretti-Frontczak & Bricker, 2004). More recent studies of the specific components of ABI, and other naturalistic approaches consistent with ABI, suggest the efficacy of these approaches for young children with special needs (see Pretti-Frontczak et al., 2003 and Pretti-Frontczak & Bricker, 2004).

For the purposes of this review, I included studies that examined the effects of ABI and other naturalistic teaching strategies (i.e., embedded learning opportunities, routines-based intervention, incidental teaching, milieu teaching, enhanced milieu language teaching) on young English-speaking children's acquisition of specific vocabulary words.

Using a single-subject alternating treatments design, Losardo and Bricker (1994) compared the efficacy of direct instruction and ABI on the acquisition and generalization of object labels (e.g., *stencil, trivet, kiwi)* for 6 young children with identified developmental delays or at-risk for delays. In the ABI condition, the context for intervention was communicative exchanges within typical classroom activities (e.g., a pretend grocery store). Training trials consisted of a variety of antecedents (e.g., comments, models, questions), designed to elicit target responses, and logically occurring consequences. In the direct instruction condition, the instructional context was described as structured initial teaching sequences (e.g., asking "what's this?") using objects. Visual inspection indicated that children learned words more quickly in the direct instruction condition. Children were significantly more likely, however, to use words taught in the ABI condition in follow-up expressive generalization probes. The authors concluded that both approaches may be useful in different phases of word learning: direct instruction for initial word acquisition and ABI for assuring generalization. This study suggests that ABI is an effective method for teaching vocabulary, particularly generalization of newly learned words.

Wilcox, Kouri, and Caswell (1991) randomly assigned 20 preschool children with receptive and expressive language delays to two intervention conditions: classroom

activities (e.g., play, art, book reading) or one-on-one free play sessions conducted outside of the classroom. Children were taught 10-17 labels for common objects (e.g., *doll, hat*), animals (e.g., *kitty, cow*), and food or drinks (e.g., *cookie, juice*). Words were selected specifically for each child based on unknown words. Interventionists used modeling of target words as the primary intervention strategy in both conditions, providing approximately 15 models of each target word during each 45-min session. While there were no significant differences between conditions in children's use of target words, children in the classroom condition showed superior use of target words during generalization sessions conducted in families' homes.

Hemmeter and Kaiser (1994) taught parents of four children with special needs between the ages of 25-49 months to use enhanced milieu teaching during play sessions with their children. Language targets were selected for each child based on a parent-completed language inventory and a language sample analysis. Targets included functional words (e.g., *more*, *want*, *help*), verbs (e.g., *go*, *jump*, *roll*), and nouns (e.g., *music*, *toy*). One child was taught phrases (want + noun; more + noun). The researchers used a multiple probe design across pairs of parent-child dyads to measure effects of the intervention on child production of language targets. All children demonstrated increases in their total use, and spontaneous use, of targets, during intervention and generalization sessions, suggesting that parent-implemented milieu language intervention during play sessions can be an effective method for increasing children's production of specific words (Hemmeter & Kaiser, 1994).

Overall, studies of ABI and naturalistic language instruction suggest that words can be taught within the context of play during one-on-one sessions or within classroom activities (Wilcox et al., 1991) and that ABI may be as efficacious as more direct methods of instruction for teaching specific words (Losardo & Bricker, 1994). Studies also suggest that these interventions can be delivered by different agents including graduate students (Losardo & Bricker, 1994; Wilcox et al., 1991) and parents (Hemmeter & Kaiser, 1994). Results also suggest that ABI and naturalistic language intervention strategies are efficacious for teaching words to children at-risk (Losardo & Bricker, 1994), or children with identified special needs (Hemmeter & Kaiser, 1994; Wilcox et al., 1991), and that they may be particularly useful for facilitating generalization (Hemmeter & Kaiser, 1994; Losardo & Bricker, 1994; Wilcox et al., 1991). Given previous research demonstrating the efficacy of these interventions for teaching words to children with identified special needs and children at-risk, it seems plausible that ABI may be promising for teaching specific vocabulary words to young children with multiple risk factors including poverty.

Purpose and Research Questions

Existing research suggests that both Dialogic Reading and ABI may be effective methods for teaching vocabulary. Studies of Dialogic Reading, and other shared book reading methods, suggest that while children can learn words within the context of book reading when specific words are intentionally taught, the number of words learned is often small, even after repeated readings (Hargrave & Senechal, 2000; Senechal, 1997; Senechal et al., 1995; Walsh & Blewitt, 2006). Studies of ABI and other naturalistic

interventions suggest that typical preschool activities (i.e., play) may provide an effective context for teaching words to children with special needs (Hemmeter & Kaiser, 1994; Losardo & Bricker, 1994; Wilcox et al., 1991) or at-risk for special needs (Losardo & Bricker, 1994).

In this review, studies were presented in which researchers examined children's word-learning within Dialogic Reading or shared book reading, within ABI or other naturalistic interventions, or as components of an intervention package that included both shared book reading and naturalistic intervention strategies. To date, however, researchers have not directly compared the separate and unique contributions of shared book reading and naturalistic interventions to word learning.

The purpose of this study, therefore, was to compare the efficacy and efficiency of two approaches to teaching vocabulary: Dialogic Reading and ABI. Four research questions guided this study:

1. Efficacy: Do 3 and 4-year-old children at-risk for later language and literacy delays due to low socioeconomic status and limited expressive oral language show differences in the number of target vocabulary words learned in Dialogic Reading and ABI conditions?

2. Efficiency: Do participants show differences in the number of sessions to criterion for learning new vocabulary words in Dialogic Reading and ABI conditions?

3. Maintenance: Do participants show differences in maintenance of words learned in Dialogic Reading and ABI conditions?

4. Generalization across setting and people: Do participants show differences in their use of words learned in Dialogic Reading and ABI conditions when interacting in the classroom with peers and staff given the same books and toys used during intervention?

Chapter 3

Method

Participants

Three preschool children, Gabe, Jayden, and Malika, considered at-risk for language and literacy delays participated in the study (see Table 1 for descriptive information about each). Children attended a half-day pilot preschool program serving 3-year-olds living in a high-poverty neighborhood within a large, urban school district. All children were eligible for free and reduced lunch. Inclusion criteria were that children received a score at or below the 50th percentile on Individual Growth and Development Indicator (IDGI) Picture Naming during fall benchmark testing (Bollman & Silberglit, 2010), and a standard score of 85 or above on the Peabody Picture Vocabulary Test, Fourth Edition (PPVT-4; Dunn & Dunn, 2007; see Table 1). Children with the lowest IGDI scores were considered first for the study. Children who were English learners and children with identified disabilities were not included.

All participants passed district-administered preschool developmental screening, including vision and hearing screening, prior to beginning the study. Gabe had attended the program since he was 43 months of age. He was cooperative during all intervention and assessment activities, and would ask to participate in the activities when I arrived at the preschool each day.

Jayden had attended the program since he was 46 months of age. Midway through the study, Jayden began attending a different full day program in the same neighborhood. Jayden's mother, and staff at the new program, expressed continued concerns about his

speech, particularly that he was difficult to understand. Jayden was evaluated, and qualified for, speech-language and occupational therapy services provided by the new program, but did not begin receiving services until after his participation in the study ended. Jayden was often reluctant to attend intervention and assessment sessions at the first preschool, and would occasionally refuse to leave the classroom. After Jayden moved to the new full day program, he was cooperative when leaving the classroom and during intervention and assessment sessions.

Malika had attended the program since she was 46 months of age. Her attendance was sporadic, particularly in the last half of the study, which may have impacted her performance. During initial sessions, Malika was cooperative. In the middle of the study, however, Malika appeared less engaged in intervention sessions. For example, during Dialogic Reading sessions, she would turn the pages in the books while I was reading and comment that she was all done with the book. During ABI sessions, she would sometimes ask why we were playing with the same toys again. In addition, she was often non-compliant during administration of the vocabulary probes. For example, she would provide an answer that was clearly incorrect and smile, or immediately say "I don't know" without attending to the item. After several sessions with minimal compliance, I implemented an incentive system for Malika, which is described below in the Procedure section.

Table 1

Participants' Demographic Information and Scores on Standardized Testing

Participant	Age$_a$	Gender	Race	IGDI Picture Naming$_b$	PPVT-4$_c$	EVT-2$_d$
Gabe	44	Male	African-American; Caucasian	9	95	103
Jayden	47	Male	African-American	9	93	93
Malika	47	Female	African-American	11	96	97

$_a$Age in months
$_b$IGDI=Individual Growth and Development Indicator; a score of 12 corresponds to the 50th percentile for 3-year-olds
$_c$PPVT-4=Peabody Picture Vocabulary Test, Fourth Edition; standard score
$_d$EVT-2=Expressive Vocabulary Test, Second Edition; standard score

Setting

Sessions were conducted in an office, hallway, or therapy room near the classroom at a child-sized table with two chairs. The table was moved aside for DR sessions and chairs were placed side-by-side for storybook reading. All sessions were videotaped.

Measures

IGDI Picture Naming. IGDI Picture Naming was used to identify participants and to measure participants' growth in oral language. IGDI Picture Naming is a 1-min general outcome measure of expressive language for children between 3 and 6 years of

age (Early Childhood Research Institute on Measuring Growth and Development [ECRI-MGD], 1998). The examiner shows the child pictures randomly selected from a deck of 120 cards with photos and line drawings of everyday objects in the lexicon of typical 5-year-olds. The examiner reads scripted directions, demonstrates the task, tells the child to "name the pictures as quickly as you can," and then presents the cards for 1 min. The child's score is the number of pictures named correctly in 1 min. One-month alternate form reliability correlation coefficients range from .44 to .78 (McConnell, McEvoy & Priest, 2002). Concurrent validity has been established with the Peabody Picture Vocabulary Test-Third Edition (PPVT-III; Dunn & Dunn, 1997) and the Preschool Language Scale 3 (PLS-3; Zimmerman, Steiner & Pond, 1992), with correlations ranging from .56 to .81 (Priest, Davis, McConnell, McEvoy, & Shinn, 1999; ECRI-MGD, 1998). For this study, total pictures named correctly in one minute was used for screening and post-study assessment.

PPVT-4. The PPVT-4 is a norm-referenced, standardized measure of receptive vocabulary (Dunn & Dunn, 2007) commonly used in early language and literacy research (e.g., Roskos & Burstein, 2011; Wasik & Bond, 2001). Mean test-retest reliability by age is .93 (Dunn & Dunn, 2007). Correlations with the Comprehensive Assessment of Spoken Language (CASL; Carrow-Woolfolk, 1999) are .50 for basic concepts, .41 for antonyms, and .54 for sentence completion (Dunn & Dunn, 2007). Correlation with the PPVT-III is .84 (Dunn & Dunn, 2007). The PPVT-4 scale score was used to confirm eligibility of all participants.

Expressive Vocabulary Test, Second Edition (EVT-2). The EVT-2 is a norm-referenced, standardized measure of expressive vocabulary (Williams, 2007). The EVT-2 has been used by other researchers examining vocabulary interventions (e.g., Leung, 2008). Mean test-retest reliability by age is .95 (Williams, 2007). Correlation with the PPVT-4 is .82 (Dunn & Dunn, 2007). Correlations with the CASL (Carrow-Woolfolk, 1999) are .59 for basic concepts, .67 for antonyms, and .51 for sentence completion (Williams, 2007). The EVT-2 scale score was used to describe participants' expressive vocabulary at the beginning of the study.

Expressive Target Vocabulary Pretest. This author-created measure was administered at the beginning of the study to determine target words already known to participants. The measure consisted of 42-49 potential target words (See Appendix A). The original measure had 42 words; seven words were added for Gabe and Malika who did not have enough unknown words out of the original 42 test items. For each target word, I administered test items twice, once using storybook pictures (DR) and once using objects (ABI). Items were administered in random order across two 15- to 20-min sessions. Administration and scoring guidelines were adapted from the EVT-2 (Williams, 2007; see Appendix B). This measure was used to identify unknown words for each participant, 30 of which were randomly selected and then randomly assigned to conditions.

Expressive Target Vocabulary Probe. The purpose of this author-created measure, which served as the primary dependent variable, was to assess participants' ability to produce target words. Probes were identical to the Pretest described above with

three exceptions: (a) Probes included only words assigned to conditions, (b) words were only assessed within their assigned conditions (i.e., words in the ABI condition were assessed using toys/objects), and (c) synonyms and partial word responses were no longer considered correct. Number of words correct in each condition was plotted and visually analyzed to examine the effect of each intervention on target word learning.

Word frequency count. To measure generalization, I recorded a frequency count of each child's use of words in all conditions during three videotaped 10-min play sessions in the child's classroom using the books and objects from intervention sessions. Unique and total words across all three sessions were calculated to examine generalization in each condition.

Receptive Target Vocabulary Posttest. The purpose of this measure was to examine participants' receptive knowledge of target words following the study. The format, directions, and scoring were similar to the PPVT-4 (Dunn & Dunn, 2007). Using a laptop, I showed each participant 30 randomly-ordered Power Point slides, one for each of the 30 words assigned to conditions. Each slide contained a photograph of the target word and three randomly selected photographs from the same condition, placed in random order on the slide. Photographs were specific to conditions (i.e., words taught in the DR condition were represented by photos from books). Control words were randomly assigned to conditions. For each slide, I asked participants to point to a picture (e.g., "Point to kiwi.") and scored responses as correct or incorrect. The number of words correct in each condition was summarized to examine receptive knowledge 4 to 6 weeks after intervention.

Procedure

I secured informed parental consent (see Appendix C) for a total of seven children whose IGDI Picture Naming scores were below the 50th percentile. After obtaining consent, I administered the PPVT-4. Four children were excluded or dropped from the study: Two did not meet criterion on the PPVT-4, one refused to leave the classroom with the examiner, and one moved after four intervention sessions.

Target words. I selected target words based on two common early childhood themes: doctor's office and grocery store. These themes were selected because they provided ample opportunities to teach unique words (e.g., *stethoscope, thermometer avocado, kiwi*), and offered a clear sequence of events both in storybooks and for dramatic play. For example, the doctor's office theme focused on a visit to the doctor's office (e.g., parent and baby wait in the reception area, patient is called, doctor listens to heart with *stethoscope* and takes temperature with *thermometer*, doctor writes a prescription, etc.). The grocery store theme included a typical grocery shopping scenario (e.g., getting a *cart*, selecting grocery items, paying the cashier, bagging the groceries, etc.). These scenarios were represented in the books selected for Dialogic Reading and in the activity plans and toys used in the ABI condition.

I first identified potential target words from Biemiller's (2009) list of partially-known root words for preschool children. I then identified additional words that met the following criteria: (a) likely unknown to 3-year-olds, (b) appeared in the selected storybooks or could be easily added to the storybooks, and (c) could be taught within the

play activities. Forty-four of the 49 words were nouns (90%), three were verbs (6%), and two were adjectives (4%).

After administering the Expressive Target Vocabulary Pretest, I randomly selected 30 words (15 per theme) that were unknown to each participant and randomly assigned them to one of the three conditions (see Table 2). Words were considered unknown if the child gave incorrect responses for both the storybook (DR) and object (ABI) test items. I omitted words if a child gave a plausible synonym (e.g., *buttons* for *keys* on a cash register) or used a portion of the word (e.g., *melon* for *watermelon*). I also omitted words that appeared ambiguous to the participant during testing (e.g., when shown a picture of a character pointing, a participant used the word *touching* rather than *pointing*). Word sets varied for each participant based on unknown words and random assignment of words to conditions.

Table 2

Target Words Randomly Assigned to Participants by Intervention Condition and Theme

Participant	Theme	Condition		
		DR	ABI	Control
Jayden	Doctor's Office	Thermometer Otoscope Bandage Stethoscope Wrist	Prescription Needle Sling Magazine White	Cotton Ball Dropper Safety Pin Tongue Depressor Newspaper
	Grocery Store	Sign (Checkout) Belt Pear Cash Register Cucumber	Pineapple Broccoli List Watermelon Grapes	Purple Price Wallet Shopping Cart Apron
Gabe	Doctor's Office	Cotton Ball Thermometer Needle Wrist Blood Pressure Cuff	Prescription Otoscope Sling Dropper Listening	Bandage Magazine Stethoscope Measuring Tape Safety Pin
	Grocery Store	(Checkout) Belt Celery Avocado Kiwi Scale	Sign Pineapple Onion Eggplant List	Pear Price Apron Cash Register Cucumber
Malika	Doctor's Office	Needle Tongue Depressor Writing Blood Pressure Cuff Measuring Tape	Dropper Otoscope Stethoscope Thermometer Sling	Prescription Safety Pin Listening Wrist Magazine
	Grocery Store	Cucumber List (Checkout) Belt Kiwi Shopping Cart	Eggplant Apron Nametag Scale Cash Register	Celery Sign Pear Onion Avocado

Design. A single-subject adapted alternating treatments design (AATD) across participants (Wolery, Gast, & Hammond, 2010) was used to compare the effects of each intervention (DR and ABI) on the primary dependent variable (production of target words). After a stable baseline was established, each intervention was delivered in randomly alternating sessions across days. Criterion for moving to maintenance and generalization was 100% acquisition of words in an intervention condition on 3 consecutive days.

Baseline and intervention phases. During the baseline phase, I administered the Expressive Target Vocabulary Probe until a stable baseline was established. During the intervention phase, I implemented either the DR or ABI condition during daily 10-min sessions one to four times per week, with a goal of 3 sessions per week. Two sessions were delivered on one day for Malika prior to the district's winter break due to numerous absences. Sessions were randomly alternated, with a condition occurring no more than twice in a row, and with an equal number of sessions implemented across intervention conditions (Wolery, Gast, & Hammond, 2010). One error in randomization was made when a session was administered out of order for Jayden. Participants received between 7 and 10 weeks of intervention.

DR condition. During each DR session I read two books, *Going to the Doctor* (Civardi, 2005) and *Edwin Speaks Up* (Stevens, 2011), following an intervention script (see Appendix D). During the book reading, I delivered one CROWD prompt and associated PEER sequence (prompt, evaluate, expand, repeat; Whitehurst et al., 1994) for each target word. Prompts followed a three-level hierarchy, beginning with Level 1

prompts (e.g., simple wh- questions). Participants typically heard each target word two times during Level 1 prompt sequences and one additional time if the word occurred in the text of the book. I administered Level 2 prompts (e.g., open-ended questions) when a participant knew 60% of the words taught in the book, based on a guideline suggested by Flynn (2011). When administering Level 2 prompts, children's responses did not always include the target word or reference to the target word. Thus, participants did not always use or hear target words during Level 2 prompt sequences. I did not administer Level 3 prompts during the study, as participants did not reach the recommended criterion of using most target words in phrases or sentences (Flynn, 2011). Each book reading lasted approximately 5 min. After each reading, I administered the Expressive Target Vocabulary Probe for the five words taught in that book. The sequence was then repeated with the second book.

Prior to initiating the intervention portion of this study and to ensure integrity with past implementations of this practice, one expert reviewed planned Dialogic Reading procedures via two videotaped practice sessions. The expert was a faculty member at another institution with research experience in shared storybook reading. The expert was asked to rate each video as either a poor, good, or excellent example of Dialogic Reading, to explain the rationale for the rating, and to recommend any changes that would make the intervention a better example of Dialogic Reading. The first video was rated as good. The expert justified the rating by citing the use of comprehension questions, receptive vocabulary instruction, at least one reference to print, and embedded instruction on nearly every page. Suggestions were to prompt expressive vocabulary

production and to ensure the use of PEER sequences. The second video was rated as excellent. The reviewer cited a better balance of different type of questions and more examples of repeating the child's utterances and did not recommend any substantive changes to this example.

  ABI condition. During each ABI session, I implemented Activity Plans for two different play scenarios: doctor's office and grocery store (see Appendix E). Materials for the doctor's office included a dress-up doctor's jacket, a doll, and a pretend doctor kit. Materials for the grocery store included a cash register, shopping cart, and pretend food. Three to five antecedents were embedded during each activity for each target word. Antecedents used were modeling, expanding or recasting, presenting a mand, giving directions involving a target word, time delay, and prompting imitation (see Appendix D for specific examples). Least directive strategies (e.g., modeling and expanding or recasting; Hepting & Goldstein, 1996) were used most frequently. Consequences included social praise and attention for participating in the activity and were a logical outcome of the child's behavior whenever possible. Each activity lasted approximately 5 min. At the end of each activity, I administered the Expressive Target Vocabulary Probe for the five words taught in that activity. The sequence was then repeated with the second activity.

  As with the DR condition, one expert, a faculty member at another institution with extensive experience in ABI, reviewed planned ABI procedures to guarantee intervention design integrity. The same form was used to elicit a rating and comments from the reviewer based on two practice videos of ABI implementation. The reviewer

rated both videos as good to excellent and justified these ratings by citing the child's interest and engagement in the activities, that the activities were child-directed, and that play activities were authentic. To improve the implementation of ABI, she suggested involving other children in the play activity and providing more wait time before telling the child a word or other desired response.

  Control condition. I assessed production of words in the control condition as determined by the alternating treatment schedule, randomly interspersing words within Probes. The number of words correct, however, began to decrease in both intervention conditions at session 13 for Malika and session 16 for Jayden. Hypothesizing that participant fatigue may have been involved, due in part to the number of unknown words in probes that included control words, from that point forward, I administered control probes half as often, omitting them from every other scheduled session, and administered them at the end of sessions.

  Incentives. I provided stickers for all participants at the end of each session. During sessions 17 and 18, I offered Malika a high-interest toy at the beginning of the session to increase her compliance when leaving the classroom and during the activity. Because this did not increase compliance, beginning at session 19, I had Malika identify two preferred toys from an array of toys offered at the beginning of each session. These toys were then used as rewards after compliance during Probes. This incentive was also added for Jayden at session 19 when the number of words correct decreased in both conditions between sessions 14 and 17.

Maintenance and generalization. Originally, the criterion for discontinuing intervention and moving to maintenance and generalization was 100% acquisition of words in a condition for three consecutive days. This criterion, however, was modified to three non-overlapping data points and a stable trend due to possible participant fatigue and that participants were not mastering all words being taught, perhaps due to their difficulty. This modified criterion was met for Gabe and Jayden, but not for Malika. Intervention was discontinued for Malika, however, because her data suggested an overlap of conditions when compliance was established. When participants reached criterion, or in Malika's case, when interventions were determined to be of similar effectiveness, I recorded maintenance and generalization during five alternating sessions across two weeks. I administered maintenance probes at one and two weeks post-intervention. Maintenance probes were identical to baseline probes except that control words were assessed last. I assessed generalization by observing each child during three 10-min play sessions in the classroom with adults and peers. During each session, I placed the intervention books and toys on a table in the classroom. Classroom staff members were asked to interact with the children as they normally would and to redirect the participant if needed to ensure engagement with the toys and books. I videotaped sessions and recorded a frequency count of the child's use of words in each condition from the video immediately following each session. Finally, 4 to 6 weeks after intervention was discontinued, I administered the Receptive Target Vocabulary Posttest.

Interobserver Agreement

Four doctoral students in educational psychology, who were naive to the study purpose and design, were recruited to code Interobserver agreement (IOA). IOA was coded for three measures: (1) Target Vocabulary Pretest; (2) Target Vocabulary Probes during baseline, comparison, and maintenance phases; and (3) Word Frequency Count during generalization sessions. Two coders were native English speakers while two were non-native English speakers. Pairs were assigned to each condition to minimize the likelihood for bias across study conditions. One native and one non-native speaker was assigned to each pair. Sessions were coded from videos. I met individually with each coder for a 1 hr training session. IOA during training averaged 97% for DR coders (range = 89% - 100%) and 100% for ABI coders.

IOA (agreements/agreements + disagreements X 100) was measured for 26% of sessions across participants and conditions. IOA for the Expressive Target Vocabulary Pretest was 93% (range = 88% to 97%). IOA for Expressive Target Vocabulary Probes administered in the baseline phase averaged 99% and ranged from 97% to 100%. IOA for Target Vocabulary Probes administered during Dialogic Reading sessions in the intervention phase averaged 97% and ranged from 90% to 100%. IOA for Expressive Target Vocabulary Probes administered during ABI sessions in the intervention phase averaged 91% and ranged from 80% to 100%. One ABI session was omitted from calculations because target words were not included in the forms given to the coder, thus preventing her from knowing the correct answers. IOA for Expressive Target Vocabulary probes administered during the maintenance phase averaged 90% and ranged from 87%

to 93%. IOA for word frequency count during generalization sessions averaged 95% and ranged from 90% to 97%. Total sessions, number of sessions coded, and IOA above 90% for each measure are reported in Table 3.

Table 3

Sessions and Interobserver Agreement (IOA) Coded for Each Measure

Measure	Sessions		IOA	
	Total Sessions	Number Coded	Number Above 90%	Percent Above 90%
Target Vocabulary Pretest	3	1	1	100
Target Vocabulary Probe: Baseline	9	3	3	100
Target Vocabulary Probe: Intervention	66	17	14	82
Target Vocabulary Probe: Maintenance	6	2	1	50
Word Frequency Count: Generalization	9	3	3	100

Fidelity of Implementation

Fidelity of implementation was measured for the Dialogic Reading intervention, ABI intervention, and administration of vocabulary probes. Fidelity was measured in 26% of sessions across participants and conditions. Sessions were coded from videos by the same doctoral student pairs. Coders were instructed to code intervention videos after vocabulary probes to ensure that they would be blind to which words were assigned to intervention and control conditions. For each measure, fidelity was calculated by dividing

the number of correctly implemented components by the total components on researcher-developed checklists (see Appendices F - H). During training, agreement between raters on the Dialogic Reading intervention fidelity checklist was 95%, while agreement between raters on the ABI intervention fidelity checklist was 94%. During training, agreement on the Expressive Target Vocabulary Probe fidelity checklist was 100% for raters in both conditions.

Fidelity of implementation for Dialogic Reading intervention averaged 97% (range = 78% to 100%). Fidelity was below 80% for one session due to a coder misunderstanding how to score one item on the checklist when level 2 open-ended prompts were administered (i.e., the coder marked an item as "no" when it should have been coded "yes"). Fidelity of implementation for ABI intervention averaged 99% and ranged from 95% to 100%. Fidelity of implementation for Expressive Target Vocabulary Probes in both the Dialogic Reading and ABI conditions averaged 99% and ranged from 90% to 100%.

Data Analysis

The number of words correct in each condition was plotted for each participant and visually examined for changes in level, trend, and variability. In addition to visual analysis, percentage of non-overlapping data (PND) was calculated to determine an effect size. PND was calculated by making a point-by-point comparison of scores in each condition, dividing non-overlapping data points by the number of data points in the second condition, and then multiplying by 100 (Gast & Spriggs, 2010). Efficiency was analyzed by comparing the number of sessions required to reach the maximum number of

words learned in the less effective condition (i.e., the condition in which the participant learned the fewest total words) and by examining slope calculated using the split-middle (Gast & Spriggs, 2010) and running median (Franklin, Gorman, Beasley, & Allison, 1997) methods. Maintenance was analyzed by comparing percentage of words produced correctly in each condition during one- and two-week follow-up probes. Generalization was examined by comparing unique and total words used in each condition across three generalization sessions.

Chapter 4

Results

The purpose of this study was to compare the effects of Dialogic Reading and ABI on word learning in 3-year-old children at-risk due to poverty and limited expressive language. I examined four research questions:

5. Efficacy: Do 3 and 4-year-old children at-risk for later language and literacy delays due to low socioeconomic status and limited expressive oral language show differences in the number of target vocabulary words learned in Dialogic Reading and ABI conditions?

6. Efficiency: Do participants show differences in the number of sessions to criterion for learning new vocabulary words in Dialogic Reading and ABI conditions?

7. Maintenance: Do participants show differences in maintenance of words learned in Dialogic Reading and ABI conditions?

8. Generalization across settings and people: Do participants show differences in their use of words learned in Dialogic Reading and ABI conditions when interacting in the classroom with peers and staff given the same books and toys used during intervention?

I first report results for each participant and then describe results specific to each research question.

Results by Participant

Gabe. Results for Gabe are presented in Figure 1. In baseline, Gabe's scores were 0 across all conditions. Visual analysis of the Intervention phase suggests an immediate

increase in level and an accelerating trend for each intervention condition, with no

overlap between conditions (see Figure 1). Visual analysis of the control condition

suggests a low and zero celerating trend. In the Intervention phase, Gabe's median scores

in each condition were 6 (range = 1 - 7) for Dialogic Reading, 7.5 (range = 2 - 10) for

ABI, and 0 (range = 0 - 1) for control. PND was 100% for Dialogic Reading and ABI,

with performance in ABI conditions higher. One week after intervention, Gabe correctly

named 6 Dialogic Reading words, 8 ABI words, and 1 control word. Two weeks after

intervention, he correctly named 4 Dialogic Reading words, 7 ABI words, and 1 control
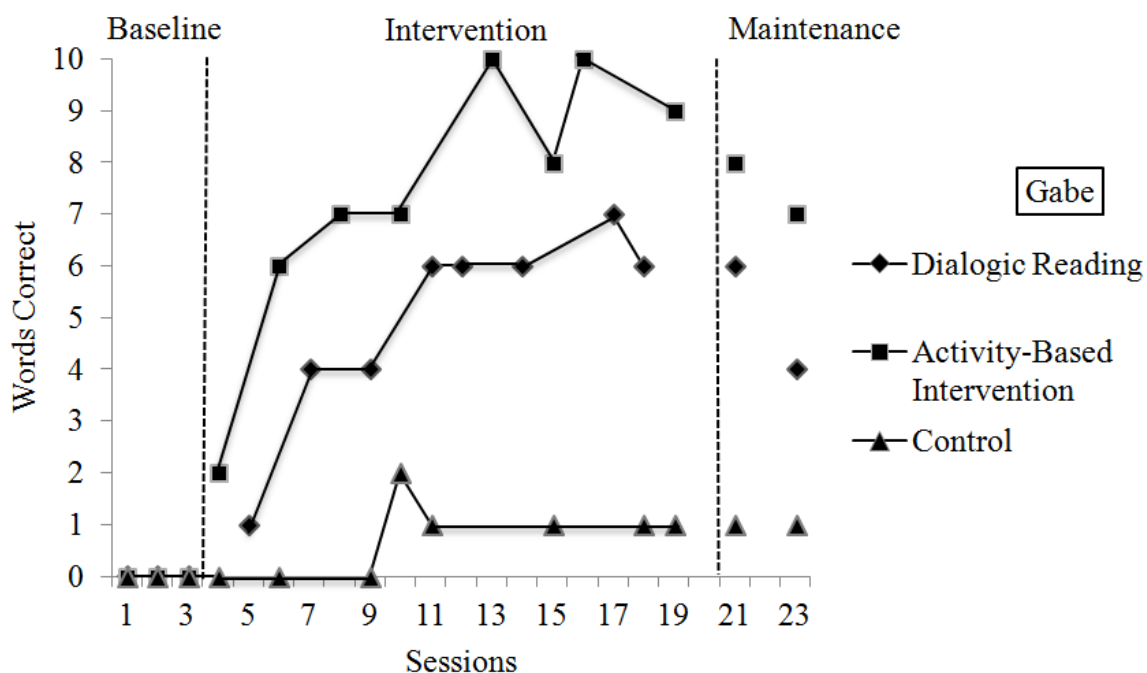
word.

Figure 1. Baseline, intervention, and maintenance data for Gabe in Dialogic Reading,

ABI, and control conditions.

Jayden. In baseline, Jayden's scores were 0 for Dialogic Reading and between 0 and 1 for ABI and control. In Intervention, visual analysis of Jayden's graph suggests an immediate increase in level in both conditions, with a variable and slightly accelerating trend for Dialogic Reading and a variable and accelerating trend for ABI (see Figure 2). Data points in the control condition remained low and stable throughout the study. Visual analysis also suggests overlap between conditions for the first 14 sessions with separation of conditions beginning in session 15; performance in Dialogic Reading remained stable for the remainder of this phase, while performance in ABI demonstrated moderate acceleration. In the Intervention phase, Jayden's median score was 3.5 (range = 1 - 5) for Dialogic Reading, 5.5 (range = 2 - 8) for ABI, and 1 for control (range = 0 - 2). PND was 58% for Dialogic Reading and ABI, with performance in ABI higher than in Dialogic Reading after week 21. One week after intervention was discontinued, Jayden correctly named 5 Dialogic Reading words, 6 ABI words, and 1 control word. Two weeks after intervention, he correctly named 3 Dialogic Reading words, 6 ABI words, and 1 control word.

Figure 2. Baseline, intervention, and maintenance data for Jayden in Dialogic Reading, ABI, and control conditions.

Malika. In baseline, Malika's scores were 0 for ABI and between 0 and 1 for Dialogic Reading and control. In the intervention phase, visual analysis of Malika's graph suggests a delayed change in level and a rapidly accelerating trend for ABI, and an immediate change in level and a slightly accelerating trend for Dialogic Reading in the first 10 intervention sessions (see Figure 3). Beginning in session 10, however, this data pattern was replaced by a rapidly decelerating trend in ABI, with a change in level from 8 words correct to 3 words correct between sessions 10 and 16, and then an accelerating trend with a change in level between 3 words correct to 6 words correct between sessions

18 and 25. In the Dialogic Reading condition, there was an accelerating trend with a change in level from 2 words correct to 7 words correct between sessions 15 and 24. In the last several sessions, there was a zero celerating trend in both conditions. In the intervention phase, Malika's median score was 5 (range = 1 - 7) for Dialogic Reading, 5 (range = 0 - 8) for ABI, and 2 (range = 0 - 2) for control. PND was 38% for Dialogic Reading and ABI, with performance in neither condition higher than the other based on visual inspection. One week after intervention, Malika correctly named 5 Dialogic Reading words, 4 ABI words, and 3 control words. Two weeks after intervention, she correctly named 4 Dialogic Reading words, 3 ABI words, and 0 control words.
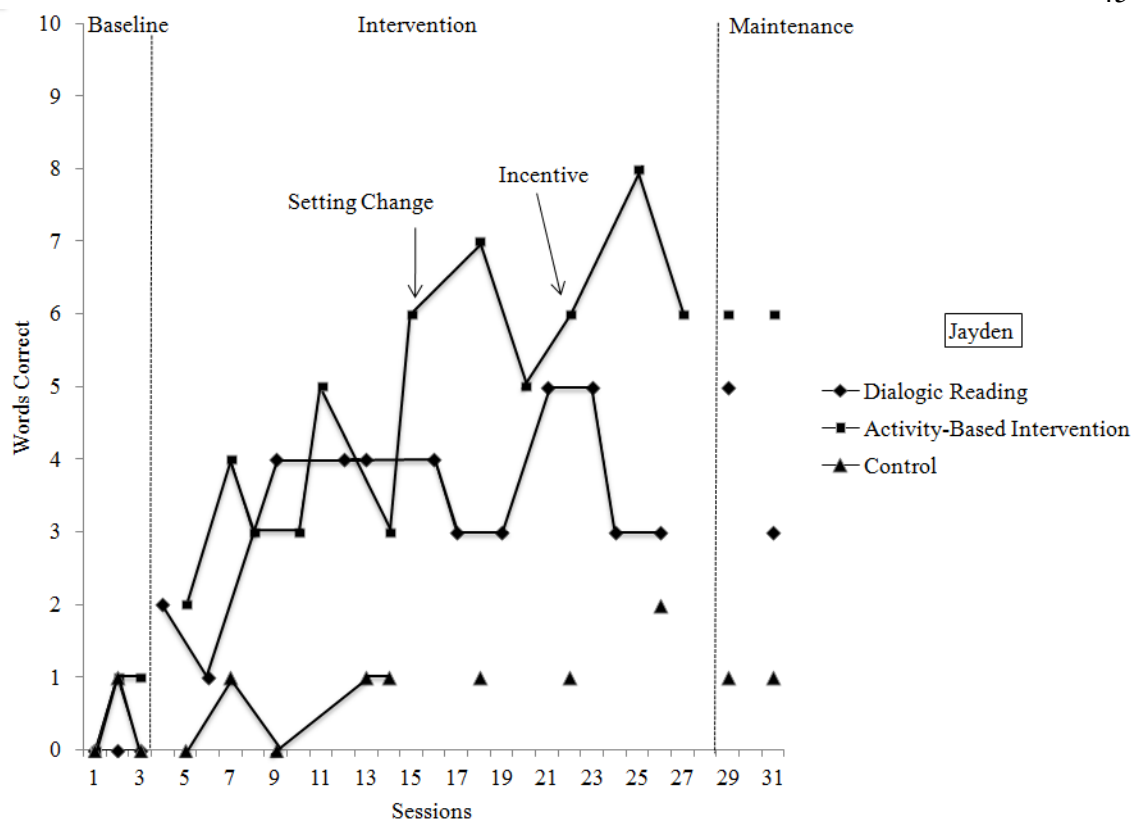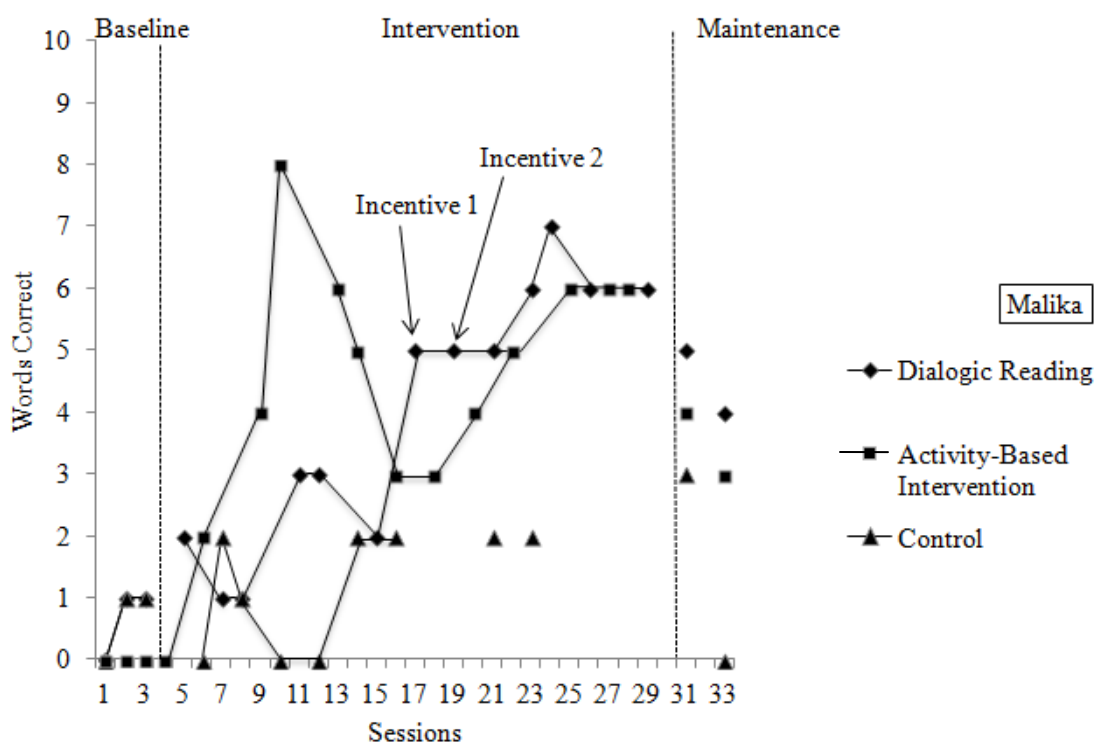

Figure 3. Baseline, intervention, and maintenance data for Malika in Dialogic Reading, ABI, and control conditions.

Receptive Target Vocabulary Posttest

Results for the Receptive Target Vocabulary Posttest are presented in Table 4.

Overall, participants demonstrated similar levels of receptive knowledge of words in both

intervention conditions. On average, participants identified 93% of Dialogic Reading

words (range = 80% - 100%) and 90% of ABI words (range = 80% - 100%). While

participants were able to identify, on average, 70% of control words (range = 30% -

90%), it should be noted that Jayden's score of 3 was considerably lower than Gabe and

Malika's scores of 9 on this measure.

Table 4

Number of Words Correctly Identified in Each Condition on Receptive Target
Vocabulary Posttest

	Condition		
Participant	Dialogic Reading	Activity-Based Intervention	Control
Gabe	8	10	9
Jayden	10	8	3
Malika	10	9	9

Results by Research Question

Question 1 (efficacy): Do 3 and 4-year-old children at-risk for later language

and literacy delays due to low socioeconomic status and limited expressive oral

language show differences in the number of target vocabulary words learned in

Dialogic Reading and ABI conditions? I examined this research question by

considering visual analysis of graphs, median and maximum number of words learned in each condition, and PND. Across participants, visual analysis suggests that the ABI condition was superior to the Dialogic Reading condition for Gabe, and likely for Jayden as well. Visual analysis indicates that neither intervention was superior for Malika. In all cases, both interventions were superior to control.

Median and maximum number of words learned in each condition are reported in Table 5. Data analyses indicate that median scores were higher in ABI than in Dialogic Reading for two participants, and the same in ABI and Dialogic Reading for the third participant. Maximum scores were higher in ABI than in Dialogic Reading for all three participants. Both median and maximum scores were higher in ABI and Dialogic Reading than in control for all three participants.

PND between intervention conditions was 100% for Gabe, 58% for Jayden, and 38% for Malika. For Gabe, PND indicates a strong difference in effect between ABI and Dialogic Reading, with the direction of the effect favoring ABI (Scruggs & Mastropieri, 1998). For Jayden, PND indicates a possible difference in effect between ABI and Dialogic Reading, with the direction of the effect favoring ABI (Scruggs & Mastropieri, 1998). For Malika, PND indicates no difference in effect between ABI and Dialogic Reading for Malika (Scruggs & Mastropieri, 1998). Overall, PND indicates a possible to strong effect favoring ABI for two of three participants, and no difference in effect for the third participant.

Table 5

Median and Maximum Words Named Correctly in Each Condition During Intervention Phase

Participant	Dialogic Reading		ABI		Control	
	Median	Maximum	Median	Maximum	Median	Maximum
Gabe	6	7	7.5	10	1	2
Jayden	3.5	5	5	8	1	2
Malika	5	7	5	8	2	2

Question 2 (efficiency): Do participants show differences in the number of sessions to criterion for learning new vocabulary words in Dialogic Reading and ABI conditions? I originally defined efficiency as the amount of instruction (i.e., number of sessions) required for participants to correctly name all 10 words in a condition. Given that the criterion for moving from intervention to maintenance and generalization was modified during the course of this study to three non-overlapping data points, and participants did not learn 10 words in each condition, I am unable to answer the research question as originally written.

The question of efficiency, however, might be conceptualized and addressed in at least two ways: (1) number of sessions required to reach the number of words learned in the condition in which the fewest words were learned, and (2) slope. The first analysis was conducted because it provides a method for comparing sessions required to learn a given amount of words, similar to the initial planned analysis. Results suggest that

participants required between three and five ABI sessions, as compared to between seven and 11 Dialogic Reading sessions, to learn the same number of words (see Table 6).

Slope was calculated using two methods: split-middle (Gast & Spriggs, 2010) and running medians (Franklin et al., 1997). Slope was first calculated for intervention phase data points in each condition using the split-middle method (see Figure 4). For Gabe, slope in both conditions was nearly equivalent. For Jayden, slope in the Dialogic Reading condition was decelerating, while slope in the ABI condition was accelerating. For Malika, while both lines were accelerating, slope in the Dialogic Reading condition was steeper than the slope of the line in the ABI condition. Slope calculated using split-middle presents a mixed picture, with neither intervention appearing more efficient than the other in this analysis.

Given the variable and nonlinear nature of the data, I also calculated slope in each condition using running medians, which can provide a better characterization of data with substantial variability (Franklin et al., 1997). In this method, median is calculated for batches of data and then plotted at the median time for each batch (Franklin et al., 1997). For Gabe, running median was calculated using a batch size of three (RM3) as recommended for data with 6 to 10 time points (Franklin et al., 1997). Given the larger number of data points for Jayden and Malika, I used a batch size of 4 (RM4) in calculating running median for these participants' data (Franklin et al., 1997). Results (see Figure 5) using this method suggest a slightly steeper slope in ABI than Dialogic Reading for Gabe and Jayden, and a steeper slope in Dialogic Reading than ABI for Malika. Overall, results from two of three efficiency measures (sessions required to learn the

same number of words and slope calculated using running medians) indicate that ABI

was more efficient than Dialogic Reading for two of three participants.

Table 6

Number of Sessions Required in Each Condition to Learn Same or Greater Number Of Words[a]

Participant	Number of Words	Condition	
		Dialogic Reading	ABI
Gabe	7	7	3
Jayden	5	9	5
Malika	7	11	4

[a]Number of words = total number of words learned in condition in which fewest words were learned
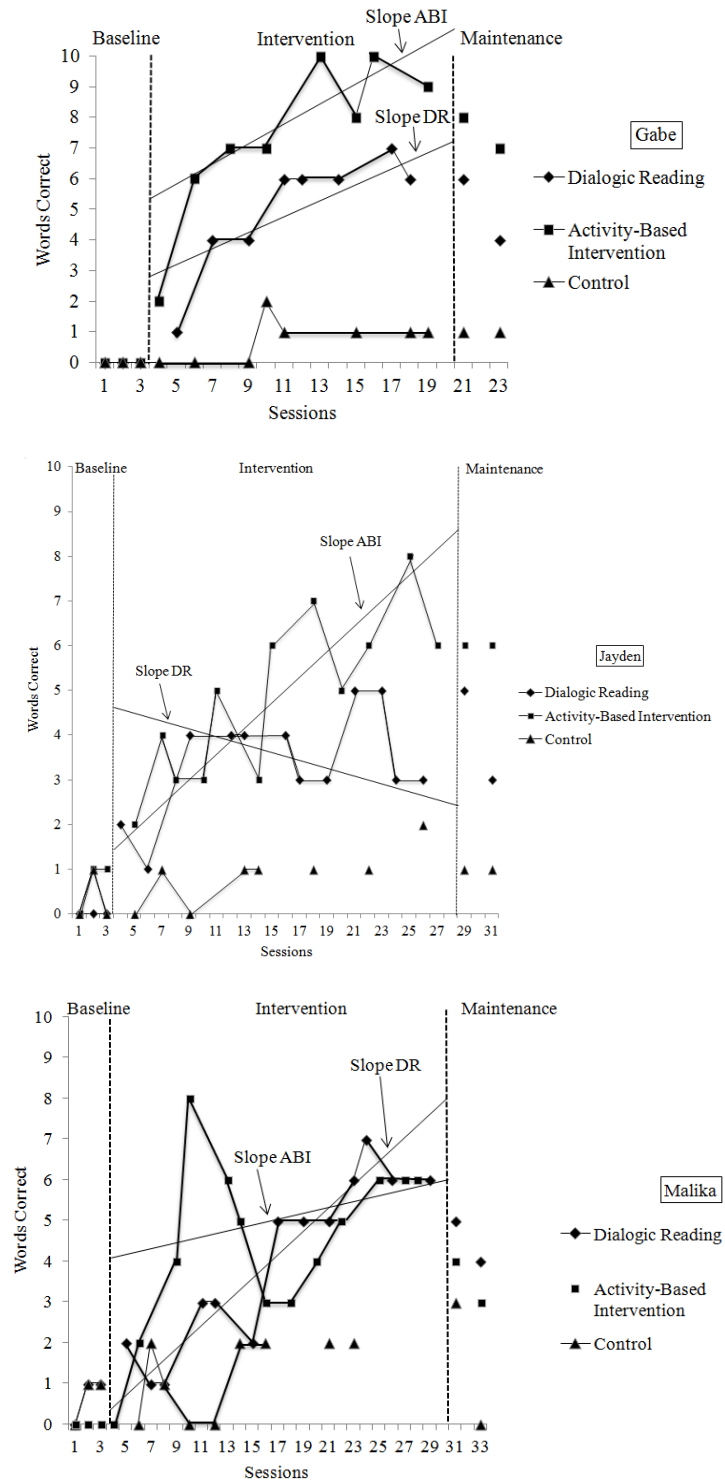
Figure 4. Slope in Dialogic Reading (DR) and ABI conditions for each participant

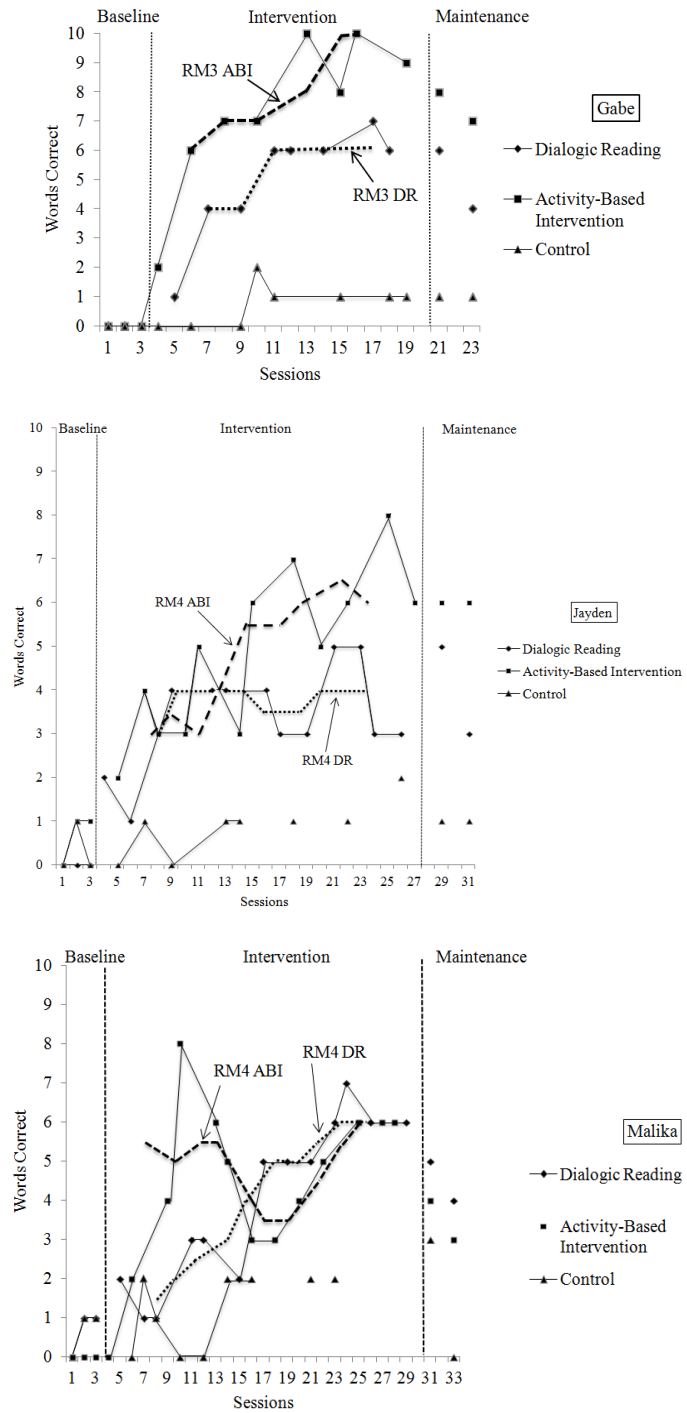calculated using split-middle method.

Figure 5. Slope in Dialogic Reading (DR) and ABI conditions for each participant calculated using running median (RM).

Question 3 (maintenance): Do participants show differences in maintenance of words learned in Dialogic Reading and ABI conditions? Maintenance probe data for each participant are summarized in Table 7 below. Data indicate that Gabe maintained 86% and 57% of words learned in Dialogic Reading, and 80% and 70% of words learned in ABI, during one- and two-week maintenance probes. Jayden maintained 100% and 60% of words learned in Dialogic Reading during one- and two-week maintenance probes, and 75% of words learned in ABI on both maintenance probe occasions. Malika maintained 71% and 57% of words learned in Dialogic Reading, and 50% and 38% of words learned in ABI, during one- and two-week maintenance probes.

Table 7

Number and Percentage of Words Produced Correctly in Each Condition Out of Total Words Learned$_a$ During Maintenance Probes at One and Two Weeks Post-Intervention

Weeks	Participants	Condition	
		Dialogic Reading	ABI
One	Gabe	6/7 (86%)	8/10 (80%)
	Jayden	5/5 (100%)	6/8 (75%)
	Malika	5/7 (71%)	4/8 (50%)
Two	Gabe	4/7 (57%)	7/10 (70%)
	Jayden	3/5 (60%)	6/8 (75%)
	Malika	4/7 (57%)	3/8 (38%)

[a]Total words learned is the highest number of words named correctly in a condition on at least one occasion.

Question 4 (generalization across settings and people): Do participants show differences in their use of words learned in Dialogic Reading and ABI conditions when interacting in the classroom with peers and staff given the same books and toys used during intervention? Unique and total words used across three generalization sessions were analyzed for each participant (see Table 8). Gabe used one unique word (*celery*) from the Dialogic Reading condition, two unique words (*eggplant, sign*) from the ABI condition, and one unique word (*cash register*) from the control condition. Jayden used two unique words (*thermometer, otoscope*) from the Dialogic Reading condition, one unique word (*needle*) from the ABI condition, and no words from the control condition. Malika used one unique word (*shopping cart*) from the Dialogic Reading condition, two unique words (*scale, apron*) from the ABI condition, and one unique word (*celery*) from the control condition. Overall, participants used very few unique words (range = 1 - 2) and few total words (range = 1 - 7) from either intervention condition. While two participants (Gabe and Malika) used more unique and total ABI words than Dialogic Reading words, differences between conditions were minimal. Gabe and Jayden used fewer unique control words than either ABI or Dialogic Reading words, while Malika used the same number of control and Dialogic Reading words.

Table 8

Unique and Total Words Produced in Each Condition Across Three Generalization Sessions

Participant	Dialogic Reading		ABI		Control	
	Unique	Total	Unique	Total	Unique	Total
Gabe	1	1	2	7	1	4
Jayden	2	3	1	1	0	0
Malika	1	1	2	2	1	1

Chapter 5

Discussion

The purpose of this study was to compare word learning in three-year-old children at risk for language and literacy delays in two conditions: Dialogic Reading and ABI. Specifically, I examined word learning in each condition on measures of efficacy, efficiency, maintenance, and generalization. I hypothesized that both interventions would be similarly efficacious (i.e., children would learn about the same number of words), but that ABI would be superior on measures of efficiency, maintenance, and generalization.

Results suggested that both Dialogic Reading and ABI can be used to teach vocabulary to preschool children at-risk due to poverty and limited expressive language, and that both methods are superior to no instruction. ABI, however, appeared to be particularly promising for two participants, Gabe and Jayden, on measures of how many words they learned (efficacy) and how quickly they learned them (efficiency). Dialogic Reading and ABI appeared equally effective, however, for the third participant Malika, on these same dimensions. During maintenance probes, while Gabe and Jayden knew more Dialogic Reading words one week after intervention, they knew more ABI words two weeks after intervention. Malika, however, named more Dialogic Reading words at both one and two weeks post-intervention. During generalization sessions, all three participants used few words from either condition, suggesting that transfer of words from one-on-one intervention to unstructured play with peers was minimal. While findings from this study are mixed, results for two of the three participants suggest that ABI is a promising intervention that warrants further research to determine its benefits for teaching vocabulary to young children living in poverty.

Efficacy

In considering the efficacy of Dialogic Reading and ABI, I compared visual analysis of data, median and maximum number of words learned in each condition, and PND, a measure of difference in performance between the two conditions. Across all measures and analyses, both ABI and Dialogic Reading appear to be efficacious for teaching vocabulary. Higher rates of performance were noted, however, for two of three participants (Gabe and Jayden) in the ABI condition.

Results for Malika should be considered in light of her reluctance to participate during intervention activities and during post-intervention probes in the middle of the study. During intervention activities, Malika's comments (e.g., "I don't want to play this."), and actions (e.g., closing the book before I was finished reading), suggest that using multiple sets of toys and books, rather than two sets of toys and books presented repeatedly, might better maintain participant engagement. During intervention probes in the middle of the study, Malika sometimes refused to provide a plausible response or any response during testing. After implementing two incentives by session 19, I was able to establish compliance with probe assessment procedures. From this point forward, Malika appeared to learn the same number of words in both interventions, suggesting that both interventions were similarly efficacious for her. It is impossible to know, however, to what extent her lack of engagement and compliance in the middle of the study impacted eventual outcomes. Her learning trajectory may have been different in each condition had effective reinforcers been put in place early in the study. In future studies, researchers

should consider including a reinforcement system from the beginning of the study for all participants.

Overall, results suggest that ABI was more efficacious for at least two of the three participants and is a promising intervention for teaching vocabulary to preschool children considered at risk due to poverty and limited expressive language. In addition, both ABI and Dialogic Reading were more efficacious than control. Given that this is the first study to directly compare these two interventions, and the mixed results for Malika, future research should be conducted to examine the relative efficacy of ABI and Dialogic Reading to avoid making a Type II error thereby missing a potentially efficacious intervention (Shadish, Cook, & Campbell, 2002).

Efficiency

I examined efficiency data by considering the number of sessions required in each condition to learn an equal number of words – the smallest number learned by that child in either ABI or Dialogic Reading– and by comparing slope in each condition using split-middle and running medians. All three participants required fewer ABI sessions than Dialogic Reading sessions to learn the same number of words, suggesting that ABI was more efficient than Dialogic Reading on this measure. Slope calculated using split-middle suggests that ABI was more efficient for Jayden, that Dialogic Reading was more efficient for Malika, and that both ABI and Dialogic Reading were similarly efficient for Gabe. Given that visual analysis suggested considerable variability in the data, and that Gabe and Malika reached asymptote within a relatively small number of sessions in the ABI condition (five sessions for Gabe and four sessions for Malika), I also examined

slope using running medians. Slope calculated using this method suggests that ABI was more efficient for two of three participants (Gabe and Jayden). Interestingly, the early asymptote in Malika's data created a slightly accelerating trajectory in the ABI condition, suggesting that this condition was less efficient than Dialogic Reading and complicating interpretation of her data. Overall, when considering all three measures, results appear mixed, but suggest that ABI may have been more efficient than Dialogic Reading, for at least two of three participants in this study.

Of interest is that only one participant (Gabe) was able to name all 10 words in a condition (ABI) on at least one occasion. Even though participants had multiple opportunities to hear and use all words in each session, many sessions (five to seven for Gabe; nine to eleven for Jayden; four to ten for Malika) were required for participants to attain their maximum score in each condition. In addition, although participants received between eight and fourteen sessions of one-on-one intervention, there were several words in each condition that they did not learn. Also of interest is the somewhat variable trajectory of word learning. For example, participants would name an object correctly in one session and then label it incorrectly in subsequent sessions. Malika, for example, correctly named *stethoscope* and *otoscope* in session 8 but was inconsistent in subsequent probes. Findings confirm existing research suggesting that word learning is gradual and that children require multiple opportunities to use and hear words before learning them (Dickinson et al., 2010).

Some words may not have been learned due to their difficulty or to their similarity with other words randomly assigned to the same condition. For example, both

stethoscope and *otoscope* were assigned to the ABI condition for Malika, who often

called both *telescope*. Based on anecdotal data, she appeared to have difficulty

distinguishing between these two words which both contained the root word *scope*. While

including words likely unknown to participants is an essential component of vocabulary

research, future studies might exclude words that contain the same word roots. Similarly,

it may be important to exclude words that might be learned in other environments. For

example, I included color words in this study. Because Jayden did not know *white* and

purple at the beginning of the study, these words were randomly assigned to the ABI and

control conditions. Jayden learned both colors early in the study, which may have inflated

his scores by one word in the ABI and control conditions. In future studies, I would

consider excluding colors and other words likely to be learned outside of intervention

sessions to increase internal validity. It should be noted, however, that excluding more

functional words likely to be heard and used in the classroom might impact vocabulary

acquisition. Future research could address acquisition of words more and less likely to be

heard and used in classroom settings (e.g., advanced but relatively common Tier 2 words

[e.g., *apron*] versus content-specific, specialized Tier 3 words [e.g., *otoscope*] using

Beck, McKeown, and Kucan's [2002] framework).

Maintenance

Maintenance probes were administered one and two weeks after intervention was

discontinued. One week after intervention, all three participants correctly named a larger

percentage of Dialogic Reading words than ABI words. Two weeks after intervention,

Malika continued to correctly name a larger percentage of Dialogic Reading words than

ABI words. Gabe and Jayden, however, correctly named a larger percentage of ABI words than Dialogic Reading words. Overall, while maintenance in Dialogic Reading was superior at one week for all participants, results were mixed at two weeks post-intervention. In future studies, researchers might administer maintenance probes at three and four weeks post-intervention to compare trends in maintenance data in each condition.

Generalization

Generalization data were collected during three 10-min generalization sessions in participants' classrooms. Gabe and Malika used more unique and total ABI words than Dialogic Reading words, while Jayden used more unique and total Dialogic Reading words than ABI words (see Table 9). Gabe and Malika each used one control word. Jayden used no words from the control condition. It should be noted, however, that the number of unique and total words used was small across all conditions and participants. This may have been due to the nature of the generalization measure, which consisted of placing the toys and books from both intervention conditions on a classroom table, and recording participants' use of words for 10 min. During these sessions, participants were often more concerned with defending toys (e.g., "That's my cash register!") than playing with the toys and engaging in social-communicative exchanges with peers and adults. This likely limited overall language use as well as the number of target vocabulary words used during the session.

Interestingly, participants showed some transfer of words from one condition to the other. For example, during play with the doctor kit in the third generalization session,

Jayden used the word *otoscope*, which was from the Dialogic Reading condition and thus

had been taught within the context of book reading. Similarly, Malika used the word

shopping cart and Gabe used the word *celery*, both from the Dialogic Reading condition,

within their play during generalization sessions. I was unable to assess transfer of words

from ABI to Dialogic Reading because participants chose to engage in play, rather than

book reading, during all generalization sessions with the exception of Jayden who

engaged in book reading for a few minutes during one session at the urging of his

teacher. It is also of note that participants typically chose to play with materials from one

theme during each generalization session. All words used by Gabe and Malika related to

the grocery store theme, while all words used by Jayden related to the doctor's office

theme. In future studies, researchers might examine generalization of words from each

theme in two 5-min sessions rather than making all materials available in one 10-min

session.

Overall, results from generalization sessions confirm the need to program for

generalization (Stokes & Baer, 1977). In future studies, researchers might build in a

generalization training phase to examine generalization in the context of adult support.

An alternative would be to conduct generalization sessions in a one-on-one setting with

an adult (e.g., teacher or parent) in more structured Dialogic Reading and ABI activities

that might better facilitate children's use of target words. In addition, differences in

treatment intensity during generalization sessions might be examined by randomly

assigning words from Dialogic Reading and ABI to high- and low-intensity prompting

conditions to examine differences in generalization of words given different levels of

prompting. While these changes might sacrifice social validity by making generalization conditions less similar to an authentic classroom situation, these changes might increase internal validity by facilitating a better understanding of generalization of words learned in Dialogic Reading and ABI interventions.

Receptive Posttest

The Receptive Target Vocabulary Posttest administered 4 to 6 weeks after intervention suggests that participants had receptive understanding not only of words they named correctly during expressive probes, but also of many words they were unable to name during expressive probe sessions. Gabe's scores on this measure suggest that he maintained his receptive understanding of all words learned in the ABI condition and that he understood more words than he named during intervention probes in the Dialogic Reading condition. In addition, his receptive understanding of words in the control condition was comparable to his understanding of words in the intervention conditions. Similarly, Malika demonstrated receptive understanding of nine to ten words in all conditions. Jayden, however displayed a different pattern. He demonstrated receptive understanding of all 10 words in the Dialogic Reading condition, eight words in the ABI condition, but only three words in the control condition. It is of note that while Gabe and Malika demonstrated receptive understanding of about the same number of words in each condition, Jayden demonstrative less understanding of words in the control condition. This could be related to a speech and language delay as Jayden was identified for speech and language services during the study. Data from this measure, particularly for Gabe and Malika, suggest that participants learned words, as measured by this receptive task,

simply through incidental exposure. This is somewhat in contrast to previous findings suggesting that specific word learning from incidental exposure during shared storybook reading is limited (Biemiller & Boote, 2006; Hargrave & Senechal, 2000; Neuman, 2011). A difference between this study and previous studies may be that more sessions were implemented in the current study than in typical shared book reading interventions.

Implications for Research

Findings suggest a need for additional research comparing word learning in Dialogic Reading and ABI with preschool children considered at-risk for at least two reasons. First, future replications are necessary because this appears to be the first study to directly compare word learning in Dialogic Reading and ABI. Second, while the results of this study present conflicting findings about the effects of each intervention on word learning with this population, results suggest promising effects for ABI with two of three participants.

Several modifications to the research design are recommended to increase power in future studies. Replications of this study might include a larger number of children (e.g., four or five). This increased number of participants would increase confidence in findings by providing additional inter-subject replications.

In addition, researchers should employ a research design that allows for examination of multiple sets of words taught with different sets of toys and books to mitigate participant fatigue. In this study, Malika, in particular, became less engaged in intervention sessions, turning pages of books before I was finished reading them and asking why we were playing with the same toys again. For example, researchers might

employ an adapted alternating treatments design (AATD) nested within a multiple baseline design across participants to allow the inclusion of multiple sets of intervention stimuli. This would also increase internal validity by allowing for intra- as well as inter-subject replication. Other changes previously noted include implementing a reinforcement system from the beginning of the study and modifying the conditions for examining generalization.

In this study, intervention and data collection were implemented by the author. While this likely increased implementation fidelity, it limits the social validity of the study. To what extent each intervention could be implemented with fidelity by classroom staff is unknown, particularly for ABI, which previous research suggests is challenging for classroom teachers to implement (Pretti-Frontczak & Bricker, 2001). Future research should examine implementation of these interventions by typical intervention agents. For example, classroom teachers or teacher candidates could be trained to deliver interventions. Fidelity of implementation of each intervention, and vocabulary acquisition as a function of implementation fidelity, could be examined. In addition, interventionists could be asked to complete a survey or participate in a focus group to examine social validity (e.g., feasibility, acceptability) of each intervention.

Another consideration is measurement of the dependent variable. Researchers might consider administering target vocabulary probes at the beginning of each session, rather than at the end of each session to increase the robustness of participant responses. In addition, a second dependent measure in the form of follow-up questions might be added to the primary dependent measure to allow for partial credit if a participant was

unable to produce a word correctly, but was able to name key features or functions of the word (e.g., that a doctor uses an *otoscope* to look in a patient's ears). This would better capture gradations of word knowledge, as opposed to the scoring system used in the current study which only allowed for correct and incorrect responses.

Another important consideration in vocabulary research is word selection (Beck, McKeown, & Kucan, 2002; Biemiller, 2010; Marulis & Neuman, 2010; Neuman, 2011; Spencer et al., 2012). Several researchers have examined which words should be taught to young children (e.g., Beck et al., 2002; Biemiller, 2009; Neuman, 2011). In this study, I focused initially on selecting root words (Biemiller, 2009) that were likely unknown to children and that could be taught within the context of the selected themes. It quickly became clear that I would need to add more challenging and unusual words (e.g., *avocado, tongue depressor*) to the corpus to have an adequate number of unknown words to carry out the study as designed. A review of previous studies (Rahn, in preparation), suggests that method of word selection (e.g., Biemiller's root words; Beck et al.'s Tiered word model) is often confounded with intervention context (e.g., storybook reading, storybook reading plus play). While this study included words selected in multiple ways (e.g., beginning with root words, adding words likely unknown to preschoolers), thus making any conclusions about word selection impossible, future research should examine word selection while holding intervention procedures constant to examine the impact of word selection (e.g., common versus rare words) on vocabulary acquisition.

Implications for Practice

Given existing evidence on vocabulary interventions and findings from this study, early educators should use a variety of intervention methods, including Dialogic Reading and ABI, to increase vocabulary knowledge for young children considered at risk. Results from this study suggest that one intervention method may be more effective than another for some children, but that either intervention successfully teaches new vocabulary to young children. In addition, teachers can incorporate both interventions into a typical preschool classroom day. For example, a teacher might use Dialogic Reading during large group book reading and ABI during planned activities (e.g., art, dramatic play) to teach vocabulary words.

The gap in vocabulary and language development between what children living in poverty know and their peers is large among young preschoolers (Hart & Risley, 1995) and continues to widen over time impacting later academic skills (Dickinson et al., 2010; NICHD, 2005; Walker et al., 1994). Early and intensive vocabulary interventions are necessary to change the trajectory of word learning, and associated later reading achievement, for preschool children living in poverty. Existing research, however, suggests that current vocabulary interventions are insufficient to close this gap (Marulis & Neuman, 2010).

This study adds to the existing literature by providing a direct comparison of the relative effects of two interventions, Dialogic Reading and ABI, on word-learning in preschool children considered at-risk due to poverty and limited expressive language. Based on a review of the literature, this appears to be the first study to compare the

benefits of teaching words within these two conditions. While findings were somewhat mixed, results suggest that both Dialogic Reading and ABI can be used to teach children vocabulary words, including relatively challenging words, and that ABI may be more efficacious and efficient for some children. Future research should incorporate the changes described above to further assess the relative merits of these interventions. Given the limited time children spend in preschool classrooms and the enormity of the task of accelerating vocabulary development, it is important that researchers examine the relative benefits of promising interventions to determine how early educators might best spend instructional time: teaching words during shared storybook reading or during typical classroom activities.

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Appendix A

Words on Expressive Target Vocabulary Pretest

apron	needle
arm	newspaper
avocado	onion
bandage	otoscope
belt	pear
blood pressure cuff	pineapple
broccoli	pocketbook
cash register	pointing
celery	prescription
cotton ball	price
cucumber	purple
doctor	safety pin
dropper	scale
ear	shopping cart
eggplant	sign
elbow	sling
grapes	stethoscope
green pepper	thermometer
keys	tongue depressor
kiwi	wallet
list	watermelon
magazine	white
measuring tape	wrist
nametag	writing
neck	

Appendix B

Directions for Administering and Scoring Expressive Target Vocabulary Pretest

and Probes

Pretest only
Say, **"I'm going to show you some pictures and some toys, and ask you some questions. Each time you answer, say only one thing. Let's try it."**

Administer 4 items using common objects/pictures of common objects. It is not important that child gives the correct response, only that he/she understands the response. Do not give any corrective feedback. If child says multiple words, remind him/her to say only one thing. If child does not seem to understand task, administer 2 additional items until child has given a one-word response for 4 practice items.

Say, **"Now let's look at some more pictures and toys."** Administer sets of words in a random order starting either with a book or set of objects and then alternating between book/objects and themes. For example, the order of administration of items might be: doctor/book, grocery/objects, doctor/objects, grocery/book. Items within each of these should be administered in a random order (e.g., as items are pulled out of bag, as child's interest dictates, etc.) rather than in the order on the recording form.

Probes
Administer items in the order specified on the recording form following the directions below.

Pretest and Probes

Dialogic Reading	Activity-Based Intervention
Turn to the page marked in the book, show the child the picture/page in the book, point to the thing representing the target word and say one of the following prompts: **"What is this?"** or **"What's this?"** **"What are these?"** **"What is he(she) doing?"** **"What is this part of his body?"** Allow 5 sec for the child to respond. Do not provide any feedback on the correctness or incorrectness of the child's response.	Draw child's attention to item or salient feature of item by pointing to a portion of the item (e.g., pointing to your *elbow*), holding up the item (e.g., for *broccoli*), placing an item on the table, or for large items (e.g., shopping cart) pointing to the item on the floor. It is important that the child not confuse the item with another test item (e.g., don't have both the *broccoli* and the *cucumber* on the table at the same time). Say one of the following prompts or a similar prompt: **"What is this?"** or **"What's this?"**

	"What are these?" **"What is he(she) doing?"** **"What is this part of your body?"** Allow 5 sec for the child to respond. Do not provide any feedback on the correctness or incorrectness of the child's response.

Prompting

If child is not paying attention (e.g., not looking at book, is distracted by noise in environment), regain the child's attention and repeat the prompt.

If the child didn't seem to hear the question (e.g., child looks at examiner and says, "Huh?") repeat the prompt.

If the child says a word that is a synonym (e.g., purse for target word *pocketbook*) prompt with the phrase, "Can you tell me another word for _____?"

If the child says a portion of the word (e.g., melon for *watermelon*), ask "What kind of ___ _____?"

If the child attends to the wrong part of an object or picture (e.g., says macaroni and cheese when target item is *price* on the macaroni and cheese box), direct child's attend to correct portion of item (e.g., by pointing) and readminister prompt.

If the child is paying attention but does not respond, within 5 sec, <u>do not</u> administer a prompt.

Scoring

Record the child's response word for word and mark each response as correct or incorrect.

If the child doesn't respond within 5 sec record NR (no response) on the data form and administer the next item.

Correct = any response that contains the target word (e.g., *broccoli* and yummy *broccoli* would both be scored as correct) unless the target word is used incorrectly.

Incorrect = any response other than the target word; unintelligible responses; partial responses (e.g., cart would be incorrect for the target word *shopping cart*).

Appendix C

Parental Consent Form

A Comparison of Word Learning During Storybook Reading and Play Activities

Your child is invited to be in a research study comparing word learning in storybook reading and play activities. Your child was selected as a possible participant because he or she: (a) attends Three School and, (b) received a score on the IGDI Picture Naming task that suggests he or she may benefit from an additional intervention focused on learning words. We ask that you read this form and ask any questions you may have before agreeing to your child's participation in the study. This study is being conducted by Naomi Rahn. Naomi is a doctoral student in Educational Psychology at the University of Minnesota. Naomi is completing an internship in the Three School Classroom where your child attends preschool.

Background Information
Learning many words during the preschool years provides an important foundation for later reading. Knowing a lot of words helps children make sense of what they read. The purpose of this study is to compare two methods for teaching words: Dialogic Reading during storybook reading and Activity-Based Intervention during play.

Procedures
If you agree to let your child be in this study, he/she will participate in some or all of the activities listed below depending on his/her scores during initial screening. All activities will be completed by me or another trained graduate student. The activities will take place between October 2012 and January 2013. These activities are part of this research project and are separate from the regular testing and teaching that takes place in your child's classroom.

Initial Screening to Determine if Your Child is Eligible to Participate in the Study:
IGDI Picture Naming. This test is used by Three School to monitor your child's language development. If you agree to allow your child to participate in the study, I will request his or her scores on this measure to help me learn about your child's knowledge of words. I will do no additional IGDI testing. I will only use existing classroom data.

PPVT-4. The Peabody Picture Vocabulary Test, Fourth Edition (PPVT-4) is a test of how many words your child understands. I will show your child several sets of 4 pictures and ask him/her to point to one of the pictures (e.g., "Point to sleeping."). This test takes 10-15 minutes. Your child will be assessed outside of the classroom (e.g., in the hallway) where it is quiet. This test will be videotaped to help us accurately record your child's responses.

Not all children will meet the screening criteria for participating in the study. Children who score *below* the level expected on IGDI Picture Naming, <u>and</u> *at or above* the expected range on the PPVT-4 will be eligible to participate. Children who score outside of these ranges will not be eligible to participate. I will send a note home in your child's backpack to let you know if your child meets the criteria for participating in the study. In either case, I will share your child's scores with the Three School teacher to help her know more about your child.

<u>Study Activities:</u>
If your child is eligible to participate in the study, he/she will participate in the activities listed below.

Intervention Words Test. This is a test that I created for this study. I will show your child several pictures and objects (e.g., toys) and ask him or her to name them (e.g., "What is this?"). This test takes 10-15 minutes.

EOWPVT-4. The Expressive One-Word Picture Vocabulary Test, Fourth Edition (EOWPVT-4) is a measure of how well your child can name actions, objects and concepts. I will show your child pictures and ask your child to name them. The EOWPVT-4 takes about 20 minutes to complete.

Intervention. Intervention sessions will take place 3 times per week for 10 minutes. During each session, I will either read books or play with your child (e.g., cars and blocks; kitchen). During book reading, I will teach words using a method called Dialogic Reading. During play sessions, I will teach words using a method called Activity-Based Intervention. I will teach 20 words throughout the study. At the end of each activity, I will test your child on the words taught using the *Intervention Words Test*.

<u>Follow-up observations and testing:</u> At the end of the study, a trained graduate student will record your child's talk during classroom play with Three School staff 30 minutes per day for 3 days to see if he/she is using the words taught during the intervention. In addition, for each of the 20 words taught, I will show your child four pictures or objects one time and ask him/her to point to a picture/object (e.g., "Show me airplane."). This test will take about 15 minutes.

All sessions will take place outside of the classroom (except follow-up observations which will take place in the classroom) and will be videotaped to help us accurately record the teaching sessions and your child's words.

Risks and Benefits of being in the Study
Your child will miss 10 minutes of regular classroom activities 3 times per week for up to 15 weeks. The testing and intervention will usually be completed during free play time. Every effort will be made to complete the activities during times when it is doesn't disrupt your child's school day. It is possible that your child may not want to participate

in the testing or intervention sessions. In that case, your child will be immediately returned to his or her regular classroom activity.

There is no direct benefit to subjects who participate in this study.

Compensation
You will not receive a payment for your child's participation in this study.

Confidentiality
Your child's teacher will be notified of your child's progress at the end of the study. The records of this study will be kept private. In any sort of report we might publish, we will not include any information that will make it possible to identify your child. An identification number will be assigned to your child and used instead of your child's name on all research documents. Research records will be stored securely in a location separate from the list of children's names and identification numbers. Only researchers will have access to the records and video recordings. Video recordings will be destroyed at the end of the study.

Voluntary Nature of the Study
Participation in this study is voluntary. Your decision whether or not to allow your child to participate will not affect your current or future relations with the University of Minnesota, Three School, or with the Minneapolis Public Schools. If you decide to allow your child to participate, you are free to withdraw at any time without affecting those relationships.

Contacts and Questions
The researcher conducting this study is Naomi Rahn. You may ask Naomi any questions you have now. If you have questions later, **you are encouraged** to contact Naomi at the Department of Educational Psychology, 612-626-0367, rahnx050@umn.edu. You may also contact Naomi's advisor, Dr. Scott McConnell at the University of Minnesota, Department of Educational Psychology, 612-624-6365, smcconne@umn.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researchers, **you are encouraged** to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

You will be given a copy of this information to keep for your records.
Statement of Consent: I have read the above information. I have asked questions and have received answers. I consent to my child's participation in the study.

Child's Name (please print) _____

Signature of parent or guardian:_____Date: _____

Signature of Investigator:_____ Date: _____

Appendix D

Dialogic Reading Scripts

Book: *Edwin Speaks Up* by April Stevens

Introducing the Book
The title of this book is *Edwin Speaks Up.*   **The author (the person who wrote the book) is April Stevens. The illustrator (the person who made the pictures) is Sophie Blackall.**   Ask a question or questions to build interest, for example: **What do you think this book is going to be about? Are there any clues on the cover?**   **Who do you think this is (pointing to main character on cover)?**   In subsequent readings: **Do you remember what this book is about? Do you have a favorite part of this book?**

Reading the book
Use planned CROWD prompts (see CROWD Strategy Planning Sheet) as you read the book, delivering a prompt each time you get to a CROWD sticky note. Across subsequent book readings, change CROWD prompts as needed to progress through Levels 1-3 of the prompting sequence and to maintain children's interest in the book.   **C**ompletion   Edwin dropped one large box of (sugar) onto the belt.   Oh no! Mrs. Finnemore's (*pocketbook*) is on roof of the car.   Oh no! Now they left the (sugar) on the roof of the car.   **R**ecall   Where were Edwin and his family going?   What does Edwin's mom say the children's job is?   What did Mrs. Finnemore lose?   **O**pen-ended   What do you think happened to Mrs. Finnemore's *pocketbook*?   What is Edwin pointing to (in the picture where the cart with the sugar is around the corner)? Why?   What is Edwin trying to tell him mom (in picture where they are at checkout)?   What does Edwin do when he gets out of the cart?   Mrs. Finnemore lost her cart. What else did she lose (page with sugar going into other cart)?

Wh-questions What is a list? What is this (pointing to *list*)? What is this (pointing to *pear*)? What are these (pointing to *watermelons*)? What is on top of the car now (sugar)?What do you think will happen next? Why does the sugar end up in the wrong cart? **Distancing** Has your mom or dad ever left something on the roof of your car? What happened? Have you ever helped make a cake or something else sweet with sugar? Has your mom or dad ever forgotten to buy something at the grocery store? What did they do? Each time you use a CROWD prompt, use the PEER Sequence (Prompt - Evaluation - Expansion - Repetition).

Closing the book
Ask a question to maintain interest, for example: **What is on the roof of the car this time?** **What did Mrs. Finnemore ask all of the children to remember? Did they remember it? Who remembered the sugar for Edwin's birthday cake? What was Edwin trying to tell his mom? Why is it funny that Edwin's mom says he will start talking on his birthday?** Ask a distancing question to connect to children's lives: **Have you ever helped make a cake for your birthday? What kinds of things do you like to buy at the grocery store?**

Book: *Going to the Doctor* by Anne Civardi

Introducing the Book
The title of this book is *Going to the Doctor.* **The author (the person who wrote the book) is Anne Civardi. The illustrator (the person who made the pictures) is Stephen Cartwright.** Ask a question or questions to build interest, for example: **What do you think this book is about?** In subsequent readings: **Do you remember what this book is about? What is your favorite part of this book?**

Reading the book
Use planned CROWD prompts (see CROWD Strategy Planning Sheet) as you read the book, delivering a prompt each time you get to a CROWD sticky note. Across subsequent book readings, change CROWD prompts as needed to progress through Levels 1-3 of the

prompting sequence and to maintain children's interest in the book.

<u>Completion</u>
The doctor puts Jack's arm in a (*sling*).

<u>Recall</u>
How did the doctor fix Jack's arm?
What did the doctor write so that they could get medicine for Jenny?

<u>Open-ended</u>
How do you think the mom feels after taking all of the kids to the doctor?

<u>Wh-questions</u>
Where is the doctor?
Where is Jack's wrist?
What does the doctor put on Jack's hurt arm?
What is this? (*stethoscope*)
What does the doctor write? (*prescription*)

<u>Distancing</u>
Tell me about a time you went to the doctor.

Each time you use a CROWD prompt, use the PEER Sequence (Prompt - Evaluation - Expansion - Repetition).

Closing the book
Ask a question to maintain interest, for example: **What is the cat in the picture doing? How do you think the mom feels?** Ask a distancing question to connect to children's lives: **Tell me about a time you went to the doctor.**

Script adapted from CONNECT Module Handouts 6.3 and 6.5

Appendix E

Activity-Based Intervention Activity Plans

Activity Name - Grocery Store	
Materials	
Pretend food Shelf (for food) Shopping baskets Grocery cart Checkout lane (table or cardboard box) Cash register Pretend money (in cash register and wallets)	Apron Wallets Purses Plastic container (for wallets and purses) Grocery store sign Paper on clipboard (for making grocery lists) Pencils
Environmental arrangement	
Arrange pretend food on shelves. Place shopping cart and baskets near food. Place wallets and purses nearby in a plastic container. Place cash register with pretend money on checkout lane. Hang or fold apron near checkout lane. Hang grocery store sign near food or checkout lane.	
Sequence of steps	
Beginning Introduce the activity (on first day) by showing child the different areas of the grocery store (e.g., food, check out lane) and describing what happens in each part of the grocery store. Ask child to tell you what they see in the grocery store. Explain that there will be a shopper and a worker in the grocery store. *Middle* Follow child's lead by assuming the role of either the shopper or worker. For example, if the child goes to the cash register first, ask them if they would like to pretend to work at the grocery store. If so, help them put on the apron. Show them how to use the cash register if necessary. While child plays at cash register, assume the role of shopper by making a grocery list, getting a cart or basket, filling it with groceries, and paying for it using money in a wallet. If child chooses to be the shopper, assume the role of cashier. In both cases, use sentences and phrases that would be typically heard in a grocery store. For example, as the cashier you might say, "Did you find everything you were looking for today?" and "Have a nice day." while the child goes through the checkout lane. *End* When about 1 min remains, let child know that there is 1 min left to play. After 1 min ask child to help clean up food, put away money in cash register, hang apron, etc. Talk with child about the grocery store activity (e.g., "You bought a lot of food!").	
Embedded learning opportunities	
While opportunities will occur to teach many skills, the focus of this intervention is vocabulary. Therefore, specific opportunities are described in the attached table for teaching each target word.	

Planned variations
Use the following variations as needed to maintain the child's interest in the activity across the length of the study: Place dolls in grocery store so child can pretend to take a baby shopping in cart. Provide different foods or rotate foods in grocery store. At end of activity, ask child to tell you about a time he/she went to grocery store. Ask child what he/she likes to buy at the grocery store. Have child help make signs for the grocery store (e.g., sale signs).

Naturalistic Language Strategies: expand or recast, model, time delay, mand, directions, prompt imitation		
Target Word	Strategy	Antecedent
List	Model	Write a pretend grocery list and say, "I'm writing a *list* of all the things I need to buy."
	Directions	Ask child if he wants to write a *list* and hand paper and pencil to child.
	Mand	As child writes *list*, ask child, "What are you writing?"
	Model	When child is pretending to be worker, bring *list* to the store and say, "Can you help me find the things on my *list*?"
	Prompt Imitation	If child doesn't readily say "list" prompt child to do so (e.g., "You're writing a *list*. Say *list*.")
	Expand or recast	When child uses word list say, "yes, you're writing a *list* of all the things you need to buy at the grocery store."
Cucumber	Model	When you are the shopper, put cucumber in basket/cart and say, "I'm buying a cucumber." Talk about what you might make with the cucumber (e.g., a salad).
	Mand	When child is buying groceries at checkout say, "What did you buy?" and hold up *cucumber*.
	Expand or recast	If child uses word *cucumber* say, "Yes, you bought a cucumber at the grocery store."
	Time Delay	At checkout if child has *cucumber* in basket ask child what he bought at the store and then wait for response to include *cucumber*.
	Directions	When you are shopper tell child that you want to buy a cucumber and ask child to help you find one.
Belt	Model	At checkout, point to *belt* on cash register and tell child to put groceries on the *belt*.
	Mand	Ask, "what is this called?" while pointing to belt.
	Expand or recast	When child uses word *belt*, expand on phrase using word *belt*.
	Prompt Imitation	Say, "This is a *belt*. Say *belt*."
Apron	Model	Say, "People who work at the grocery store wear

		aprons." Help child put on apron.
	Directions	Ask child if you can wear the *apron* when you switch roles.
	Directions	Give child something to put in *apron* pocket (e.g., price stickers) and ask child to up them in *apron* pocket.
Cash Register	Directions	Ask child to bring *cash register* over to table during set up.
	Model	Show child how to put money in the cash register drawer. As you are talking use word *cash register*.
	Forgetting	Forget to put out cash register (in subsequent sessions) and wait for child to request it.
Onion	Model	When you are the shopper, put *onion* in basket/cart and say, "I'm buying an *onion*."
	Mand	When child is buying groceries at checkout say, "What did you buy?" and hold up *onion*.
	Expand or recast	If child uses word *onion* say, "Yes, you bought an *onion* at the grocery store."
	Time Delay	At checkout if child has *onion* in basket ask child what he bought at the store and then wait for child to respond with target word *onion*.
	Directions	When you are shopper tell child that you want to buy an *onion* and ask child to help you find one.

Activity Name - Grocery Store	
Materials	
Doctor costume Medical bag Stethoscope Pretend needle Blood pressure cuff Bandage Pretend thermometer	Otoscope Doll Paper & Pencils
Environmental arrangement	
Place medical kit containing doctor's instruments, uniform, and doll on table.	
Sequence of steps	
Beginning Introduce the activity (on first day) by showing child the different things that are in the doctor's medical bag. Explain that there will be a doctor, a patient (baby) and a mom or dad (for the baby) at the doctor's office. *Middle* Follow child's lead by assuming the role of either the doctor or parent. Assist the child in acting out a doctor's office scenario (e.g., mom brings baby to the doctor because she is coughing). As the doctor, use the doctor's instruments to go through the typical parts of	

the office visit (e.g., take temperature with thermometer, listen to chest with stethoscope, take blood pressure, put on a bandage, look in ears, write a prescription). When child is the doctor, encourage child to use all of the instruments in the bag and to write a prescription.

End

When about 1 min remains, let child know that there is 1 min left to play. After 1 min ask child to help clean up medical kit, take off doctor costume, etc. Talk with child about the doctor's office activity (e.g., "You did a good job making the baby better!").

Embedded learning opportunities

While opportunities will occur to teach many skills, the focus of this intervention is vocabulary. Therefore, specific opportunities are described in the attached table for teaching each target word.

Planned variations

Use the following variations as needed to maintain the child's interest in the activity across the length of the study:

Vary the reason for the doctor's visit to fit targeted vocabulary (e.g., if target word is *ankle*, suggest that the baby has a hurt ankle and needs a bandage.)

Provide different "patients" (e.g., teddy bear, different dolls, etc.)

At end of activity, ask child to tell you about a time he/she went to the doctor.

Pretend to have a pharmacy and have child take prescription to pharmacy to get "medicine" for baby.

Create a waiting room with 2 chairs and magazines; have doctor call patients from the waiting room.

Naturalistic Language Intervention Strategies: expand or recast, model, time delay, mand, directions, prompt imitation

Target Word	Strategy	Antecedent
thermometer	Directions	Suggest that the child find the *thermometer* in the doctor's bag because the baby feels like she has a fever.
	Model	When you are the doctor, say, "I'm going to use a *thermometer* to take the baby's temperature. I think she has a fever."
	Expand or recast	If child uses word, expand upon phrase (e.g., "Yes, you're taking the baby's temperature with a *thermometer*.")
	Mand	When child is using thermometer say, "What is that?" or "What are you using to take the baby's temperature?"
	Time Delay/ Prompt Imitation	After above mand, if child doesn't use word thermometer, say, "That's a *thermometer*. Say *thermometer*."
elbow	Model	As the mom say, "I think my baby hurt her *elbow*" while pointing to doll's elbow.

	Directions	Ask child to put bandage on doll's elbow.
	Mand	Ask child where he/she is putting bandage or where baby is hurt (i.e., elbow).
bandage	Model	As doctor, say, "I think your baby hurt her wrist/elbow/ankle. We should put a *bandage* on it."
	Directions	Ask child to find bandage in doctor's bag.
	Model	As doctor put bandage on doll and talk about what you are doing using word bandage.
needle	Directions	Ask child to find needle in doctor's bag.
	Model	As doctor, say "I'm going to give your baby a shot with this needle to help make her better. Don't worry, it won't hurt the baby very much."
	Mand	When child is doctor ask, "What are you using to give the baby a shot?"
	Prompt Imitation	If child doesn't use word ear, say "This is an ear. Say ear." Have child find his/her own ears.
ear	Directions	As doctor get out otoscope and say that you need to check the baby's ears. Ask child, "Where are the baby's ears?"
	Model	When child points to ears say, "Yes. Those are the baby's ears. Let's see how they look."
	Model	As you are looking say, "Do you think the baby has an *ear* infection - an owie in her *ear*?"
	Mand	When child is doctor and looking in ears say, "What are you checking?" or point to ear and say, "What is that?"

Appendix F

Dialogic Reading Fidelity Checklist

Name of Coder _____   Date Coded _____
Video Title _____   Video Level: 1   2   3

Intervention Component	Circle Response (Y = Yes, N = No)	
Before the Book Reading		
The reader says the title of the book to the child.	Y	N
The reader tells the child who the author of the book is.	Y	N
The reader asks the child at least one question to build child's interest in the story. (*Ex: What do you think this book is about?*)	Y	N
During the Book Reading		
Interventionist provides at least one opportunity for child to hear or use **each** of the following words during a CROWD prompt. 1. _____2. _____3. _____4. _____5. _____ _____	Y	N
The interventionist uses at least **2 different** CROWD prompts (e.g., **W**h- questions and **C**ompletion prompts) during the book reading: **C**ompletion- Reader creates an incomplete sentence to prompt the child to come up with the appropriate response (i.e. fill-in-the-blank). (Ex:*To open the mailbox Sam will need to use a ___.)* **R**ecall- Reader asks a question designed to help child remember key elements of the story (Ex: *Can you remember what happened to Sam and Ellen on the way to the mailbox?*) **O**pen-Ended- Reader asks a question or makes a statement that requires child to describe part of the story in his own words beyond yes/no response. (Ex: *Tell me what is happening in this picture.)*	Y	N

	Circle Response
Wh-questions- Reader asks a question about the story that begins with what, where, who, or why. (Ex: *What kind of shoes is Sam wearing?)* **D**istancing- Reader helps child make connections between events that happen in the story to those that occur in their own lives. (Ex: *Sam is big enough to go by herself to get the mail. What do you do all by yourself to help Mom/Dad?)*	
PEER Sequence: For each CROWD **P**rompt, the reader **E**valuates (e.g., provides correction if child labels word incorrectly) and **E**xpands on the child's response (e.g., child says "dog", adult says, "Yes, it's a big dog!"), and then provides **R**epetition by using another prompt containing the target word <u>or</u> asking child to repeat word.	Y N
After the Book Reading	Circle Response
At the end of the book, the reader asks the child at least one question to maintain their interest in the story or to relate the story to their lives. (*Ex: Which do you like better, caterpillars or butterflies? Why?* or *How do you feel when you eat too much food at dinner?*)	Y N

Intervention Component	Circle Response (NA = Not Applicable)		
Level - What is the level of this book reading (see above)?	1	2	3
For Level 1 Readings Only:			
Are *"Wh" questions* the most frequently used CROWD Prompt?	Y	N	NA
For Level 2 Readings Only:			
Are *Open-ended questions* the most frequently used CROWD Prompt?	Y	N	NA
Is the child retelling portions of the story or talking about the target words so that both the adult and child are talking during the reading of the book?	Y	N	NA
For Level 3 Readings Only:			
Are *Distancing questions* the most frequently used CROWD Prompt?	Y	N	NA
Does the interventionist ask higher level questions about the plot, characters, or sequence of events *(Ex: Why was he sad?; What does he do next?)*	Y	N	NA

		Comments:
Total yes responses from pages 1 & 2 / Total yes + no responses from pages 1 & 2 X 100	_____ _____ = _____ % **fidelity of implementation**	

Adapted from CONNECT (2011). Dialogic Reading Observation Form. Chapel Hill: University of North Carolina, FPG Child
     Development Institute, CONNECT: Center to Mobilize Early Childhood Knowledge.

Flynn, K. S. (2011). Developing children's oral language skills through Dialogic Reading: Guidelines for implementation. *Teaching*
     Exceptional Children, 44(2), 8-16.

Appendix G

Activity-Based Intervention Fidelity Checklist

Name of Coder _____   Date Coded _____

Video Title _____

Record a tally mark in the yellow column each time <u>interventionist</u> says target word or provides an opportunity for child to use target word. Circle yes or no for each question. Calculate fidelity of implementation on page 2.

Intervention Components	Tallies	Implementation (Circle Y for yes or N for no)	
Opportunities			
Does <u>interventionist</u> provide at least 3 opportunities for child to hear or use target word_____?		Y	N
Does <u>interventionist</u> provide at least 3 opportunities for child to hear or use target word_____?		Y	N
Does <u>interventionist</u> provide at least 3 opportunities for child to hear or use target word_____?		Y	N
Does <u>interventionist</u> provide at least 3 opportunities for child to hear or use target word_____?		Y	N
Does <u>interventionist</u> provide at least 3 opportunities for child to hear or use target word_____?		Y	N
Intervention Strategies	Implementation (Circle Y for yes or N for no)		
Does interventionist <u>use at least 3</u> of the following intervention strategies? **-model** use of some target words (e.g., "I'm going to put my money in the *wallet*.")? **-ask questions that require child to <u>say</u> some target words** (e.g., interventionist says, "What do	Y N		

you want?" while holding wallet to elicit target word *wallet*)?

-expand or **recast** child's utterances that contain target words (e.g., child says "*wallet*" and adult says, "Yes, let's put the money in the *wallet*." or child says "He got wallet" and adult says, "Yes, he's got a wallet.")?

-pause/time delay (defined as a 3-5 sec pause) as an antecedent for some target words (e.g., when child is looking for wallet, adult holds up wallet and waits for child to request it)? Note that if child doesn't respond, the pause/time delay is usually followed by use of another strategy.

-provide directions for child to <u>do</u> something with some target objects (e.g., "I need to buy my groceries but I can't find my *wallet*. Could you help me find it?")?

-prompt imitation of some target words (e.g., says "Say *wallet*" or "Can you say *wallet*")?

Additional Intervention Components	Implementation (Circle Y for yes, N for no, or NA for not applicable)
Doe interventionist use **more non-directive antecedents** (e.g., models, expansions, recasts, time delay, directions) than directive antecedents (e.g., prompting imitation)?	Y N
When the child initiates an interaction, does the **interventionist follow the child's lead** (e.g., child says, "I want to play with the cash register"; adult responds, "Sure, you can work at the grocery store and I'll be the shopper) rather than ignoring the child's initiations?	Y N NA
Are consequences almost always **an inherent part of the interaction or a logical outcome** of the interaction (e.g., child holds up wallet and says, "*wallet*"; adult says, "Yes, do you have money in your *wallet*?") rather than artificial (e.g., child holds up wallet and says "*wallet*"; adult says, "Good job saying *wallet*")?	Y N
When the child makes an **error** in responding to an antecedent (e.g., adult says "What's this?" while holding up *wallet*; child responds, "purse") does the interventionist **provide a correction** by modeling the correct response (e.g., "That's a *wallet*.") and/or providing a different antecedent (e.g., "This is a *wallet*. What is this?")?	Y N NA

Total yes responses from pages 1 & 2 _____
/ Total yes + no responses (i.e., do not include NA responses) from pages 1 & 2 _____
X 100
= _____ %
fidelity of implementation

Please provide comments for "no" responses:

*Adapted from an ABI Fidelity of Implementation Form created by Losardo and Bricker for a Model Demonstration Grant

Appendix H

Expressive Target Vocabulary Probe and Pretest Fidelity Checklists

Name of Coder _____ Date Coded _____
Name of Video _____

Administration Component	Tallies	Implementation (Circle one response; Y = Yes, N = No, NA = Not Applicable)	Comments
Pretest only: Examiner reads stated directions with little to no variation from script: **"I'm going to show you some pictures and some toys, and ask you some questions. Each time you answer, say only one thing. Let's try it."**		Y N	
Pretest only: Examiner administers 4 practice items (2 objects, 2 pictures in books) without giving corrective feedback and then says, **"Now let's look at some more pictures and toys."**		Y N NA	
When presenting each item, examiner uses one of the following prompts or very similar prompts: **"What is it?", "What's this?", "What are these?", "What is he/she doing?", "What color is this?", "Who is this/who wears this?", "What is this part of your body?"**		Y N	
Examiner draws child's attention to object or part of object by pointing to it, holding it up, placing it on table, etc. so that it is clear what is being referred to		Y N	
Examiner allows 5 sec for child to respond.		Y N NA	

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Examiner only prompts child in the following situations (e.g., no prompts are given when child does not respond or says "I don't know."): Child is not paying attention(repeat prompt) Child appears to have not heard question (repeat prompt) Child says a synonym for the word (provide clarifying question - e.g., "Can you tell me another word for _____?") Child attends to wrong part of object (e.g., "Okay, but what is *this* [while pointing at salient feature]?" or "But what is the whole thing called?")		Y N NA	
The interventionist should <u>not</u> give any corrective feedback when the child answers incorrectly. Does the interventionist avoid giving corrective feedback?		Y N	
The interventionist gives general praise (e.g., "You're doing a great job!") instead of feedback about the correctness of the responses (e.g., "You're right, that is a cow.").		Y N	
Yes responses / total Y + N _____ X 100 = ____% **fidelity of implementation**			

Comments: