Making Early Literacy Interventions Work for Everyone:

Exploring a Potential Barrier to Effectively Teaching Dialogic Reading Strategies

By

Margaret Elizabeth Shavlik

Dissertation

Submitted to the Faculty of the

Graduate School of Vanderbilt University

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

in

Psychology

May 12, 2023

Nashville, Tennessee

Committee:

Amy E. Booth, Ph.D.

David K. Dickinson, Ed.D.

Megan M. Saylor, Ph.D.

Georgene L. Troseth, Ph.D.

For my parents, who read with me when I was little and fostered my lifelong love of reading.

Acknowledgements

I am extremely grateful to Dr. Amy Booth, without whom this endeavor would not have been possible, and who has been an incredible advisor, mentor, and supporter throughout my graduate career as a whole. I would also like to express my deep appreciation to my dissertation committee: Amy Booth, David Dickinson, Megan Saylor, and Georgene Troseth, whose guidance helped me through the many stages of this project along the way. Special thanks also to Safe Haven Family Shelter (and Hope Hodnett in particular), the Martha O'Bryan Center, and the Discovery Center for their incredible support and collaboration as my community partners.

My gratitude to the Spencer Foundation, Peabody College, and the Graduate Leadership Institute for their generous financial support that made this project possible. I would also be remiss not to mention my deep gratitude to the research assistants at the Little Learners Lab, and especially to Emma Hart, Gabby Schwingshakl, Teresa Adenaike, Kelsey Beers, and Eugene Chi, without whose help I would not have been able to collect and analyze the data for this project! And, lastly, I would like to thank the parents and children who participated in this project and who helped me learn more about shared book reading. I have loved working with you, and am deeply indebted to you for your support!

Table of Contents

List of Tables

List of Figures

List of Appendices

CHAPTER 1

Introduction

1.1 Background and Significance

1.1.1 Opportunity Gaps and the Home Learning Environment

Promoting literacy and language development is an important goal of early education, as these skills are strong predictors of overall success in school and work (e.g., Biemiller, 2006; Song et al., 2015). There are, however, myriad barriers to achieving this goal, and as a result, achievement gaps emerge early across these, and other, subject areas (e.g., Reardon et al., 2008). Unfortunately, academic opportunity gaps that contribute to disparate literacy outcomes have been repeatedly associated with students' socioeconomic status (SES; see Sirin, 2005, for a meta-analytic review). It is important to note that both parent input and children's vocabulary growth vary substantially within socioeconomic strata and related gaps are not due to a family's socioeconomic status per se (e.g., Pan, Rowe, Singer, & Snow, 2005). Rather, evidence strongly suggests that poverty and discrimination, along with poor quality healthcare and education, can introduce challenges that affect the home language environment and children's development (e.g., Perkins et al., 2013).

Regardless of the precise mechanisms involved, it is well established that fewer than half of children living in poverty in the United States begin school at grade level (Isaacs, 2012), with vocabulary knowledge serving as a particularly salient metric (e.g., Fernald, Marchman, & Weisleder, 2013; Hart & Risley, 1995; Hoff, 2013; Pungello et al., 2009). Early emerging social differences in vocabulary knowledge unfortunately fail to narrow appreciably over time, and have long-term consequences for literacy as well as broader academic achievement (e.g.,

Cunningham & Stanovich, 1997; Stahl & Nagy, 2006, but see Sénéchal et al., 2006). Socioeconomic opportunity gaps emerge early – when children are as young as 3 years old – and reach their peak by kindergarten entry, at which point they remain alarmingly stable through middle school (Farkas & Beron, 2004). These gaps have persisted at a similar level for over half a century (see Hanushek et al., 2019), indicating a critical need for early intervention.

Of the myriad factors potentially shaping early literacy trajectories, the home learning environment has received the most attention in the literature. The home learning environment (HLE) includes not only the toys and educational materials available to the child, but also, and arguably more importantly, the social support provided while the child engages with these materials. Research has indicated that the HLE is as strong, if not stronger, of a predictor of early development as are broad indicators of SES like income or maternal education (e.g., National Institute of Child Health & Human Development [NICHD], 2005; Walberg, 1984). More specifically, research has also linked the amount of reading materials at home to higher reading proficiency scores for children (e.g., Barton & Coley, 2007). Additionally, associations between race/ethnicity and child reading and math scores have been shown to be mediated by home literacy activities and parents' general knowledge of child development (Sonnenschein & Sun, 2016). Relatedly, after controlling for their education level, mothers' beliefs surrounding literacy were predictive of the quality (in terms of affect and instruction-style) of shared book reading interactions, as well as the broader home literacy environment (Bingham, 2007).

Given the cascading effects that parents can have on the home learning environment and their child's learning trajectory (e.g., Froiland et al., 2013), parent-child interactions have figured prominently in early intervention programs. Most of these programs have focused on optimizing parent-child interactions in the context of a common household activity: shared book reading.

1.1.2 Shared Book Reading

Before children become independent readers, much of their exposure to books occurs in the context of reading with an adult. For young children, this adult is usually their parent or primary caregiver. While some parents report that they began reading regularly to their child at as young as 7 months of age (e.g., Debaryshe, 1993), overall, book reading is infrequent for parents of children under one year old (Fletcher & Reese, 2005). Reported reading frequency, however, increases rapidly with age such that, by the time children are three to four years old, daily reading is the norm – at least for White, middle-class families (Bingham, 2007). Studies with more diverse samples also find similar patterns of frequent (if not daily) book reading. For example, in a study with Head Start and Early Head Start families, many parents reported reading to their child at least a few times a week at 14, 24, and 36 months of age (Rodriguez et al., 2009). In another study (drawing from the same Head Start and Early Head Start evaluation data), Raikes et al. (2006) found that about half of the 2,581 mothers reported reading to their child at least once a day.

Notably, while parent-child reading predicts child language and literacy outcomes at least as well as SES and the HLE (e.g., Bracken & Fischel, 2008; Scarborough & Dobrich, 1994), it is not simply an indicator of these broader factors. The main effect of shared book-reading frequency on child outcomes is not dependent on the SES of participating families (Bus et al., 1995). Indeed, a longitudinal study in the Netherlands, which followed children from diverse socioeconomic, religious, and linguistic backgrounds from 4 to 7 years old, found that the effects of background variables (i.e., SES, ethnicity, and parents' own literacy practices) on child language and literacy outcomes were fully mediated by home literacy practices (Leseman & De Jong, 1998). Thus, shared book reading appears to provide a key foundation for success in

learning to read independently, which makes it an attractive area for early intervention.

1.1.2.1 Developmental Outcomes of Shared Book Reading

Reading to a child, especially from an early age, is related to a wide range of positive outcomes. Consistent with the individual studies discussed thus far, meta-analyses have demonstrated a reliable impact of shared book reading on child language and literacy outcomes. Specifically, meta-analyses of parent-focused book reading interventions find modest but robust effects on children's general literacy ability (d = 0.18), comprehension (d = 0.22), and code-related skills (d = 0.17; van Steensel et al., 2011), as well as on their expressive and receptive vocabulary (d = 0.41 and 0.26, respectively; Dowdall et al., 2020). In one of the earliest meta-analyses of this literature, Bus et al. (1995) reported that across social classes, exposure to book reading accounted for 8% of the variance in child language outcomes.

While effects on language are the most direct and easiest to document, the relationship between shared book reading and attachment and self-regulation also merit consideration (see Dickinson & Morse, 2019). Not only is shared book reading particularly conducive to parent-child bonding (e.g., Barratt-Pugh & Rohl, 2015), it offers opportunities for practicing fundamental cognitive skills like sustaining attention (e.g., Lawson, 2012). Shared reading also has been shown to predict less harsh parenting in a large urban sample, even after accounting for the amount of disruptive child behaviors (Jimenez et al., 2019).

Shared book reading is also related to a love of reading later in life (e.g., Pillinger & Wood, 2014). Although this love of reading might well contribute indirectly to the child's language and literacy skills in the long run (e.g., Whitehurst & Lonigan, 1998), shared book reading with an attentive adult also appears to directly enhance development in these areas (e.g., Debaryshe, 1993; O'Farrelly et al., 2018). In fact, young children can acquire new receptive

vocabulary words after just one or two readings of a book (Robbins & Ehri, 1994; Sénéchal & Cornell, 1993). And, more broadly speaking, by the time children are 2 years old, as much as 35% of the variance in their receptive language skill can be explained by home reading exposure (Debaryshe, 1993). As noted earlier, for these, and likely other less well-documented reasons, parent-child reading has emerged as a particularly strong predictor of child language and literacy outcomes, often surpassing associations with SES (e.g., Bracken & Fischel, 2008; Scarborough & Dobrich, 1994; Bus et al., 1995; Leseman & De Jong, 1998).

Books not only increase children's exposure to language, but because the words and concepts encountered in them are relatively sparse in extemporaneous conversation, they substantially broaden the type of language children are exposed to (Cunningham, 2005; DeTemple & Snow, 2003; Montag et al., 2015). Additionally, compared to other types of play, adults tend to talk in more complex ways during storybook reading: they label referents more frequently, talk more, are more responsive, use more abstraction, and more actively guide the child's attention to, and participation in, the book reading activity (e.g., Hoff-Ginsberg, 1991; Snow et al., 1976). These behaviors, in turn, have all been shown to relate to language and literacy development (e.g., see Dickinson & Morse, 2019), with decontextualized talk (about topics not directly represented in the pictures or text) highlighted as especially beneficial to the development of language skills (Dickinson & Tabors, 2001; Rowe, 2012).

The parent often also takes on the responsibility of making the book interesting and relevant by connecting aspects of the child's experience to the content (Bus, 2001). Joint remembering, or reminiscing, in this elaborative way not only helps strengthen the bond between conversational partners, but it also helps build skills that the child can later use independently to learn new information (Fivush et al., 1996, 2006; Salmon & Reese, 2016). Indeed, mapping new

knowledge onto existing knowledge has been found to bootstrap the learning process, and leads to deeper understanding of the learned material (Gentner, 1983; Gentner & Markman, 1997).

1.1.2.2 Dialogic Reading

While reading in general appears to support vocabulary to some degree, evidence suggests that these benefits can be enhanced by implementing specific interactive book-reading strategies (e.g., Hargrave & Sénéchal, 2000). For example, explaining novel words to children when encountered in a book leads to better memory for those words (Vaahtoranta et al., 2018). Question-asking has also been shown to facilitate learning. Questions that encourage the child to put the story into their own words help boost memory for the macrostructure of the story or text by encouraging summarization (see Pressley et al., 1989), and, at a more fine-grained level, asking questions about target words can help build associations to referents in support of comprehension and production (Blewitt et al., 2009).[1] Although evidence suggests that parents do not generally do so without explicit coaching, strategic question-asking that guides children toward the right answers can be especially powerful in scaffolding learning (e.g., Anderson et al., 2011).

Indeed, the instructional quality of joint book reading episodes predicts not only vocabulary, but also children's print and letter knowledge (e.g., Bingham, 2007). In a review of 21 studies investigating the effectiveness of various forms of shared book reading, the strongest predictors of total language scores were the degree to which parents used positive feedback and

[1] Notably, children with larger vocabularies learned more than those with smaller ones in this work, providing one explanation for why achievement gaps compound over time. This sort of Matthew effect, where individual differences accumulate over time so that a child's initial skill level is positively related to his or her rate of growth in that skill (Stanovich, 1986, 2000) is present across much research on language learning (Ewers & Brownson, 1999; Hindman, Connor, Jewkes, & Morrison, 2008; Penno, Wilkinson, & Moore, 2002; Reese & Cox, 1999; Robbins & Ehri, 1994).

related the book's content to the child's own experiences (Trivette et al., 2010).

These two features figure prominently in a widely promoted technique called *dialogic reading*. Introduced by Whitehurst and colleagues (1988), dialogic reading endeavors to turn shared book reading into a conversation about the story. To do this, parents are taught a sequence to follow while engaging with a book. The first step is prompting the child to talk about something in the book by asking a question. There are, of course, many different questions a parent could ask. To help parents remember these, parents are taught to use the acronym "CROWD," with the letters standing for different types of prompts. "C" is for completion prompts: these are fill-in-the-blank questions, where the parent creates the sentence frame, setting the child up to complete it (e.g., "When we eat soup, we use a ____"). "R" is for recall prompts: these are questions that require the child to remember aspects of the book (e.g., "Can you remember some of the things that Sally did at school?"). "O" is for open-ended questions: these are statements that encourage the child to respond to the book in his or her own words (e.g., "Now it's your turn to tell about this page" or "What do you think will happen next?"). "W" is for who, what, where, when, and why questions (e.g., "What is this called?" or "Why did Peter stay home from school?"). Lastly, "D" is for distancing prompts: these are questions that require the child to relate the content of the book to aspects of life outside of the book (e.g., "Did you ever stay home from school like Peter did?").

The child might not always answer the prompts – perhaps because they do not know the answer, or they just are not used to talking while reading a book. When this happens, parents are encouraged to try easier questions to get the child started – or to just answer their own questions and see if the child will repeat what they say. But, when the child does answer the parent's questions, parents are encouraged to respond to keep the conversation flowing. Whitehurst and

colleagues also developed tips to help parents do this, creating the acronym "PEER" to help parents remember the sequence. "P" stands for prompt: for this step, parents are encouraged to use any of the CROWD prompts. "E" stands for evaluate: parents are encouraged to evaluate their child's responses to the prompts by praising a correct answer or gently correcting one that is not quite right (e.g., "That's right! We use a spoon to eat soup!" or 'Hmm, I don't think we eat soup with a fork – we use a *spoon* to eat soup!"). "E" also stands for expand: parents are encouraged to expand on their child's response in a way that provides more information (e.g., after saying "That's right, we use a spoon to eat soup!" the parent could add "We also can use a spoon to eat ice cream."). Lastly, "R" stands for repeat: if the child is willing, parents are encouraged to have them repeat the expanded response (e.g., "Yes, we use a spoon to eat soup and ice cream. Can you say that?"). Additionally, dialogic reading emphasizes the value of reading the same book again later, and to keep coming back to it again and again.

Dialogic reading has been shown to be particularly effective in supporting language development (Flack et al., 2018; Hargrave & Sénéchal, 2000; Lever & Sénéchal, 2011; Simsek & Erdogan, 2015), especially for children with limited vocabularies (e.g., Hargrave & Sénéchal, 2000). Manz et al. (2010) identified a moderate effect size of 0.32 among studies specifically investigating DR techniques. Importantly, these intervention effects persist longitudinally (e.g., Huebner and Payne, 2010), and have been replicated cross-culturally and cross-linguistically (e.g., Wing-Yin Chow & McBride-Chang, 2003; Simsek & Erdogan, 2015).

Notably, the effectiveness of dialogic reading is consistent with sociocultural theories of development. Book reading is a socially constructed, interactive activity (Sulzby & Teale, 1991), during which the adult, child, and book create a dynamic learning environment (Fletcher & Reese, 2005). Transactional models of development (e.g., Vygotsky, 1978) emphasize that these

interactions are not unidirectional with parents only affecting their child, but rather reciprocal in nature (Raikes et al., 2006; Sameroff & Fiese, 2000). For example, the child's interest can moderate the frequency of shared book reading episodes, and their contributions help shape conversations about the book. In turn, talk about the content of the story and the affective quality of the interaction relate to children's subsequent motivation to read (Sonnenschein & Munsterman, 2002).

Vygotsky (1978) further highlighted the importance of steering these interactions in ways that optimize the balance between support and challenge for the learner within their "zone of proximal development"– the space between what someone can do on their own, and what they can do with the help of a skilled partner. Through frequent shared book reading, the parent becomes more sensitive to their child's ability level and needs, and can therefore better tune their behaviors to their child's zone of proximal development in ways that best support their learning. Importantly, by systematically building on the child's knowledge and experiences, the parent can help the child reach a deeper understanding of the material than if they had just provided information out of context. Moreover, research indicates that guiding a child toward the right answer, instead of providing it to them outright, aids in deeper understanding (e.g., Bonawitz et al., 2011; Booth et al., 2020). Overcoming challenges to understanding in the context of book reading also can build the child's confidence, which can help them become a more independent learner.

1.1.2.3 Limits on the Impact of Shared Reading Interventions

While theory and evidence generally support the effectiveness of shared book reading interventions, key limitations have also been identified. Importantly, the efficacy of different types of reading interventions has been shown to interact not just with SES, but also with reading

skills, bilingual status, and the race/ethnicity of participating families (e.g., Manz et al., 2010; Reese et al., 2010). While Manz et al., (2010) identified a moderate overall effect size of family-based emergent literacy interventions on child language and literacy outcomes ($d = 0.33$), this may be driven by inflated effect sizes for studies with primarily Caucasian participants ($d = 0.64$, compared to $d = 0.16$ for primarily minority samples), and/or those from middle or high SES backgrounds ($d = 0.39$, compared to 0.14 for lower SES). Notably, a pediatric reading intervention with mothers and their newborn babies found limited effects for lower SES families, particularly when maternal reading skills fell below a 9th grade level (Mendelsohn et al., 2011). And according to a meta-analysis of 16 studies, the benefits of dialogic reading are primarily found for child participants who are from more affluent families (Mol et al., 2008): while dialogic reading interventions have a moderate effect on oral language development for children from higher-SES families ($d = 0.53$), children from more at-risk backgrounds did not reap as large of a benefit ($d = 0.13$).

There are many reasons why these interventions may not reach the same level of efficacy for all families. Some may be endemic to the conditions of living and access imposed by structural social and economic disparities. For example, shared reading interventions might have less impact for children from lower SES families because these families do not have adequate reading materials (not just in terms of *quantity* of books available, but also *quality* of books) with which to practice and implement the prescribed strategies. Indeed, research has identified stark disparities in access to print for families living in areas of concentrated poverty compared to those from more affluent neighborhoods (e.g., Neuman & Moland, 2019). Although many intervention programs have reported success in alleviating these disparities through book distribution in underserved communities (e.g., Zuckerman & Needlman, 2020), other related

constraints might still limit the effectiveness of shared reading interventions. In particular, for families living in noisy, crowded, or chaotic households, finding the necessary time and space for quiet one-on-one shared book reading may simply be an unrealistic goal. Unfortunately, if this proves to be a key limiting factor, little can be done other than to push broad social-political efforts towards alleviating poverty.

It might be, however, that other more malleable factors contribute to the differential results of shared reading interventions. For instance, parents' literacy or language skills may contribute to their initial learning of dialogic reading techniques, and/or their confidence in implementing them. Consistent with this possibility, neuroimaging research has identified a predictive link between mothers' reading fluency and greater connectivity in the parts of their child's brain associated with language and cognitive control, and regions comprising their future reading network (Horowitz-Kraus et al., 2018). It is therefore surprising that few home-based interventions take the *parents'* literacy skills into account at all (Manz et al., 2010).

It is also possible that child factors moderate the impact of these reading interventions. For example, lower language (Hart & Risley, 1995), or self-regulatory (Howse et al., 2003; Duncan & Magnuson, 2011) skills may limit children's ability to fully engage in dialogic reading, even when it is practiced with fidelity and confidence by their caregivers. Indeed, children with larger starting vocabularies read longer and more frequently (Lyytinen et al., 1998) and tend to enjoy greater gains from shared book reading than their age-matched counterparts (Robbins & Ehri, 1994). Additionally, executive function (EF) has been found to be a better predictor of story recall and attention during book reading than age (Richter & Courage, 2017). It is easy to imagine how EF could directly contribute to story attention and recall, but also potentially indirectly, by interfering with parental attempts to implement optimal dialogic

reading techniques. If a parent has to work hard at simply keeping their child on task while reading, they are likely to struggle with incorporating dialogic reading techniques into the interactions, thereby potentially degrading the quality of these interactions and discouraging persistent practice. Evidence linking poverty-related toxic stress to lower EF skills (Shonkoff, 2011), strengthens the viability of this potential explanation.

1.2 Dissertation Research

The current work takes initial steps towards adjudicating among these possible contributions to disparities in the effectiveness of dialogic reading interventions. Although much of the existing research on dialogic reading has focused on child outcomes, I focus instead on parents' implementation of the techniques offered by the intervention. This is an important link in the causal chain between the intervention and child literacy outcomes, which can clarify where these programs might be failing to meet their promise. Indeed, meta-analytic research has identified treatment fidelity (i.e., implementation quality) as the most important factor in determining the impact of book reading interventions on child outcomes (van Steensel et al., 2011). In other words, whether families actually carried out the shared reading activities in the way intended by the program determined whether the intervention had a meaningful impact on child outcomes. Unfortunately, evaluating the intensity and quality of parent-child book reading interactions in response to an intervention can be difficult, and the majority of existing studies do not provide information on these outcome measures (see Mol et al., 2008). Indeed, a meta-analysis of 30 dialogic reading studies found none that measured the effectiveness of the parent-training procedures in terms of successfully teaching the parents the prescribed material (Towson et al., 2017).

I address this gap in the research literature explicitly, by treating parent's success in implementation of the intervention-taught dialogic reading techniques as my outcome variable of interest. In Study 1, I lay the groundwork for this line of inquiry by investigating whether SES-related differences in intervention efficacy, previously demonstrated in terms of child outcomes, are also evident in parent implementation. Based on the literature reviewed above, I expected to find this to be the case, with years of education positively predicting parent implementation of intervention techniques.

In Study 2, I turn my attention to potential limitations on parents' uptake of the reading guidance offered to them. Specifically, I investigate whether the conceptual accessibility of intervention training materials might constrain successful implementation of dialogic reading techniques by manipulating the complexity of the language used therein. I am especially interested in whether instruction complexity interacts with maternal education when predicting the degree to which parents adopt dialogic reading strategies. Additionally, I further extend this investigation to consider more proximal measures of parent and child characteristics that might be related to successful implementation of dialogic reading techniques.

In Study 3, I depart somewhat from my initial goals to clarify the nature of potential effects observed in Study 2. Specifically, I attempt to disentangle effects of the specific intervention content (i.e., dialogic reading techniques) from the broader one-on-one reading intervention context (which has been shown to influence parent reading behaviors; e.g., Huebner & Meltzoff, 2005; Mendelsohn et al., 2011). To do so, I compare my original dialogic reading conditions to an intensity-matched reading intervention focusing on different aspects of parent-child interaction in the context of shared book reading.

CHAPTER 2

Study 1

2.1 Study Aims

The aim of Study 1 was to replicate and extend existing research on dialogic reading interventions to investigate whether SES-based gaps in efficacy are present at the implementation phase. Past research has identified these gaps in terms of child outcomes (e.g., words learned), but I hoped to identify whether gaps also appear in terms of how parents are able to incorporate the intervention-prescribed reading tips into their book reading interactions. Based on the evidence discussed in my literature review, I believed that previously observed effects in child outcomes were likely mediated by parents' success in implementing dialogic reading strategies, and that parents' implementation success likely varies by their socioeconomic status. I therefore expected years of education to positively predict parent implementation of intervention techniques. In additional exploratory analyses, I also considered other parent- and child-level factors (e.g., parent literacy and child EF) that, based on the literature reviewed above, might also predict intervention efficacy.

2.2 Methods

2.2.1 Participants

A total of 60 dyads (52 mothers) participated in at least one session of the study, with 39 finishing all 3 sessions. Child participants ranged from 2- to 5-years of age (mean = 3.84, *SD* = 1.01). Parent education ranged from 8th grade to graduate degree (see Table 1) and did not correlate with number of completed sessions. Sixty-nine percent of participating children were

enrolled in preschool or kindergarten.

Table 1: *Demographic Characteristics of Study 1 Participants*

		Parent Education							
		Did not Graduate High School	GED	High School	Some College	Associate degree	Bachelor's Degree	Graduate Degree	
Child Race	Black	4	2	5	6	1	1	4	23
	White	1	0	0	2	1	12	11	26
	Mixed Race	2	0	2	0	2	3	1	10
		7	2	7	8	4	16	16	60

Note. Four participants also identified as Hispanic/Latino.

2.2.2 Materials

My dialogic reading intervention was based on a popular training kit available to parents: Pearson's "Read Together, Talk Together" (RTTT; Pearson Education, 2002). All books used throughout this study were selected from this kit, and I attempted to choose ones that were of similar complexity and emotional tone to control for the effect of those variables, and to make the books accessible for the full age range of participants. Appendix E provides more information about the books.

2.2.3 Procedure

Table 2 outlines the overall participation structure. All measures discussed below are also available in full at osf.io/ks3vc**.**

Table 2*: Structure of Participation*

Session 1 *(Baseline)*	Session 2 *(First Follow-Up)*	Session 3 *(Second Follow-Up)*
• Parent and child read "Little Cloud"	• Parent and child read "Little Cloud" and "Rabbits and Raindrops"	• Parent and child read "Little Cloud" and "Oonga Boonga"
• Parent interview	• Parent interview	• Parent interview
• StimQ-P	• BRIEF-P	
• NIH-ECB (child)	• NIH-CCB (parent)	
• Parent training (during which experimenter reads "Good Night, Gorilla" with parent and child)		
• Take home 3 of 5 book options	• Take home 1 of remaining 2 books	• Take home last book

2.2.3.1 Shared Book Reading Observation

At each session, participants read two books. At the first session, as a "baseline" measure of the types of reading strategies parents used with their children, families read "Little Cloud" (Carle, 1996). The experimenter, parent, and child also read "Good Night, Gorilla" (Rathmann, 1994) near the end of the session, as part of the training process.

Two- to four- weeks later (M = 19.28 days, SD = 5.77), parent-child dyads participated in a second session (first follow-up), during which they read the original book and a new book together. This procedure was repeated another two to four weeks later (M = 21.11 days, SD = 8.41) at a third session (second follow-up). At the first follow-up session, families read "Little Cloud" again, as well as "Rabbits and Raindrops" (Aronsky, 1997). At the second follow-up session, they read "Little Cloud" and "Oonga Boonga" (Wishinsky, 1990). While having the same book at each session holds content consistent, there are also drawbacks to this approach. For example, research suggests that both child story comprehension and parent reading style change with repeated readings of a book (e.g., Bus, 2001, Fletcher & Reese, 2005). Additionally,

the types of questions parents ask might differ based on whether the child is guessing what will happen in the book, versus asking if the child remembers what happens from the last reading. Therefore, I decided to use one familiar and one new book at each of the follow-up sessions. Sessions were video-recorded, and later coded by research assistants for specific dialogic reading behaviors (i.e., PEER/CROWD usage).

Dyads also completed measures of literacy, vocabulary, and executive function in order to consider individual differences in these domains. At each session, parents answered a short survey about their reading practices (e.g., frequency, techniques used; see Appendix B).

2.2.3.2 Dialogic Reading Intervention

To ensure the initial training was held constant across all participants, instructions were provided in the form of a brief (under 4 minute) video that I created based on training available through the RTTT kit described above (see Appendix A1.1). This was followed by a discussion with parents reviewing the dialogic reading strategies. The experimenter then read the first half of a book with the child to model the use of the tips (following a general script, see Appendix A1.4), and then handed off the book to the parent to practice with the second half. Parents were provided with feedback on what they did well and ways they might incorporate other dialogic reading strategies in the future.

2.2.3.3 Home Practice

To eliminate access to books as an impediment to dialogic reading practice, I provided families with books to take home and keep. These books were also part of Pearson Inc.'s "Read Together, Talk Together" program kit, and had accompanying discussion materials which we adapted to be included as a pamphlet in each book (see Appendix A1.3 for an example). At the initial session, the child chose three of the five book options to take home. At the first follow-up

session, they chose one of the remaining two, and at the second follow-up session, we sent them home with the last book. So, if a child completed all 3 sessions, they would own all five books. The book choices were: “The Snowy Day” (Keats, 1962), “Corduroy” (Freeman, 1968), “Gilberto and The Wind” (Ets, 1963), “Fire Engines” (Rockwell, 1986), and “The Tale of Peter Rabbit” (Potter, 1901).

Parents were asked to practice what they learned during the training phase at home with their child. We encouraged parents to practice the dialogic reading techniques with their child once a day for 20 minutes – a common recommendation for reading interventions (e.g., Hughes, 1999) and to record their practice on a reading log.

2.2.4 Measures

2.2.4.1 Experimenter Fidelity to Intervention Protocol

Before evaluating how well parents were able to implement the prescribed reading techniques, I needed to quantify how well/consistently those techniques were taught to them by the experimenter (i.e., as a validity check). Using a written transcription of the audio recordings of the interaction (in order to code blindly), coders scored each experimenter on various components of the intervention content (e.g., the degree to which experimenter engaged in coaching after reading “Good Night, Gorilla” together; see Appendix C).

2.2.4.2 Parent Implementation of Dialogic Reading Techniques

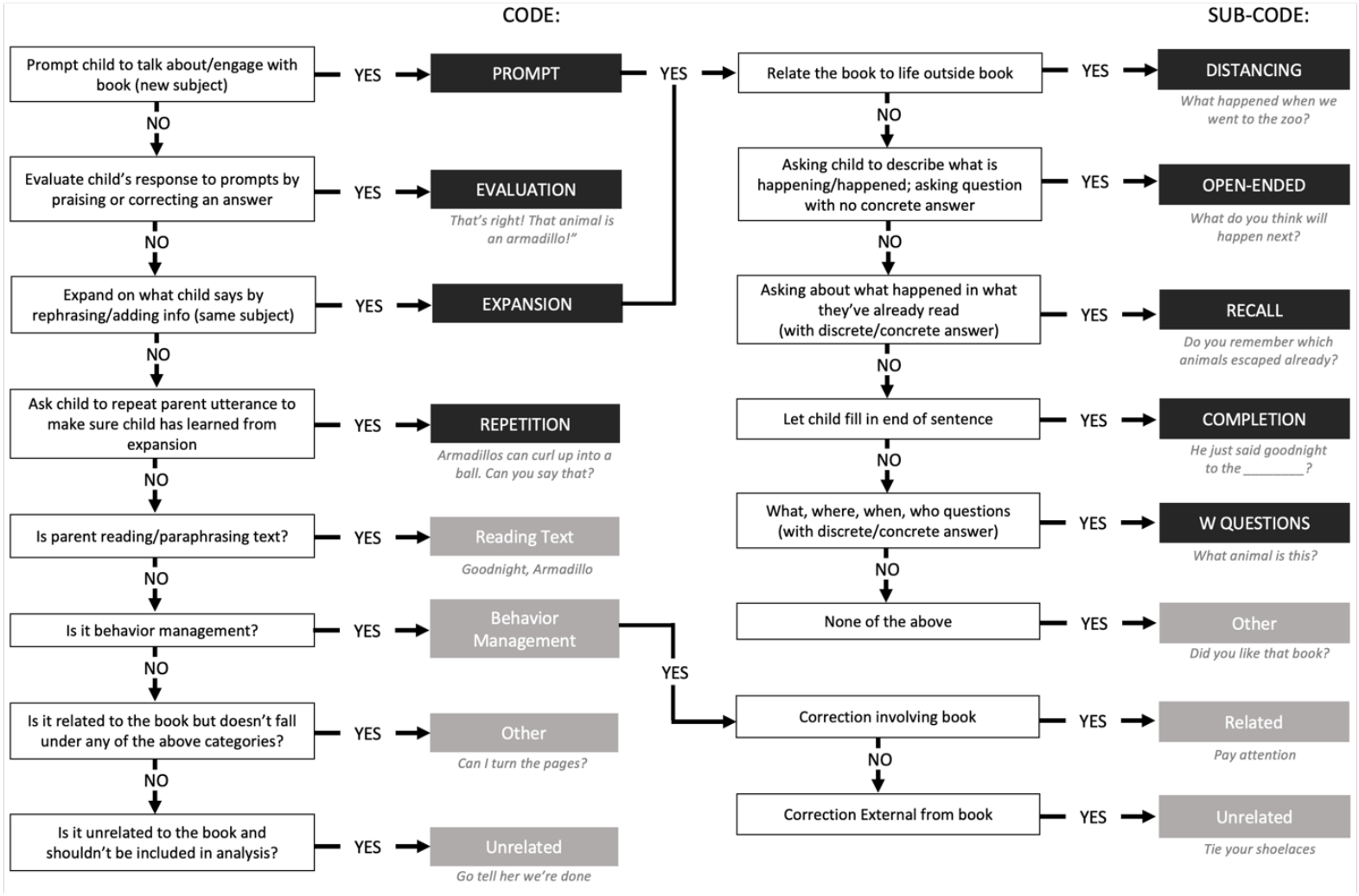
Dialogic reading implementation was assessed in two ways: via parent self-report and through behavioral observation. For the former, parents reported how frequently they used intervention strategies at home and whether they felt their reading style had changed due to the strategies discussed. These questions were asked at both follow-up sessions.

My behavioral measure of dialogic reading use was obtained from the videos of parent-child dyads reading together in the lab. Parent utterances that were part of the PEER sequence were given a code for the appropriate category (prompt, evaluation, expansion, and repetition). Prompts and Expansions were then also assigned a subcode according to which type of CROWD prompt they corresponded with. So that each utterance was only given one subcode, these were treated hierarchically, with the most complex subcode assigned that applied to a given utterance. The "distancing" prompts were treated as the most complex, followed by "open-ended", which was then followed by the other CROWD components. In other words, utterances that connected something from the book to the child's experience or knowledge were given the "distancing" code (even if they were open-ended questions), and questions that had more than a one-word or definite answer were coded as open-ended (even if they were a "what" question). See Figure 1 for a complete coding flowchart, example utterances, how non-PEER/CROWD utterances were coded, etc.

As I was comparing use over time, I wanted to control for book content and length as much as possible. Therefore, for each book, I made summed the individual utterance codes into frequency scores (of each code/subcode type), and then collapsed (averaged) the two books read at each of the follow-up sessions to create a single session-score. As a measure of overall use of dialogic reading techniques, I created a composite score of utterances that were part of the PEER sequence (i.e., prompts, evaluations, expansions, repetition), and divided it by the total number of parent utterances (per session) to create a score reflecting the proportion of total parent talk that was considered dialogic reading. I used this proportion score as the primary dependent variable in my analyses. I also was interested in changes in use of complex prompting, as these have been strongly associated with child outcomes in existing literature on shared book reading

(e.g., Barnes & Dickinson, 2017; Trivette et al., 2010). So, prompts or expansions that were coded as “distancing” or “open-ended” were also summed and divided by total parent talk to generate a secondary dependent variable of interest. Raw frequencies for each specific PEER/CROWD element are presented in Appendix F.

Figure 1: *Coding Flowchart for Parent Utterances (During Shared Book Reading)*



2.2.4.3 Demographics and Home Environment

To learn about the child's home learning environment, I created a series of questions to ask parents during a structured interview. Questions pertained to demographics (parent education, child's race/ethnicity, child's birthdate, child's gender, additional languages spoken at home), as well as home reading practices. I also used the StimQ-Preschool (StimQ-P; Mendelsohn et al., 1999), a questionnaire that measures the cognitive home environment across the preschool period. The StimQ-P is designed for use with young children between five months and six years old. While the measure consists of four scale scores (Availability of Learning Materials, Reading, Parental Involvement in Developmental Advance, and Parental Verbal Responsivity), I chose to focus on the StimQ Total Score as a single omnibus measure of the quality of the home learning environment.

2.2.4.4 Cognitive Skill

To measure individual differences in cognitive factors (for parents and children), I used the National Institute of Health Toolbox for Assessment of Neurological and Behavioral Function (NIH Toolbox; Gershon et al., 2013). This standard set tools for assessing cognitive, emotional, motor and sensory function is administered on an iPad. NIH Toolbox measures have been normed and validated in participants aged 3- 85. Child-participants completed the Early Cognition Battery (Picture Vocabulary Test, Flanker Inhibition Task, Dimensional Change Card Sort Task, and Picture Sequence Memory Test) as a measure of general cognitive skill, while parents completed the Picture Vocabulary Test and Oral Reading Recognition Task (which together form the Crystalized Cognition Composite Score) as a measure of parent literacy.

As an additional measure of child executive functioning, I used the Behavior Rating Inventory of Executive Functioning - Preschool (BRIEF-P; Gioia et al., 2003). This parent-report

measure evaluates eight aspects of executive functioning, and is appropriate for children 2 to 5 years old. I used the total score as a measure of global executive function skill.

2.2.5 Coding and Data Management

Videos of parent-child reading sessions were coded offline using Datavyu software. Datavyu is an open-source, Java-based, video coding and data visualization tool for collecting behavioral data from video. To ensure inter-rater reliability, extensive coder training was conducted for each coder before they began independently coding, and 20% of videos were blind double-coded. Behavioral codes created in Datavyu were then exported as a .csv file and formatted for analysis using R Studio software. All other study data were collected and managed using REDCap (Research Electronic Data Capture; Harris et al., 2009; Harris et al., 2019) hosted at Vanderbilt University. REDCap is a secure, web-based software platform designed to support data capture for research studies, providing 1) an intuitive interface for validated data capture; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for data integration and interoperability with external sources. Data analysis was completed using SPSS 26, and data visualizations were created using Tableau Software and Microsoft Office programs. All data and syntax/code files are available at osf.io/ks3vc.

2.3 Analyses and Results

As a validity check, I confirmed that my measure of experimenter fidelity did not correlate with any other variables. Next, I inspected data missingness. Little's Test (Little, 1988) was not significant, suggesting that my data were missing completely at random (MCAR), $\chi^2(9899) = 4045.81$, $p = 1.00$. As is typical of longitudinal designs, attrition was observed over sessions, and was the leading cause of missingness (see Appendix D for specific reasons for

missing data). In order to preserve as much data as possible and reduce bias, values were multiply imputed for missing data points (100 iterations). Pooled results from the imputed datasets are used for all subsequent analyses.

The main question of Study 1 is whether the SES-defined difference in intervention efficacy, traditionally measured in terms of child outcomes, was also evident in parents' learning and use of dialogic reading techniques. To get a sense of longer-term retention, I compared parents' dialogic reading behaviors at two follow-up sessions to their baseline reading behaviors.

2.3.1 Research Question: Do parent reading behaviors change over time as a result of a dialogic reading intervention?

Before I could investigate whether SES predicted intervention efficacy, I had to evaluate whether there was an overall change in dialogic reading behavior as a result of the intervention. I investigated this in two ways – first by parent report, and then using my observational data.

2.3.1.1 Parent Report

To assess the effectiveness of the intervention over time, I first considered parent self-report of reading beliefs and practices, and their home literacy environment. Parents reported having an average of 101.71 children's books at home (SD = 96.34), although the range was quite large across participants, spanning from 0 to 400 children's books. At all three timepoints, the majority of parents reported that they either *enjoyed* or *really enjoyed* reading together (T_1 = 87.5%, T_2 = 93.2%, T_3 = 95.2%), with no significant difference between average response at the three sessions.

At the time of the first session, parents reported reading for 18.52 minutes (SD = 12.16, range = 3-60) at a time, on average, when reading with their child. Reported reading session length was relatively consistent across time, M_2 = 16.40 minutes (SD = 7.81), M_3 = 17.30 minutes (SD = 10.69), with no significant difference between the three timepoints. At baseline, 61.5% of

parents reported that they generally read with their child 7 days a week (M = 5.64 days, SD = 1.98), but at follow-up, reported frequency was lower, with 40.0% reporting daily reading at session two (M = 5.40 days per week, SD = 1.59), and 42.3% at session 3 (M = 5.13 days per week, SD = 1.85), perhaps due to an increased awareness of actual habits, or the phrasing of the questions at follow-up sessions ("During the past couple of weeks, how many days per week did you read together?") compared to baseline ("How many days each week do you read children's books to your child?", as phrased in the StimQ-P) leading to more accurate reflection. A repeated measures ANOVA (rmANOVA) revealed that while the main effect of session on overall reading frequency was only trending toward significance (p = .073), average reported frequency at second follow-up was significantly lower than at baseline, p = .050.

I next looked at practices more directly related to dialogic reading (see Table 3). At baseline, most parents (91.7%) reported that they already liked to stop and talk about the book while reading. And, in general, parents reported using the intervention techniques, with 90.9% at first follow-up and 97.7% at second follow-up reporting use at least half of the time they read with their child (there was no significant difference between average response at the two follow-up sessions). Notably, and consistent with my hypotheses about the semi-opaque language used in the intervention materials, at first follow-up, 68.9% (and 70.5% at second follow-up, and no significant difference between average response at either session) reported that they *never* used the PEER/CROWD acronym to remember the tips. Parents also seemed to become more comfortable just reading part of a book (rather than feeling compelled to finish it), as well, increasing from 25% at baseline to over half endorsing this behavior at both follow-up sessions. Indeed, an rmANOVA revealed a main effect of session, $F(2,118) = 10.20$, p =.004, with a significant increase from baseline to first follow-up (p = .010), but no significant change from

first to second follow-up.

Table 3: *Parent Reading Beliefs and Behaviors in the "Classic" Condition*

	Session		
When reading together …	1	2	3
…We like to stop and talk about the words and the pictures	91.7	-	-
… I am okay just reading a few pages of the book	25.0	54.5	63.6
In the time since the last session, I used the dialogic reading tips…			
… (1) none of the time while reading	-	0.0	0.0
… (2)	-	9.1	2.3
… (3) half the time while reading	-	40.9	43.2
… (4)	-	20.5	29.5
… (5) every time we read together	-	29.5	25.0
Since learning these strategies, my reading style has changed…			
… (1) not at all	-	4.7	4.5
… (2)	-	2.3	2.3
… (3) a little bit	-	58.1	61.4
… (4)	-	16.3	20.5
… (5) a lot	-	18.6	11.4

Note. Values indicate percentage of parents endorsing a response option.

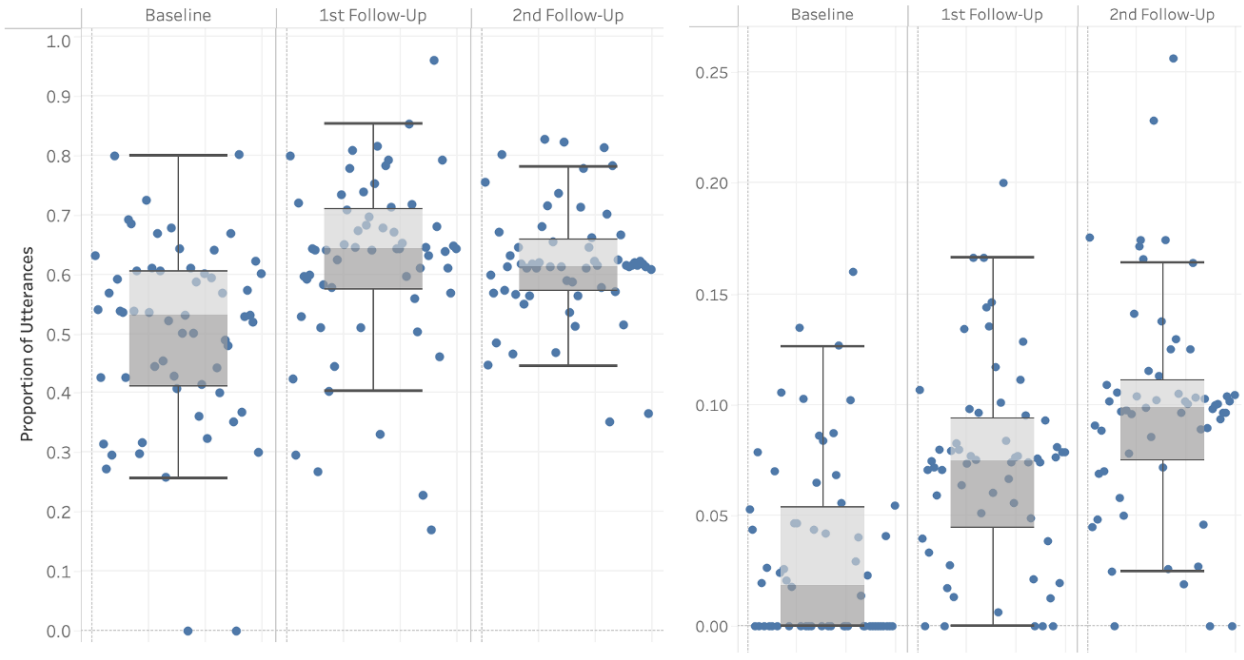
2.3.1.1 Observational Data

Next, I considered our direct observations of dialogic reading strategies. Using an rmANOVA, with session as a within-subjects factor (and no between-subject predictors), I compared dialogic reading over time to assess changes in behavior as a result of the parent-training intervention. For use of the PEER sequence, there was a main effect of session (indicating change in PEER use over time), $F(2,118) = 20.46$, $p < .001$. Pairwise comparisons of estimated marginal means at each session (i.e., a comparison of difference scores) revealed a significant increase in PEER use from baseline to first follow-up ($M_{change} = 0.12$, $SE = 0.02$), but not from first to second follow-up ($p = .86$), signaling that use increased after the intervention, then remained constant between the two follow-up sessions.

A parallel analysis, this time with repeated measures of complex prompting, also revealed

a main effect of session, $F(2,118) = 54.16$, $p < .001$. Pairwise comparisons revealed a significant increase in PEER use from baseline to first follow-up ($M_{change} = 0.04$, $SE = 0.01$, $p < .001$), and from first to second follow-up ($M_{change} = 0.03$, $SE = 0.01$, $p = .002$), signaling that use increased after the intervention and continued to increase over time. Figure 2 plots individual proportion scores (i.e., for each parent) on each of these variables to illustrate trends over time.

Figure 2: *PEER use (left) and Complex Prompting (right) Across Sessions*



Note. The top and bottom border of each box indicates the upper and lower quartiles of the data spread, with datapoints inside the box comprising the interquartile interval (where 50% of the data is found). Each box is split at the median score, with the lighter (upper) portion containing the 25% of data values greater than the median score. For clarity, the vertical y-axis is truncated for complex prompting (*right*), in order to show variability, despite a more limited range of proportion scores compared to PEER use overall (*left*).

2.3.2 Research Question: Is there an effect of socioeconomic status on intervention efficacy?

After confirming an effect of the dialogic reading intervention on parent reading behaviors, I was ready to investigate whether this effect might differ by the socioeconomic status of the participating families. I predicted that there would be a positive predictive relationship, with more years of education predicting a greater intervention effectiveness. I tested this using a repeated measures analysis of covariance (rmANCOVA), comparing my repeated measurements of the proportion of utterances that were part of the PEER sequence (within-subject factor), with parent education as a covariate (between-subject factor). Table 4 displays the parameter estimates from these analyses.

As predicted, there was a main effect of education on use of the PEER sequence, $F(1,58) = 4.36$, $p = .042$. There was not a main effect of session. There was, however, an interaction effect between the two variables, $F(2,116) = 4.84$, $p = .010$. To explore the nature of this interaction, I examined the model's parameter estimates (see Table 4). Figure 3 displays overlapping scatter plots (with plotted points for each observation point) that displays the relation between parent education and use of dialogic reading strategies over time. While parent education was not a significant predictor at baseline, it significantly predicted dialogic reading use at the first follow-up session, with a medium effect size ($\beta_2 = .41$). However, after accounting for this effect at first follow-up, parent education was no longer a significant predictor at second follow-up. This is perhaps unsurprising, given that, as previously discussed, there was not a significant change in PEER sequence use from the first to second follow-up sessions.

There was also a main effect of parent education on complex prompting, $F(1,58) = 9.23$, $p = .005$. where parent education predicted use at first and second follow-up (but not baseline), with moderate effect sizes at both timepoints ($\beta_1 = .38$ and $\beta_2 = .30$. There was no main effect of session, and no interaction between session and parent education. Figure 4 compares the relation between parent education against use of complex prompting over time.

Table 4: *Parameter Estimates from rmANCOVAs on [A] PEER use and [B] Complex Prompting*

			Unstandardized		Standardized			95% CI	
	Outcome	Predictor	*B*	*SE*	β	*t*	*p*	*LL*	*UL*
[A]	Baseline	Education	0.00	0.01	.00	0.00	.973	- 0.01	0.01
	1st Follow-Up	**Education**	**0.02**	**0.01**	**.41**	**3.42**	**< .001**	**0.01**	**0.03**
	2nd Follow-Up	Education	0.01	0.00	.19	1.44	.151	0.00	0.02
[B]	Baseline	Education	0.00	0.00	.20	1.50	.134	0.00	0.01
	1st Follow-Up	**Education**	**0.01**	**0.00**	**.38**	**3.03**	**.002**	**0.00**	**0.01**
	2nd Follow-Up	**Education**	**0.01**	**0.00**	**.30**	**2.25**	**.025**	**0.00**	**0.01**

Note. rmANCOVA = repeated measures analysis of covariance; CI = confidence interval; *LL* = lower limit, *UL* = upper limit. For added clarity, significant predictors are bolded, and intercept terms are omitted.

Figure 3: *Parent Education and PEER use Across Sessions*

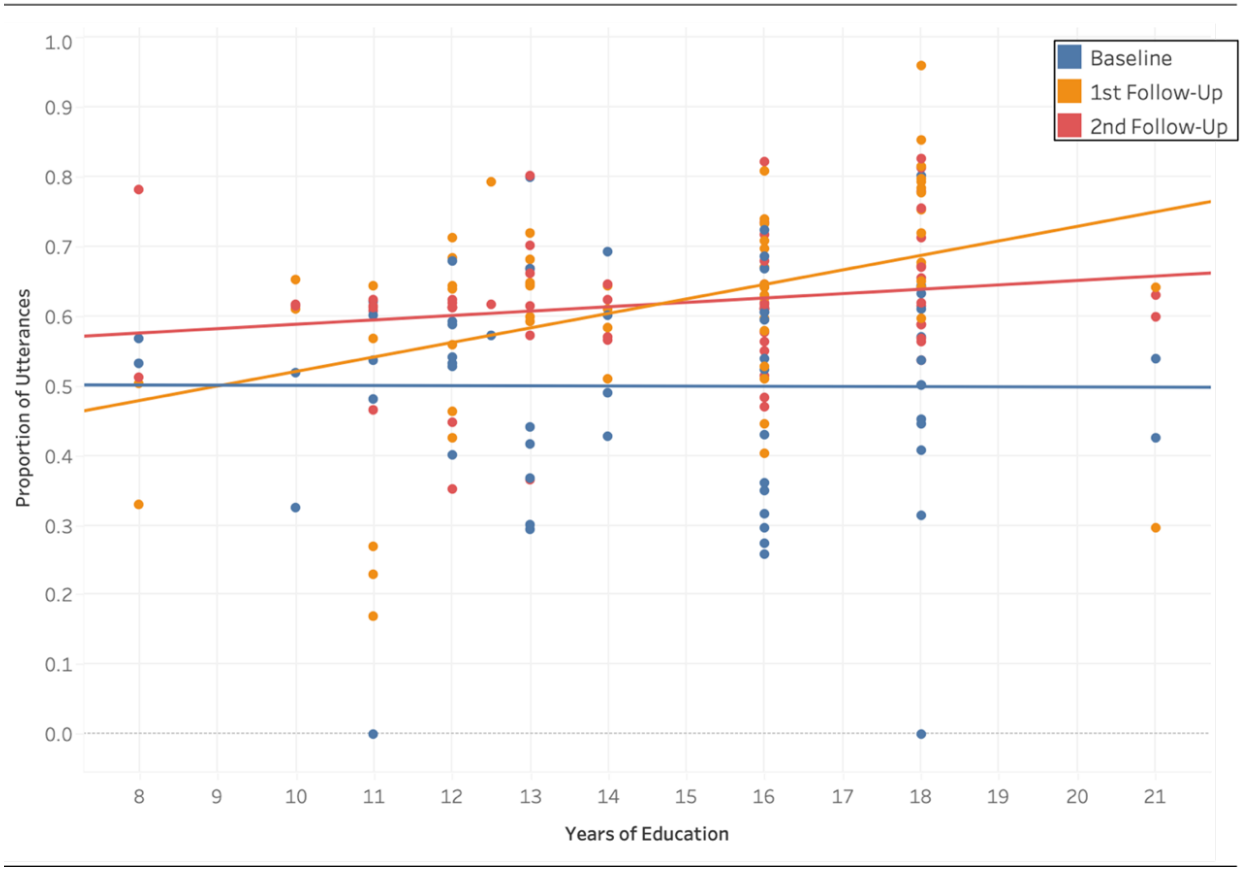
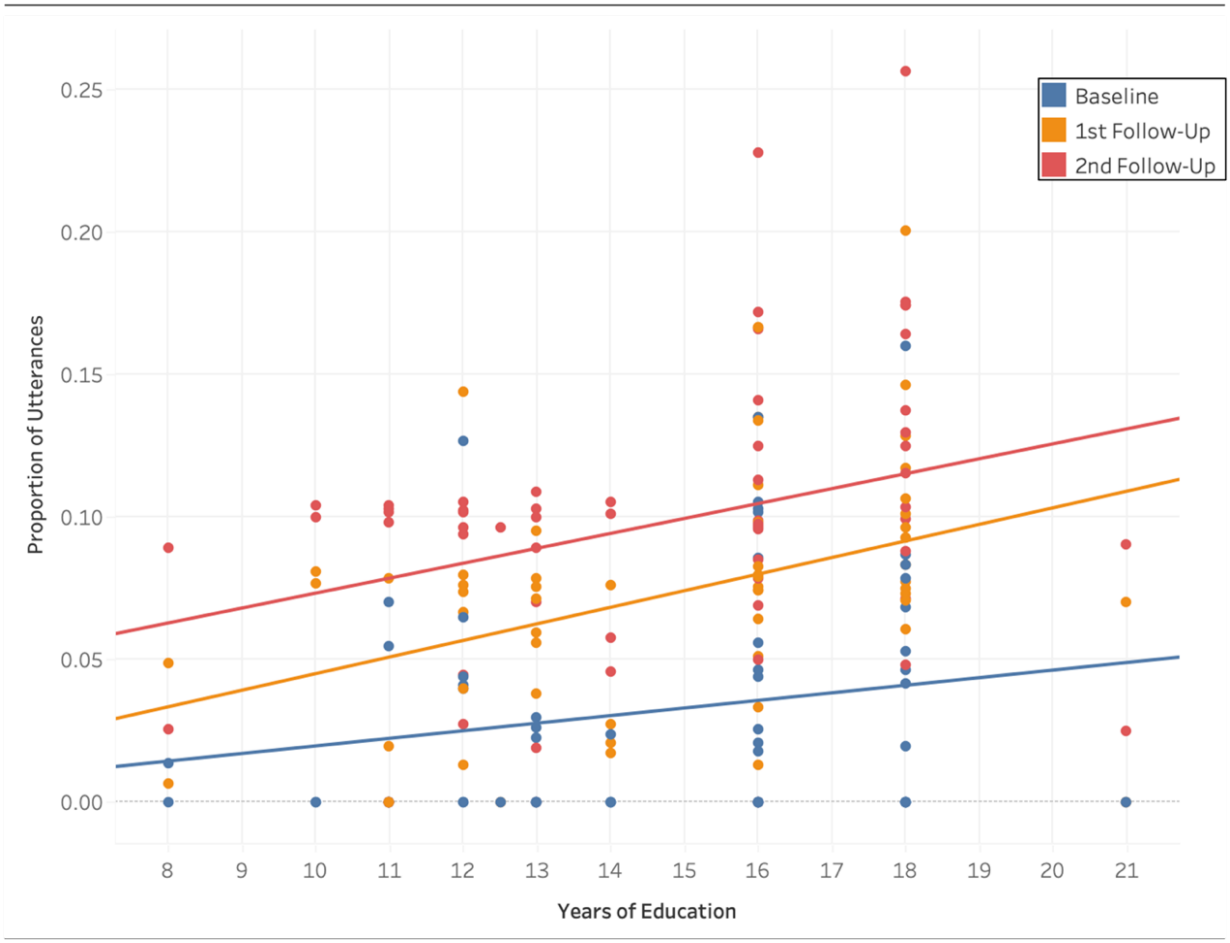


Figure 4: *Parent Education and Complex Prompting Across Sessions*



2.3.3 Research Question: How do other relevant factors relate to intervention efficacy?

While my main research question centered around socioeconomic status, I also considered other parent- and child-level factors that, based on my literature review, I believed might also predict intervention efficacy. While I expected parent literacy to have the greatest impact on intervention success (due to its potential impact on parents' learning of the techniques, as well as their confidence in implementing them), I also consider other potential moderating factors such as the home learning environment (which parents curate for their child, and which has been shown to predict child outcomes above and beyond the influence of SES), and child

vocabulary and executive function. As dialogic reading is, by definition, a dialogue between the child and their parent, I wanted to consider the role of child factors (such as attention and vocabulary knowledge) that might also contribute to parent success.

2.3.3.1 Parent Factors

In order to evaluate potential relations between more proximal measures that may relate to the SES effects observed, I ran a rmANCOVA with the home learning environment and parent literacy as covariates. I ran this analysis once with PEER sequence use as my outcome measures, and again with complex prompting. Table 5 displays the parameter estimates from these analyses.

As predicted, there was a main effect of parent literacy on the use of the PEER sequence over time, $F(1,57) = 6.23$, $p = .016$. There was no effect of session, and the interaction between parent literacy and session was not significant (although it did trend in that direction, $p = .081$). While not a significant predictor at baseline, parent literacy was a significant predictor at the first follow-up session with a moderate effect size ($\beta = .41$), and was marginal at second follow-up ($\beta = .22$, $p = .06$). Surprisingly, there was no main effect of the home learning environment, and no interaction between session and HLE. See Figure 5 for a visualization.

When looking at complex prompting, a similar trend emerged, with a main effect of parent literacy $F(1,57) = 5.94$, $p = .021$, but no main effect of the HLE or session. Again, the interaction between session and HLE was not significant, nor was the interaction between parent literacy and session (although the latter did trend in that direction, $p = .089$). While not a significant predictor at baseline, parent literacy was a significant predictor with a modest effect size at both first ($\beta = .31$) and second follow-up ($\beta = .26$) sessions. See Figure 6 for a visualization.

Table 5: *Parameter Estimates from rmANCOVAs on [A] PEER use and [B] Complex Prompting*

			Unstandardized		Standardized			95% CI	
	Outcome	Predictor	*B*	*SE*	β	*t*	*p*	*LL*	*UL*
[A]	Baseline	Literacy	0.00	0.00	.07	0.55	.585	0.00	0.01
		HLE	0.00	0.00	.08	0.56	.573	-0.01	0.01
	1st Follow-Up	**Literacy**	**0.01**	**0.00**	**.41**	**3.20**	**.001**	**0.00**	**0.01**
		HLE	0.00	0.00	.06	0.39	.694	-0.01	0.01
	2nd Follow-Up	Literacy	0.00	0.00	.22	1.88	.060	0.00	0.00
		HLE	0.00	0.00	.04	0.28	.777	0.00	0.01
[B]	Baseline	Literacy	0.00	0.00	.07	0.52	.600	0.00	0.00
		HLE	0.00	0.00	.11	0.78	.437	0.00	0.00
	1st Follow-Up	**Literacy**	**0.00**	**0.00**	**.31**	**2.73**	**.006**	**0.00**	**0.00**
		HLE	0.00	0.00	.09	0.71	.475	0.00	0.00
	2nd Follow-Up	**Literacy**	**0.00**	**0.00**	**.26**	**2.17**	**.030**	**0.00**	**0.00**
		HLE	0.00	0.00	.05	0.34	.735	0.00	0.00

Note. rmANCOVA = repeated measures analysis of covariance; CI = confidence interval; *LL* = lower limit, *UL* = upper limit; HLE = home learning environment. For added clarity, significant predictors are bolded, and intercept terms are omitted.

Figure 5: *Parent Literacy and PEER use Across Sessions*

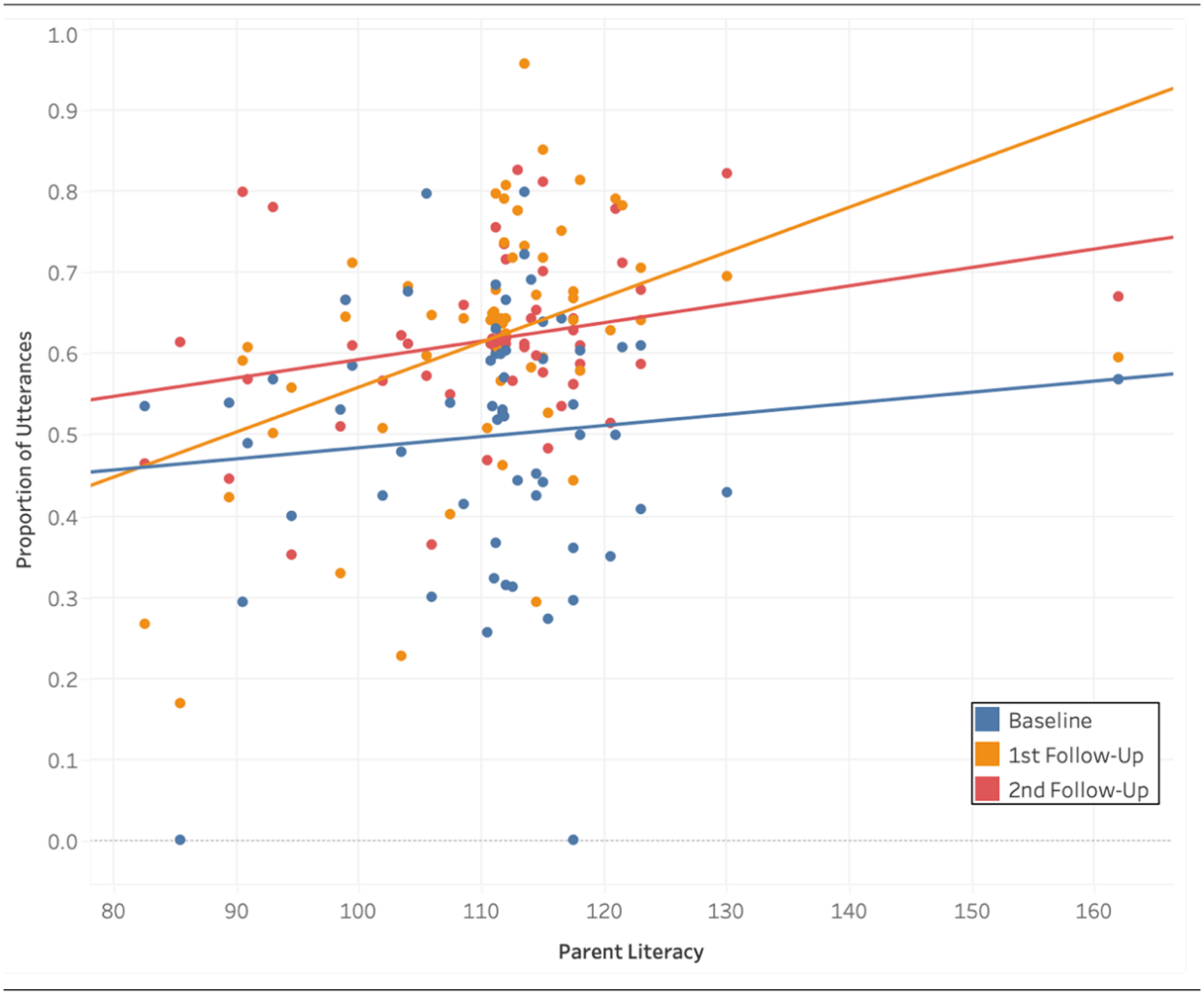
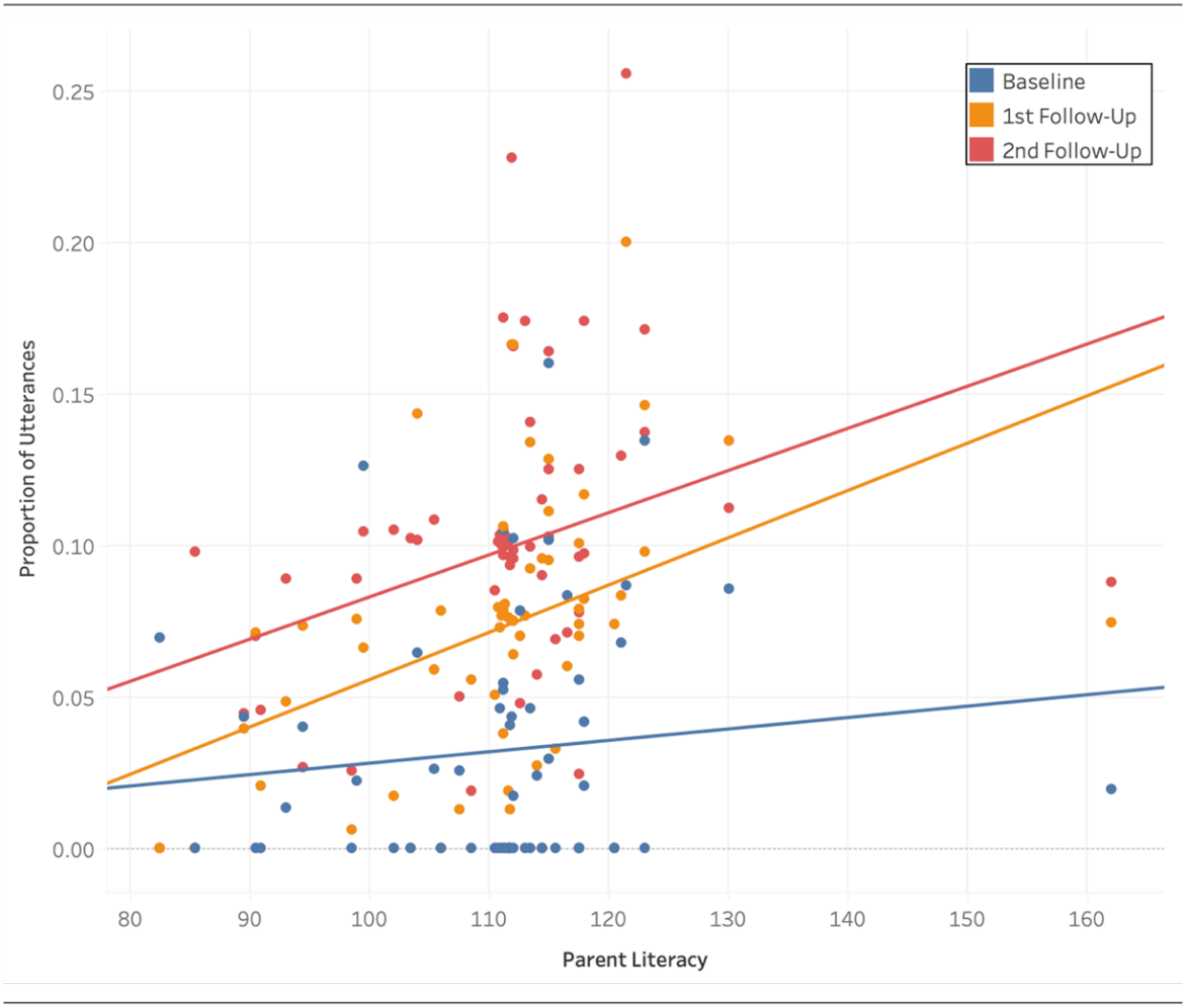


Figure 6: *Parent Literacy and Complex Prompting Across Sessions*



2.3.3.1 Child Factors

I next included child cognitive skill and executive functioning to see if these factors might be related to parent reading behaviors. I also considered associations with child age, as language skills varied greatly across participating children which could support different types of conversations. I included these three variables as covariates in two parallel rmANCOVAs – first with PEER sequence and then with complex prompting. For both analyses, there were no main effects or interactions for any variables.

2.4 Interim Discussion

In Study 1, I investigated whether SES-based differences in intervention success, previously demonstrated in terms of child outcomes, were evident earlier in the causal chain: during parent implementation of the prescribed techniques. My analyses revealed that parent education interacted with intervention effectiveness, with higher dialogic reading adoption for higher-SES families. Importantly, I did not find an effect of parent education at baseline, suggesting that its influence was specifically on adoption of intervention techniques, and not reading style in general. Indeed, at baseline, about half of parent utterances were part of the PEER sequence, regardless of parent education. But while the frequency of PEER use in general was fairly high at baseline (49.87% of parent utterances, on average), use of more complex prompting was uncommon for all participants at baseline (3.22% of utterances). This latter finding is consistent with previous research (e.g., Huebner & Meltzoff, 2005), that parents do not naturally engage in high rates of dialogic reading without instruction.

Another important take-away is that initial gains were maintained from first to second follow-up, suggesting long-term retention of the PEER sequence. Moreover, for use of complex prompting, scores continued to improve during this interval, perhaps signaling increased comfort using these more advanced and abstract techniques with time and practice.

When planning my analyses, I had reason to believe that several additional predictor variables would be associated with PEER/CROWD use, based on the literature relating them to child vocabulary outcomes (e.g., Mol et al., 2008) and general parent engagement while reading (e.g., Dowdall et al., 2020; Huebner & Meltzoff, 2005). As prior research has found parent reading level as a moderator of intervention success (e.g., Mendelsohn et al., 2011), I was especially interested in interactions with parent literacy. I also believed that the home learning

environment may be related to intervention success due to the role it might play in whether dyads were able to practice dialogic reading at home during the delay between intervention and follow-up sessions.

I observed a consistent effect of parent literacy on adoption of dialogic reading techniques. As was the case for SES, there was a significant interaction effect with session on implementation success, with no predictive relationship at baseline, and significant ones at follow-up session. However, I found no main effect of the HLE after accounting for the influence of parent literacy (despite only a modest correlation between the two variables themselves, $r = .374$, $p < .001$).

Research has also indicated that parents may adapt their reading style to their child's skill level, with parents of lesser experienced children tending to be more interactive (presumably to better help their child understand the story), and more advanced children mainly sitting and listening to the story like an audience (Bus & van IJzendoorn, 1995). However, other research suggests a different age-based change in style, with parents of younger children using more elaborations and attention-recruiting verbalizations, and those of older children relying more on questions and feedback (see Sénéchal et al., 1995). Surprisingly, though, child age, as well as my measures of child executive function and overall cognitive skill had no effect on either of my outcome variables. It is possible that the lack of effect for these variables is a floor effect related to the simplicity of the books I used as stimuli (see Appendix E). Future research might explore this possibility by varying the complexity of books used.

Given these findings, I can more confidently extend the previously observed differential effectiveness on child outcomes earlier in the causal chain – to parent implementation of the strategies learned. Differential effects on parent behaviors could, then, be due to problems with

initial learning and/or uptake of the intervention techniques, or perhaps with retention of them after a delay. Unfortunately, the nature of this study does not allow us to clearly differentiate between these two possibilities, but exploratory analyses from parents' reading of "Good Night, Gorilla" (during the parent training phase) suggest that parents were able to incorporate components of PEER and CROWD at a higher rate than at baseline and both follow-up sessions. This may signal accurate learning/uptake of intervention techniques, but perhaps diminishing retention over time. However, because "Good Night, Gorilla" was chosen for the training phase specifically because of its unusually rich affordances for complex prompting, it is possible that this pattern is unrelated to the intervention. Future research might add a same-session "post-intervention" reading observation with a book more comparable with those used at other measurement timepoints in order to more rigorously adjudicate between these possibilities. Regardless, it is important to note that parent education was a significant predictor for both overall PEER use ($\beta = .27$, $p < .001$), and complex prompting ($\beta = .36$, $p < .001$) during reading of "Good Night, Gorilla", demonstrating that SES differences in uptake even at this intermediate stage of the training process.

If I had not found an effect of SES on implementation, then the differences in intervention efficacy previously observed in the literature might more convincingly be attributed to something other than differences in parent uptake (e.g., child or home factors). However, my analyses failed to find any predictive relations between HLE, child age, child EF, or child cognitive skill. That being said, my analyses did not take into account every potentially relevant factor, such as noise level at home and number (and age) of siblings, which are worth exploring in the future.

In any case, there is good reason to believe that initial learning may be contributing to the

differential effect of dialogic reading interventions on child outcomes. This may, in part, be due to the complexity of the language used within traditional dialogic reading intervention training, which may require a higher reading level or vocabulary to comfortably understand. The fact that few parents reported use of the PEER/CROWD acronyms when practicing at home also lends support to this possibility. I test this hypothesis in Study 2.

CHAPTER 3

Study 2

3.1 Study Aims

Study 1 was designed to clarify whether the SES effects on dialogic reading intervention efficacy, observed in the literature in terms of child outcomes, are already evident in parents' attempts to implement the prescribed strategies. Study 2 further tests the hypothesis that parent literacy is a bottleneck that interferes with initial learning of the techniques, by attempting to teach the techniques in a more accessible way. To do this, I manipulated the intervention materials to form a new "simplified" condition and compared this revised intervention's efficacy with that of Study 1 ("classic" condition). If it is the obtuse language traditionally used in dialogic reading training is contributing to differential outcomes for children, then improving parent understanding of and confidence in using the strategies could be a promising area for intervention. If, however, broader social disparities are primarily responsible for these outcomes, this manipulation may not be enough to produce meaningful differences in outcomes.

3.2 Methods

3.2.1 Participants

The 60 participant pairs from Study 1 comprised the "classic" control condition. An additional 57 parent child dyads (mean child age = 3.89, *SD* = 0.98) participated in at least one session of the experimental "simplified" condition, with 37 finishing all 3 sessions. Parent education in the simplified condition ranged from 9th grade through graduate school (see Table 6) and did not correlate with number of completed sessions. Nearly two-thirds (63.8%) of

participating children were enrolled in preschool/kindergarten.

Table 6: *Demographic Characteristics of Study 2 Participants in the "Simplified" Condition*

		Parent Education							
		Did not Graduate High School	GED	High School	Some College	Associate Degree	Bachelor's Degree	Graduate Degree	
Child Race	Black	6	3	5	2	0	1	1	18
	White	1	0	3	1	1	8	13	27
	Mixed Race	2	1	2	1	0	4	2	12
		9	4	10	4	1	13	16	57

Note. Participants from the "classic" condition can be seen in Table 1.

3.2.2 Procedure

The procedures for the simplified condition were identical to those of the classic condition but were implemented with modified intervention materials. First, although the same general PEER and CROWD concepts were introduced in both conditions, more concise explanations (without reference to the complex PEER/CROWD acronyms) were utilized in the simplified condition (see Appendix A2.1). Moreover, the average reading level for the simplified instructions was just under 5th grade, compared to the 12th grade vocabulary words used in the classic condition. Second, although the experimenter read "Good Night, Gorilla" identically in both conditions, she engaged with the parent somewhat differently in the post-reading reflective discussion to match the absence of PEER/CROWD terminology used in the simplified version (see Appendix A2.2). Lastly, while the families were sent home with identical books, those in the simplified condition received pamphlets matching the revised information presented to them in the training session (see Appendix A2.3).

3.3 Analyses and Results

As in Study 1, missing data were multiply imputed (100 iterations) and the following analyses use the pooled results.

3.3.1 Research Question: How does a simplified dialogic reading intervention compare to the conventional version?

3.3.1.1 Interaction with Socioeconomic Status

Based on the literature reviewed earlier linking parent education to shared book reading practices and intervention efficacy (e.g., Manz et al., 2010), I believed that the SES effects on parent implementation of dialogic reading strategies observed in Study 1 may be due to parents' learning of (and comfort with) the intervention instructions themselves. So, in Study 2, I investigated whether the conceptual accessibility of intervention training materials might constrain successful implementation of dialogic reading techniques by manipulating the complexity of the language used therein.

To answer this research question empirically, I ran two rmANCOVAs. I first included repeated measures of proportion of parent utterances that were part of the PEER sequence (at baseline, first follow-up session, and second follow-up session), with condition, parent education (SES), and the interaction between the two as predictors. I then replicated this analysis with complex prompting as my repeated measure over time. Between- and within-subjects effects for each rmANCOVA are discussed below, and parameter estimates are provided in Table 7.

Results of the first rmANCOVA reveal that overall, there was a positive main effect of SES (parent education) on use of the PEER sequence, $F(1,113) = 11.55$, $p < .001$, and an interaction between session and SES, $F(2,226) = 4.77$, $p = .010$. SES was not a significant predictor at baseline, but did predict use of the dialogic reading sequence at both follow-up

sessions, with a moderate effect size at first follow-up (β = .41) and a modest one at second follow-up (β = .26). There was no effect of condition however, and no interaction effect between SES and condition. There was also no main effect of session and no interaction between session and condition. See Figure 7 for a visualization.

I repeated this same analysis with parent use of complex prompting (open-ended and distancing prompts) in particular, which is visualized in Figure 8. Again, there was a main effect of parent education, $F(1,113) = 25.55$ $p < .001$, predicting complex prompting at all three timepoints, with increasing effect size over time: $\beta_{t1} = .28$, $\beta_{t2} = .33$, $\beta_{t3} = .41$. There were no other main effects or interactions.

Table 7: *Parameter Estimates from rmANCOVA on [A] PEER use and [B] Complex Prompting*

			Unstandardized		Standardized			95% CI	
	Outcome	Predictor	*B*	*SE*	β	*t*	*p*	*LL*	*UL*
[A]	Baseline	Education	0.00	0.01	.06	0.56	.574	-0.01	0.01
		Condition	0.11	0.16	.06	0.68	.499	-0.21	0.42
		Interaction	0.00	0.01	.06	0.61	.545	-0.01	0.01
	1st Follow-Up	**Education**	**0.02**	**0.00**	**.41**	**4.79**	**< .001**	**0.01**	**0.03**
		Condition	- 0.11	0.12	- .26	- 0.94	.346	-0.33	0.12
		Interaction	0.00	0.00	- .05	- 0.62	.538	-0.01	0.01
	2nd Follow-Up	**Education**	**0.01**	**0.00**	**.26**	**2.94**	**.003**	**0.00**	**0.02**
		Condition	0.10	0.09	.11	1.07	.285	-0.08	0.29
		Interaction	0.00	0.00	.09	0.93	.352	0.00	0.01
[B]	Baseline	**Education**	**0.00**	**0.00**	**.28**	**3.18**	**.001**	**0.00**	**0.01**
		Condition	0.03	0.03	.03	0.88	.380	- 0.04	0.10
		Interaction	0.00	0.00	.07	0.83	.405	0.00	0.00
	1st Follow-Up	**Education**	**0.01**	**0.00**	**.33**	**3.49**	**< .001**	**0.00**	**0.01**
		Condition	- 0.02	0.05	- .03	- 0.34	.734	-0.11	0.07
		Interaction	0.00	0.00	- .03	- 0.30	.763	0.00	0.00
	2nd Follow-Up	**Education**	**0.01**	**0.00**	**.40**	**4.16**	**< .001**	**0.00**	**0.01**
		Condition	0.06	0.05	.04	1.18	.236	-0.04	0.16
		Interaction	0.00	0.00	.11	1.13	.259	0.00	0.01

Note. rmANCOVA = repeated measures analysis of covariance; CI = confidence interval; *LL* = lower limit; *UL* = upper limit; Interaction = the interaction between condition and education. For added clarity, significant predictors are bolded, and intercept terms are omitted.

Figure 7: *Parent Education and PEER use Over Time*

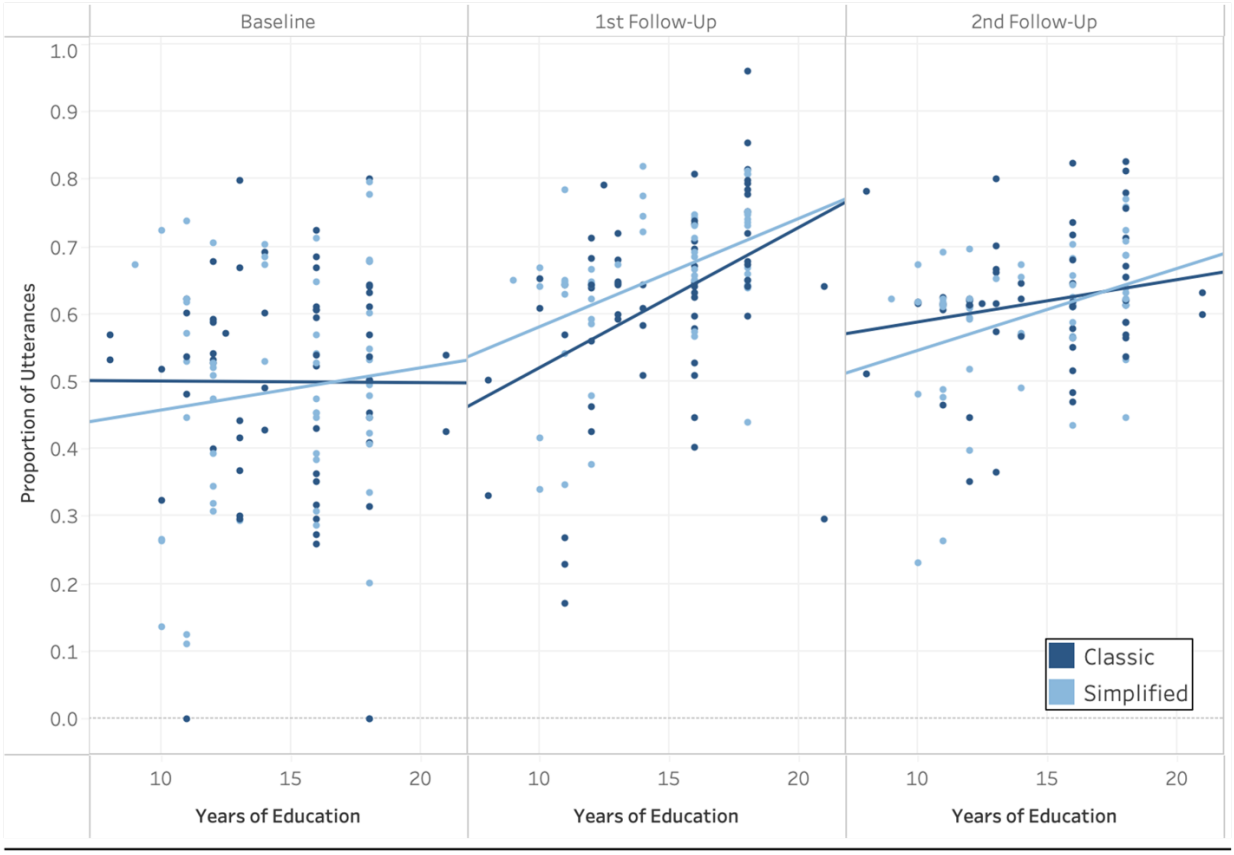
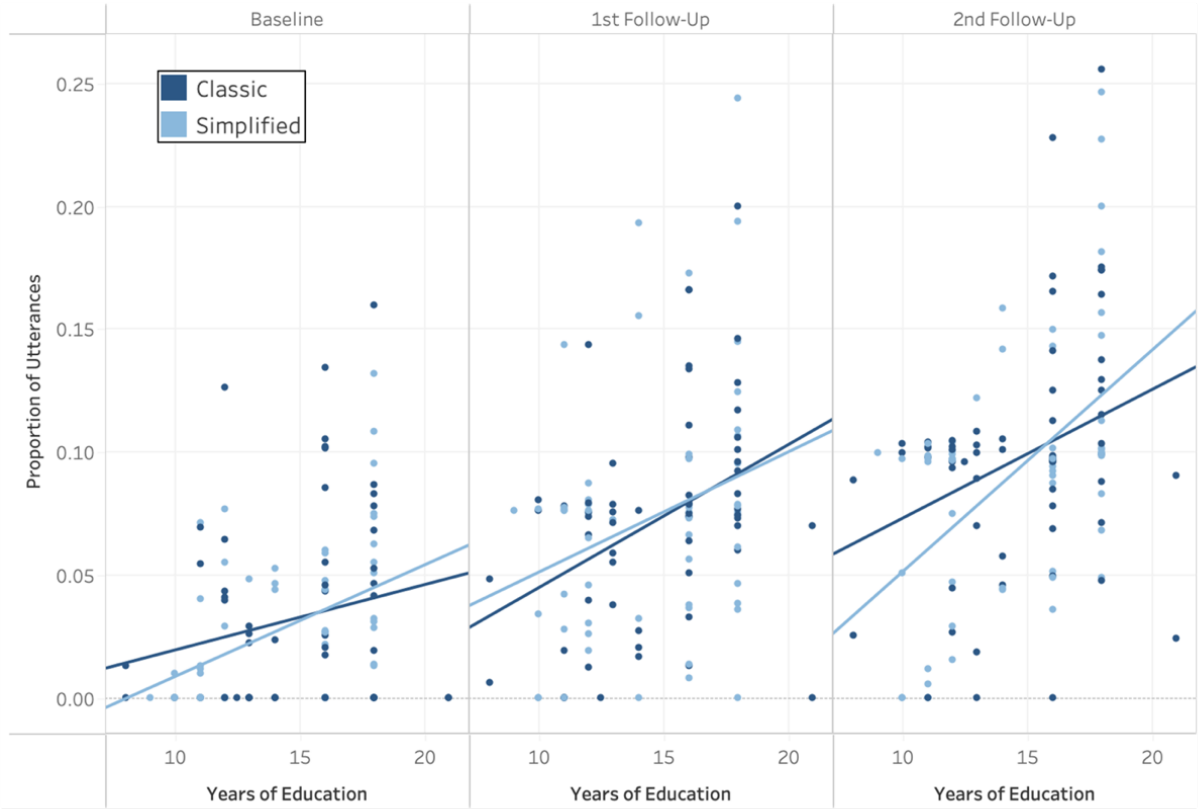


Figure 8: *Parent Education and Complex Prompting Over Time*



3.3.1.2 Interaction with Parent Literacy

While I did not find an interaction between intervention complexity and socioeconomic status, I thought that parent literacy (for which I found a main effect in Study 1) may be more tightly aligned with my predicted mechanism of action. I was especially interested in how instruction complexity and parent literacy might interact to predict the degree to which parents adopt dialogic reading strategies. Therefore, I replicated the same analyses as above, this time with parent literacy instead of education.

Results of the first rmANCOVA reveal that overall, there was a positive main effect of parent literacy on use of the PEER sequence, $F(1,113) = 12.70$, $p < .001$, and an interaction between session and parent literacy, $F(2,226) = 3.19$, $p = .050$. Parent literacy was not a

significant predictor at baseline, but did predict use of the dialogic reading sequence at both follow-up sessions, with a medium effect size at first (β = .37) and second follow-up (β = .34). As was the case with parent education, there were no other main effects or interactions. See Figure 9 for a visualization.

I repeated this analysis with parent use of complex prompting, which is visualized in Figure 10. Again, there was a main effect of parent literacy, $F(1,113) = 25.76$ $p < .001$, with, on average, higher reading skill predicting higher rates of complex prompting. There was also a significant interaction between session and literacy $F(2,226) = 48.94$, $p = .002$: while the effect of literacy on complex prompting did not reach significance at baseline ($p = .088$), it was significant at both follow-up sessions, with increasing effect sizes ($\beta_1 = .35$, $\beta_2 = .48$). This suggests that the influence of parent literacy on use of complex prompting increases over time.

Unlike the other analyses, there was a main effect of session on complex prompting, $F(2,226) = 4.22$, $p = .02$. An interaction between session and condition also trended toward significance ($p = .061$), as did a three-way interaction between session, condition, and literacy ($p = .067$). To better understand the nature of these interaction trends, I completed the following exploratory analyses.

Inspection of parameter estimates reveal that the possible session-by-condition interaction was likely driven by the (modest) simple main effect of condition at second follow-up (β = .11). Paired comparisons of the estimated marginal means reveal a significant mean difference between the two conditions at this session (only), with the classic condition outperforming the simplified condition overall ($p = .018$). The possible three-way interaction between session, condition, and parent literacy, was likely driven by the modest condition-by-literacy effect on complex prompting at second follow-up (β = 21). Inspection of the fitted

regression lines seen on Figure 10 suggest that, for parents with lower literacy skills, the classic condition was more highly related to complex prompting than was the simplified condition. However, for higher levels of parent literacy, the simplified condition led to higher levels of complex prompting. This result was surprising, and in fact was the opposite interaction as I had predicted.

Table 8: *Parameter Estimates from rmANCOVA on [A] PEER use and [B] Complex Prompting*

			Unstandardized		Standardized			95% CI	
	Outcome	Predictor	*B*	*SE*	β	*t*	*p*	*LL*	*UL*
[A]	Baseline	Condition	- 0.05	0.35	.09	- 0.14	.892	- 0.72	0.63
		Literacy	0.00	0.00	.07	0.70	.484	0.00	0.00
		Interaction	0.00	0.00	- .02	- 0.18	.860	0.00	0.00
	1st Follow-Up	Condition	- 0.21	0.25	-.26	- 0.86	.390	- 0.70	0.27
		Literacy	**0.01**	**0.00**	**.37**	**4.20**	**< .001**	**0.00**	**0.01**
		Interaction	0.00	0.00	- .06	- 0.72	.470	0.00	0.00
	2nd Follow-Up	Condition	0.26	0.19	.16	1.37	.172	- 0.11	0.64
		Literacy	**0.00**	**0.00**	**.34**	**3.88**	**< .001**	**0.00**	**0.01**
		Interaction	0.00	0.00	.11	1.28	.199	0.00	0.00
[B]	Baseline	Condition	0.05	0.08	.08	0.65	.515	- 0.10	0.20
		Literacy	0.00	0.00	.16	1.70	.088	0.00	0.00
		Interaction	0.00	0.00	.06	0.61	.539	0.00	0.00
	1st Follow-Up	Condition	0.01	0.10	-.02	0.11	.914	- 0.18	0.20
		Literacy	**0.00**	**0.00**	**.35**	**3.66**	**< .001**	**0.00**	**0.00**
		Interaction	0.00	0.00	.01	0.12	.905	0.00	0.00
	2nd Follow-Up	**Condition**	**0.24**	**0.10**	**.11**	**2.40**	**.016**	**0.04**	**0.43**
		Literacy	**0.00**	**0.00**	**.48**	**5.47**	**< .001**	**0.00**	**0.00**
		Interaction	**0.00**	**0.00**	**.21**	**2.36**	**.018**	**0.00**	**0.00**

Note. rmANCOVA = repeated measures analysis of covariance; CI = confidence interval; *LL* = lower limit; *UL* = upper limit; Interaction = the interaction between condition and parent literacy. For added clarity, significant predictors are bolded, and intercept terms are omitted.

Figure 9: *Parent Literacy and PEER use Over Time*

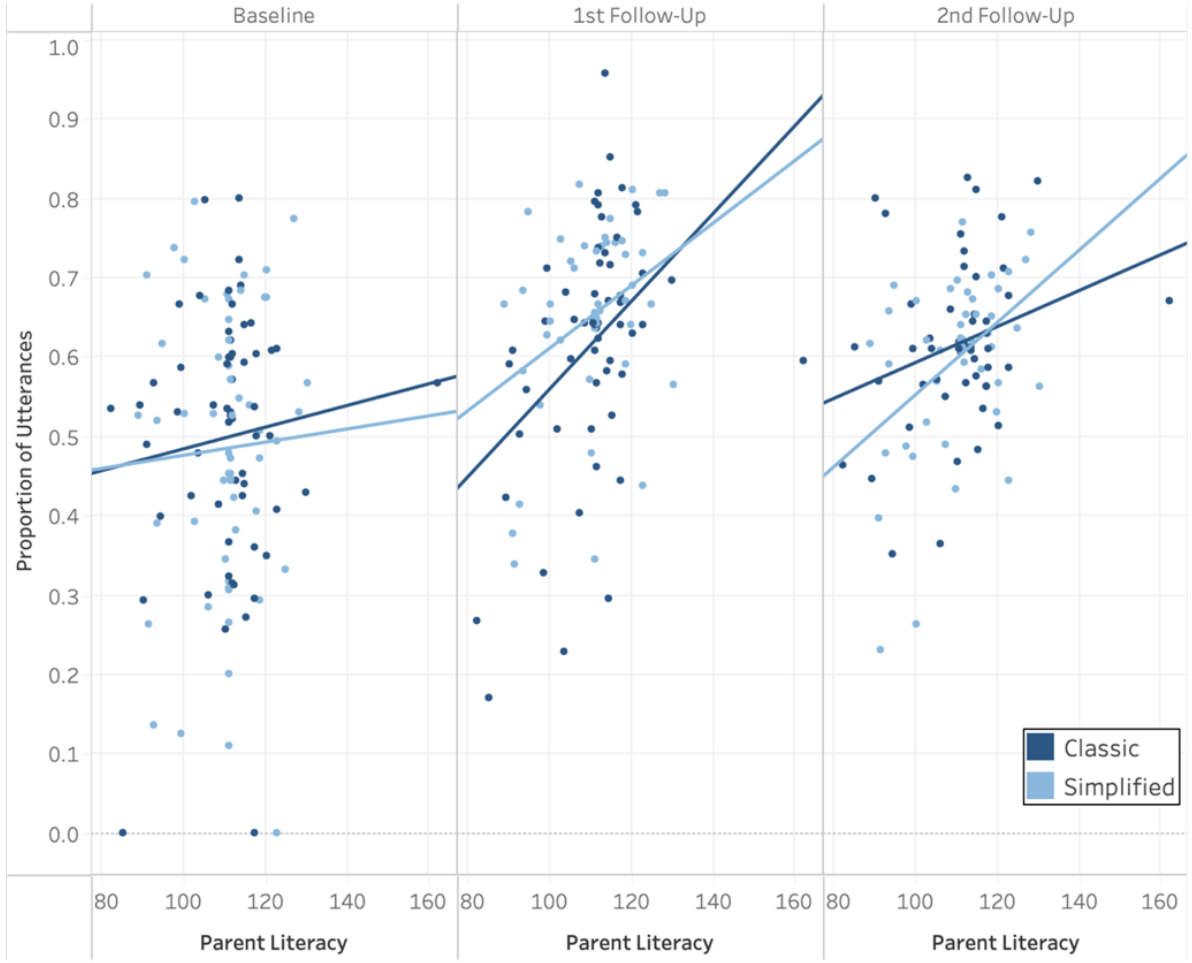
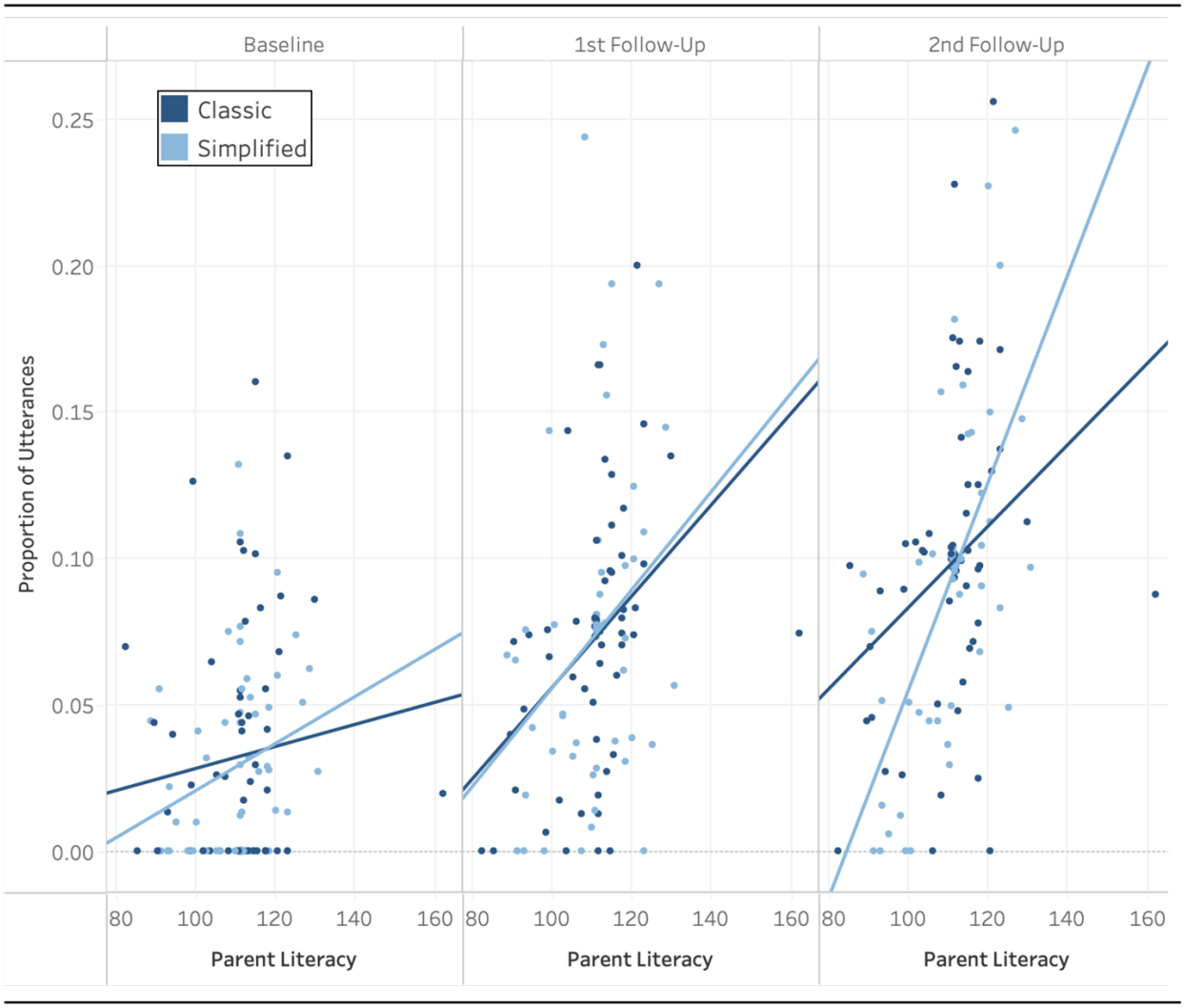


Figure 10: *Parent Literacy and PEER use Over Time*



3.5 Interim Discussion

Study 2 was designed to more deeply probe whether parent literacy might be a bottleneck interfering with initial learning of dialogic reading techniques, by attempting to teach the same techniques in a more accessible way. While parents in both the "classic" and "simplified" conditions seemed to benefit from the reading intervention overall, no difference between the two conditions was evident.

I did, however, observe a consistent effect of SES – and also parent literacy - on adoption of dialogic reading techniques, replicating the results of Study 1 with an expanded sample. For both of these parent measures there was a significant interaction effect with session on ability to implement the PEER sequence, with no predictive relationship at baseline (pre-intervention), and significant ones at follow-up sessions (post-intervention). While moderately correlated, parent education and literacy were not redundant measures ($r = .53$, $p < .001$), and indeed, the effects differed slightly between the two measures when inspecting the effects on complex prompting. Exploratory analyses suggest that for parent literacy, there may be hints of an effect of condition, with the simplified condition providing a boost only to parents with higher reading levels. This result is contrary to what I had predicted, as I had thought perhaps the opposite trend would emerge, with more literate parents perhaps finding the simplified condition *too* simple. It is unclear why this trend emerged, and as this was an exploratory analysis of a (non-significant) trend in the data, replication with new or expanded data would help shine more light onto the true nature of this potential association.

Importantly, overall, the intervention was effective across conditions, as I observed meaningful change in dialogic reading behaviors and complex prompting in particular. Moreover, and consistent with previous research, its effectiveness was moderated by parent education/literacy variables (as observed in interactions between these variables and session).

Unexpectedly, however no main effect of condition was observed. This null finding is consistent with two key conclusions. First, simplifying dialogic reading training materials' wording was not enough to overcome the effect of SES or parent literacy on the success of intervention implementation. Second, for those parents who were able to adopt the dialogic reading strategies, teaching them the PEER/CROWD acronym was not necessary (and, in fact, as

suggested in Study 1, parents do not seem to rely on the acronym as a mnemonic device to help them remember). With the exception of the one exploratory finding at session 3, the simplified explanation of dialogic reading strategies was just as effective as classic (and empirically supported) methods of explanation. This suggests that an easier approach is viable, thereby perhaps improving prospects for scaling-up interventions.

However, my failure to observe a significant difference between the two intervention groups leaves open the possibility that the content of the dialogic reading training was entirely irrelevant to the observed gains in strategy use. Alternatively, it might simply be the supportive and encouraging reading environment in general that led to increases in these behaviors. I designed Study 3 to help adjudicate between these possibilities.

CHAPTER 4

Study 3

4.1 Study Aims

Research has shown that receiving hands-on, one-on-one reading support can increase parents' use of interactive book reading strategies (e.g., Mendelsohn et al., 2011; see also Landry et al., 2012). Given this evidence, it is possible that the increase in parents' use of dialogic reading behaviors observed in Studies 1 and 2 may not be entirely attributable to the core content of our intervention, but instead could reflect a more general boost from the support and encouragement provided by the experimenter. The fact that comparable improvements in dialogic reading were observed in both conditions of Study 2 is consistent with this possibility. The main difference between these conditions was in the non-interactive aspects of the intervention. Specifically, while the details of the videos and follow-up explanations differed between conditions, both conditions received the same one-on-one feedback and support. The DR-specific content provided might therefore have been irrelevant to the improvements observed in both conditions. In other words, *any* one-on-one reading intervention might have been equally effective in eliciting this change.

To disentangle these theoretically important possibilities, I created a third condition that was comparably supportive as my dialogic reading conditions but focused on different (non-DR) aspects of the reading activity. My goal in doing so was to establish a "baseline" measure of changes in reading behavior that I might expect from general support and encouragement from an experimenter. I predicted that dialogic reading use would be higher in the dialogic reading conditions than for the control condition. By including an active control condition with which to

compare the other two conditions, I can more confidently ascribe potential benefits to the appropriate source.

4.2 Methods

4.2.1 Participants

For this condition, I planned to closely match the demographics of participants from Studies 1 and 2. However, due to the COVID-19 pandemic, I was not able to obtain my full sample. Therefore, the current study explores preliminary results from a convenience sample.

The 117 participant pairs from Studies 1 and 2 were included in this analysis. An additional 27 parent child dyads (mean child age = 3.79, *SD* = 0.84) participated in at least one session of an active control condition, with 23 finishing all 3 sessions. See Table 9 for participant demographics.

Table 9: *Demographic Characteristics of Study 3 Participants in the "Active Control" Condition*

		Parent Education							
		Did not graduate High School	GED	High School	Some College	Associate Degree	Bachelor's Degree	Graduate Degree	
Child Race	Black	0	0	0	0	0	0	0	0
	White	0	0	0	0	0	8	15	23
	Mixed Race	0	0	0	0	0	0	4	4
		0	0	0	0	0	8	19	27

Note. Participants from the other conditions can be seen in Tables 1 and 5.

4.2.2 Procedure

The procedures for Study 3 were identical to those of Studies 1 and 2, with the following exceptions. While the classic and simplified conditions from Studies 1 and 2 only differed subtly in content, the content of our active control condition was, by design, completely different.

Instead of teaching dialogic reading strategies, the intervention focused on teaching parents ways to promote their child's executive function in the context of shared book reading (see Appendix A3.1). As a consequence of this different focus, the experimenter engaged in different extratextual talk while reading the first half of "Good Night, Gorilla" with the child, and referenced a different tip sheet with the parent while engaging in the post-reading coaching. The pamphlets tucked into the take-home book options also differed from the other two conditions in that they reflected the tips corresponding to the active control condition's intervention content (see Appendix A3.3 for an example).

4.3 Analyses and Results

As in Studies 1 and 2, missing data was multiply imputed prior to analysis. Data from Studies 1 and 2 were merged with this new dataset to make a combined dataset with three conditions (classic, simplified, and active control). As I found no effect of condition in Study 2, the classic and simplified conditions were collapsed into a single "dialogic reading" condition. Thus, I had two conditions: "dialogic reading" (a combination of those from Studies 1 and 2), and "active control."

4.3.1 Research Question: How important is the specific content of dialogic reading interventions?

To answer this question, I ran an rmANCOVA with use of the PEER sequence at each timepoint as my dependent variables (within-subjects factor), and condition (DR vs non-DR) as my predictor variable (between-subjects factor). See Figure 11. Although the participants in the non-DR condition were not as diverse as those in the DR condition (thereby precluding the possibility of detecting any meaningful SES by condition interaction), I retained parent education as a covariate in this analysis as a control variable. Table 10 contains the parameter results from

these analyses.

As expected, there were main effects of both education, $F(1,141) = 13.23$, $p < .001$ and condition, $F(1,141) = 29.144$, $p < .001$. There was no main effect of session, but there was a significant interaction effect between session and condition, $F(2,282) = 5.45$, $p = .006$, suggesting that while there was not an overall increase in dialogic reading use over time irrespective of condition, there was a change that was differentially affected by condition and observation timepoint. And, as expected based on the results from Studies 1 and 2, there was again an interaction effect between session and parent education, $F(2,282) = 4.98$, $p = .008$.

To probe these effects, and specifically the interaction between session and condition, I inspected the parameter estimates for each predictor at each session time point. Neither education nor experimental group predicted use of the PEER sequence at baseline, which served as a good manipulation check. Compared to our active control, the dialogic reading interventions led to more frequent use of aspects of the PEER sequence at both follow-up sessions, with moderate effect sizes at both observations ($\beta_1 = .49$ and $\beta_2 = .46$). Notably, these effects were considerably stronger than those for parent education ($\beta_1 = .39$ and $\beta_2 = .28$). Pairwise comparisons of the differences in estimated marginal means confirm that while the two conditions did not differ at baseline, parents in the dialogic reading intervention were significantly higher in use of the PEER sequence at both follow-up sessions (both ps $< .001$).

A second rmANOVA was conducted, this time considering frequency of complex prompting (i.e., “distancing” and “open-ended” prompts/expansions). See Figure 12. Again, there was a main effect of education, $F(1,141) = 27.01$, $p < .001$. However, there was not an interaction between session and education, suggesting that the influence of education on complex prompting was present both before and after the intervention. And, as was the case with the

PEER sequence overall, there was a main effect of condition, $F(1,141) = 8.78$, $p < .001$. There was no main effect of session, but there was a significant interaction effect between session and condition, $F(2,282) = 8.90$, $p = .002$, suggesting that while there was no overall increase in complex prompting over time, there was an increase that was differentially affected by condition. To probe these effects, and specifically the interaction between session and condition, I inspected the parameter estimates for each predictor at each session time point.

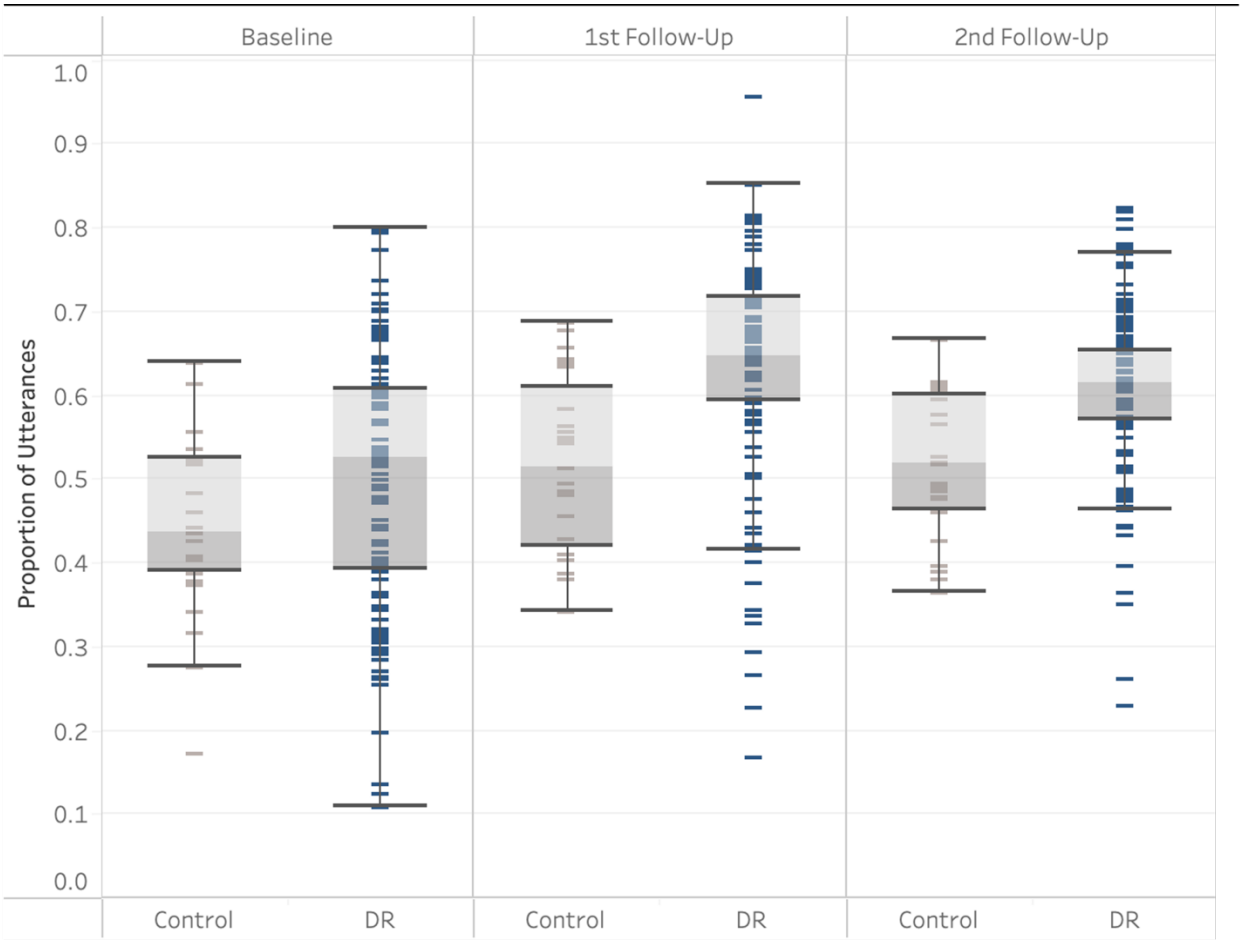
While condition was not a predictor at baseline, education was ($\beta = .29$). The effect of education persisted over time: more years of education predicted more frequent complex prompting at both follow-up sessions, with modest effect sizes at both observations ($\beta_1 = .33$ and $\beta_2 = .39$). And, compared to our active control, the dialogic reading interventions led to more frequent use of complex prompting at both follow-up sessions, with modest effect sizes at both observations ($\beta_1 = 26$ and $\beta_2 = .31$). Pairwise comparisons of the differences in estimated marginal means confirm that while the two conditions did not differ at baseline, the DR intervention was significantly higher in use of the PEER sequence at both follow-up sessions ($p = .004$ and .002, respectively).

Table 10: *Parameter Estimates from rmANCOVA on [A] PEER use and [B] Complex Prompting*

			Unstandardized		Standardized			95% CI	
	Outcome	Predictor	*B*	*SE*	β	*t*	*p*	*LL*	*UL*
[A]	Baseline	Education	0.00	0.01	.05	0.59	.553	- 0.01	0.01
		Condition	0.03	0.02	.13	1.41	.158	- 0.01	0.06
	1st Follow-Up	**Education**	**0.02**	**0.00**	**.39**	**4.82**	**< .001**	**0.01**	**0.03**
		Condition	**0.09**	**0.01**	**.49**	**6.05**	**< .001**	**0.06**	**0.11**
	2nd Follow-Up	**Education**	**0.01**	**0.00**	**.28**	**3.23**	**.001**	**0.00**	**0.02**
		Condition	**0.06**	**0.01**	**.46**	**5.40**	**< .001**	**0.04**	**0.08**
[B]	Baseline	**Education**	**0.00**	**0.00**	**.29**	**3.22**	**.001**	**0.00**	**0.01**
		Condition	0.00	0.00	- .05	-0.56	.576	- 0.01	0.01
	1st Follow-Up	**Education**	**0.01**	**0.00**	**.33**	**3.59**	**< .001**	**0.00**	**0.01**
		Condition	**0.02**	**0.01**	**.26**	**2.92**	**.004**	**0.01**	**0.03**
	2nd Follow-Up	**Education**	**0.01**	**0.00**	**.39**	**4.25**	**< .001**	**0.00**	**0.01**
		Condition	**0.02**	**0.01**	**.31**	**3.56**	**< .001**	**0.01**	**0.03**

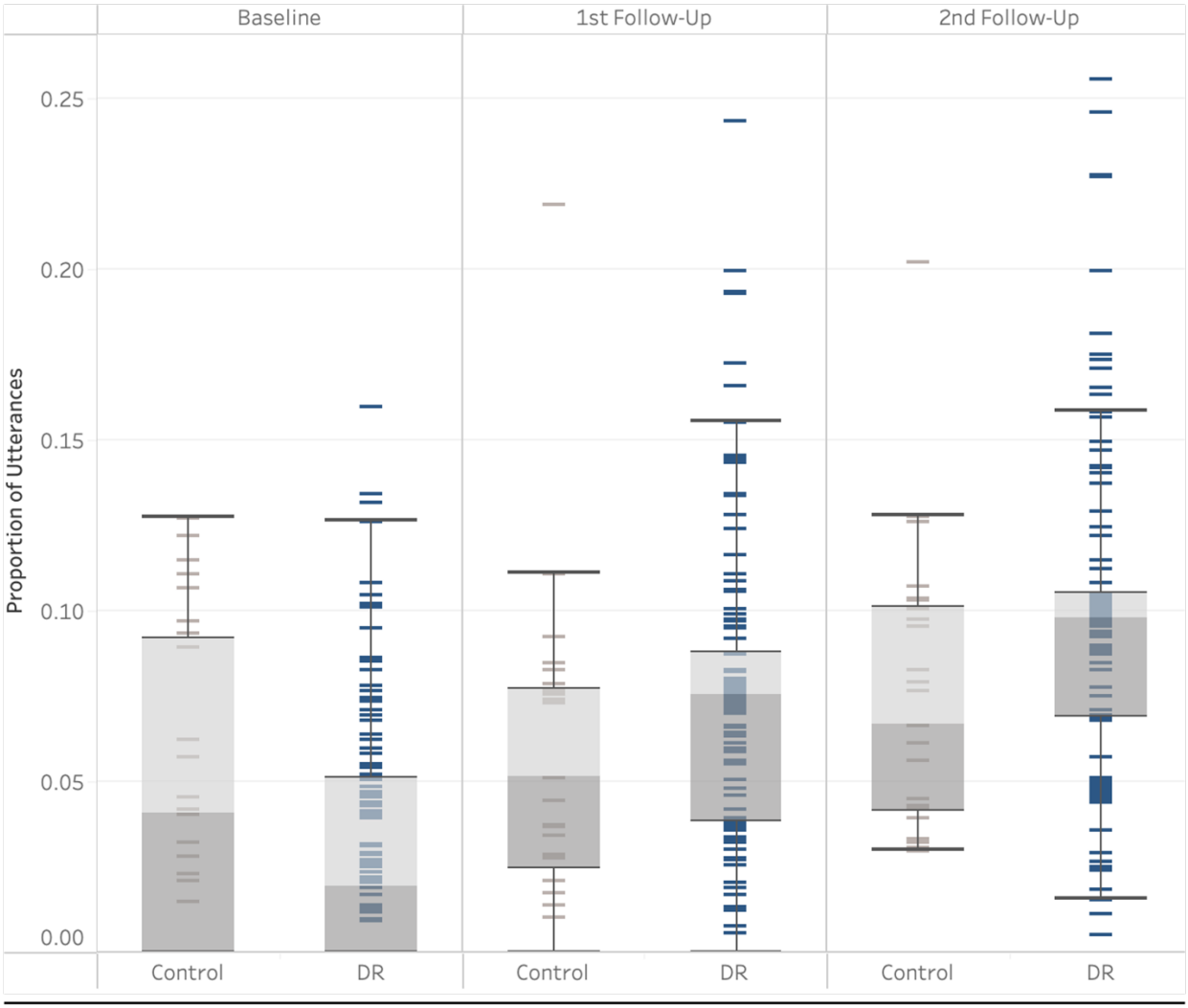
Note. rmANCOVA = repeated measures analysis of covariance; CI = confidence interval; *LL* = lower limit, *UL* = upper limit; Interaction = the interaction between condition and education. For added clarity, significant predictors are bolded, and intercept terms are omitted.

Figure 11: *Box and Whisker Plot of PEER use by Condition*



Note. The top and bottom border of each box indicates the upper and lower quartiles of the data spread, with datapoints inside the box comprising the interquartile interval (where 50% of the data is found). Each box is split at the median score, with the lighter (upper) portion containing the 25% of data values greater than the median score.

Figure 12: *Box and Whisker Plot of Complex Prompting by Condition*



Note. The top and bottom border of each box indicates the upper and lower quartiles of the data spread, with datapoints inside the box comprising the interquartile interval (where 50% of the data is found). Each box is split at the median score, with the lighter (upper) portion containing the 25% of data values greater than the median score.

4.5 Interim Discussion

Interestingly, I observed a modest (but significant) increase in dialogic reading behaviors from baseline to first follow-up session even in the active control condition. This suggests, perhaps, that to some degree, supportive literacy interventions (or, at bare minimum, repeated observational sessions / readings of these books) naturally increase the quality of dialogues during parent-child reading interactions.

Nonetheless, these preliminary findings revealed a large effect of condition. This lends confidence to conclusions regarding the effectiveness of dialogic reading intervention content. This is especially important as there was not an observed difference between my classic and simplified conditions.

Of course, since this study has a more limited sample – both in terms of size and diversity – it is important to interpret these findings with caution. This is especially true given the association education had with intervention efficacy (as found in both Studies 1 and 2). However, I have reason to believe that even with a more diverse sample for the active control condition, I would still have found the same main effect of condition. In Studies 1 and 2, I found that higher education led to greater use of dialogic reading techniques, and the higher end of the education spectrum was well-reflected in this sample, yet use of dialogic reading was still low. It is difficult to imagine why a completely unrelated intervention curriculum would somehow provide a selective boost in dialogic reading use to parents with lower education levels. Nonetheless, I plan to continue collecting data in order to more thoroughly explore Study 3's research question. If the results change once I have a more complete sample, it may suggest that the impact of dialogic reading intervention content interacts with parent education in more complex ways than I originally considered.

CHAPTER 5

Conclusion

Dialogic reading curricula are designed to promote early childhood literacy and language skills. And time and time again, these interventions have demonstrated superior effects to reading on its own in terms of child outcomes such as vocabulary and overall print skills (e.g., Bingham, 2007; Hargrave & Sénéchal, 2000; Trivette et al., 2010). However, these effects appear to be most pronounced for families with higher education levels or more financial means – arguably leaving behind those most in need of the interventions in the first place. One explanation for this limitation is that the chronic financial and emotional stressors faced by many families preclude opportunities for quality one-on-one reading time with children. If true, dialogic reading interventions are unlikely to ever impact children's learning in these households in the absence of considerably broader social and material support.

The outlook for dialogic reading might, however, not be quite so bleak as alternative mechanisms might account for its limited generalizability. In particular, parents might fail to implement prescribed reading practices with sufficient fidelity because they do not confidently understand how to do so. For instance, many parents might simply not be sufficiently literate to master the instructions presented by these intervention programs. Despite the urgency of discovering ways to increase the effectiveness of early literacy interventions for high-risk families, little attention has been paid to understanding the processes that support parents' learning of joint-reading techniques in the first place (see Manz et al., 2010).

In a series of three studies, I explored the linguistic complexity of intervention training materials as a potential bottleneck to implementation success. First, I confirmed that these SES-

based differences were evident at the implementation phase of a dialogic reading intervention (Study 1). Next, I explored whether these differences could be shrunken by simplifying the way of explaining dialogic reading techniques (Study 2). Lastly, I explored whether dialogic reading itself, as opposed to reading supports more generally speaking, is the key ingredient in promoting a positive impact (Study 3).

Study 1 was designed to test whether the SES-defined difference in intervention efficacy, traditionally measured in terms of child outcomes, was also evident in parents' learning of dialogic reading techniques and use thereof. If I found that parental education explained variance in parents' use of dialogic reading techniques, then that would provide support for a bottleneck theory of potential barriers to optimal intervention efficacy. If I did not observe an effect of parent education, this would suggest that differential effects on child outcomes are not due to training effectiveness or parent ability to apply dialogic reading strategies. Rather, they might have more to do with constraints on practice in the home (e.g., conduciveness of the home learning environment to shared book reading, child attention, etc.).

I expected to find a positive association between parent education and implementation of intervention techniques. A repeated measures analysis of variance supported this prediction. While, overall, parents in my sample were able to implement the dialogic reading PEER sequence (despite the majority stating that they never used the actual acronym to remember it), frequency of use immediately after training (while reading "Good Night, Gorilla"), and change in use over time (at follow-up), were both predicted by parent education. Interestingly, education was not a predictor at baseline, at which time around half of parent utterances were categorized as part of the PEER sequence, irrespective of parent education level.

To better understand the factors influencing parent implementation, I also inspected the roles of parent literacy and the home learning environment (HLE) in predicting intervention implementation success for parents. The influence of parent literacy was similar to that of education, with a main effect of parent literacy on use of both the PEER sequence and complex prompting in particular. There was no main effect of the HLE on either outcome variable, and no interactions (although in both analyses, there was a trend toward significance for the interaction between session and parent literacy). While I believed parent literacy would be relevant to how easily parents understood the training materials, I had believed the role of the HLE would be relevant to how conducive the home would be to practicing the strategies between experimental sessions (after learning them at baseline). When looking at bivariate correlations, I did observe an association between HLE and my outcome measures of interest, but this relation was explained away by parent literacy when both were included in the same model.

The effect of parent education on implementation of dialogic reading adoption provides compelling evidence that parent implementation of techniques could be moderating the child language and literacy outcomes so often studied in the research literature on shared book reading interventions. If this is indeed the case, it would be valuable to further investigate what might be affecting parent's adoption of these strategies, and why education is a predictor thereof.

Study 2 was designed to probe whether parent literacy might be a bottleneck interfering with initial learning of dialogic reading techniques (and/or comfort in implementing them), by attempting to teach the same techniques in a more accessible way. I therefore manipulated the intervention materials, which typically rely heavily on the components of the PEER/CROWD acronym, to form a new, simplified condition. I predicted that I could still convey the same information and increase use of the same techniques typically explained using PEER/CROWD.

Furthermore, I also predicted that this simplified condition might even teach these techniques *better* than traditional methods, due to its increased linguistic accessibility.

The results from Study 2 supported the former part of this hypothesis, but not the latter. While both conditions saw an increase in the use of dialogic reading from baseline to follow-up (i.e., an effect of the intervention), I did not detect a difference between the two conditions. I did, however, replicate the main effect of education on implementation success, this time with an expanded sample.

There are two important implications of the lack of an effect of condition. While my simplified instructions were not enough to overcome the effect of education on parent implementation, for those parents who *were* able to adopt the dialogic reading skills, teaching them the PEER/CROWD acronym was not necessary – they were just as successful when provided with simplified instructions that avoided this complex terminology. Importantly, the lack of difference between conditions did not mean that there was no effect of the intervention – as meaningful change in dialogic reading behaviors was observed, particularly with respect to complex prompting. With the exception of the one exploratory finding at session 3, my simplified explanation of dialogic reading strategies was just as effective as typical methods of explanation, perhaps making scaling more broadly accessible.

There is an important caveat to consider when interpreting these results. As described earlier, the only difference between the classic and simplified interventions was how the dialogic reading behaviors were introduced. They were modeled in the same way (just without reference to PEER/CROWD in the simplified condition), and both conditions received support and coaching. It could be, then, that the support of an encouraging experimenter (and the general promotion of reading practice) might increase dialogic reading behaviors.

Therefore, in Study 3, I endeavored to separate the effect of an interactive book reading intervention from that of dialogic reading in particular. I found that implementation of dialogic reading strategies did indeed differ between the control and experimental conditions, confirming that the supportive interactive context alone was not enough to explain the effects observed in Studies 1 and 2.

While I replicated other findings that few parents employ complex dialogic reading practices without explicit instruction (and many still struggle even after receiving instruction), this in no way means that rich and valuable shared book reading interactions are not happening at baseline. There is, of course, much more nuance to what happens during shared book reading than what is reflected in whether or not parents employ the PEER sequence (or complex prompting). And indeed, while shared book reading is widely practiced, there is a wealth of research on the great deal of variability in how specific interactions unfold.

To better understand this variability, researchers have attempted to classify naturally occurring book-reading interactions into distinct styles. Using cluster analysis techniques, multiple studies have highlighted a key distinction between *story-readers* (who stick to the book's text) and *story-tellers* (who engage in extratextual talk about the book's story and pictures). While most parents tend to fall into the story-reader category (Britto et al., 2006; Hammett et al., 2003), three types of storytellers consistently emerged that differed in the type and amount of extratextual talk they employed (Haden et al., 1996; Hammett et al., 2003). *Describers* employed mostly descriptive utterances about objects and characters in the pictures, placing low demand on their child. In contrast, *collaborators* employed high-demand comments and frequently encouraged the child's contribution to the discussion of the story, and *comprehenders* employed high-level and high-demand extratextual talk, linking the text with

real-world knowledge.

Another way to look at reading style differences is with respect to parents' use of "explicit" and "implicit" teaching techniques. Explicit techniques focus directly on teaching vocabulary through definitions and examples, whereas implicit approaches use the context of a story-reading activity to expose children to new words, without deliberate teaching (see Marulis & Neuman, 2010). Vaahtoranta et al. (2018) identify a third, hybrid approach that retains the focus of the story (as is the case with the implicit approach) while also providing some support for difficult words encountered while reading. In this approach, termed *elaborative storytelling*, the reader works to maintain the child's engagement in the shared story, and capitalizes on the story context itself to enrich vocabulary knowledge. For example, a reader might accompany a difficult word with an elucidating gesture or rephrase the sentence using a synonym in its place, instead of explicitly explaining or defining a word. This elaborative storytelling approach is most similar to that encouraged by dialogic reading interventions.

Importantly, not all reading styles and strategies will necessarily have the same effects on children's learning. For example, a *describer* style, as discussed earlier, with frequent story interruptions to talk about specific details of the text and pictures, might offer benefits in terms of specific vocabulary knowledge. However, frequent interruptions to the story might place greater demands on the child's executive function, thereby undermining story comprehension. In contrast, a *performance-oriented* style, restricting discussion to before and after the story to preserve flow, might instead offer benefits in terms of overall story comprehension (but see Dickinson & Smith, 1994, for the benefits of this style on vocabulary growth as well).

Dialogic reading is, broadly speaking, a strategy designed to encourage parents to become *story-tellers*, instead of merely *story-readers*. In doing so, the technique incorporates

elements of both the *describer* (evident especially in expansions) and *comprehender* styles (evident especially in use of distancing and open-ended prompts), as well as the *collaborator* style described earlier (evident through all parts of the PEER sequence, and with "evaluate" especially so). One notable caveat, though, is that while dialogic reading endeavors to create a dialogue around a book, following the PEER/CROWD prompts tends to position the parent as the question-asker, which places the child in the role of a responder. This may have important implications, especially if shared book reading sessions become too taxing on a child and undermines the enjoyment of storybook reading (see also Neuman & Roskos, 2005).

In a review of 21 studies investigating the effectiveness of various forms of shared book reading, the strongest predictors of total language scores were the degree to which parents used positive feedback while reading and related the book's content to the child's own experiences (Trivette et al., 2010). And, strategic question-asking that guides children toward the right answers can be especially powerful in scaffolding learning (e.g., Anderson et al., 2011). These "moments of time out" during book reading are highly motivating and engaging to the child and tend to increase in frequency with multiple exposures to the same book. In fact, with increased exposure, conversations tend to shift from being parent-led to being largely child-led (Bus, 2001; Sulzby & Teale, 1987). At the same time, repeated readings of a book can help strengthen a child's memory for the content within, thereby leading not only to stronger word-referent associations (Horst et al., 2011), but also to deeper understanding of the story's meaning (Fletcher & Reese, 2005).

There are also socioemotional implications of shared book reading, and dialogic reading in particular. As maternal attachment style has been found to predict dialogic reading behaviors such as whether parents initiate conversations around the pictures (versus sticking to the text;

e.g., Duncan & Magnuson, 2001). And, as shared book reading has been linked to the quality of parent-child attachments (e.g., Pillinger & Vardy, 2022), interventions promoting dialogic reading may also promote positive socioemotional outcomes for families, which then, in turn, may lead to richer reading practices.

In the future, I might expand my analysis of my current data in several ways. For example, I might code for the behavioral corrections parents produce, to investigate how use changes over time (with the hope that the dialogic reading intervention would increase story engagement, and therefore decrease behavioral corrections). I could also code for the emotional valence (e.g., amount of warmth) of parent utterances, and "evaluations" in particular (noting the especially influential role of positive feedback on child outcomes; e.g., Trivette et al., 2010). Another future direction might be to re-create the analyses discussed in Studies 1, 2, and 3, but focusing on *child* utterances or conversational turns as the outcome variables. The latter has been especially highlighted as important for language development (e.g., Donnelly & Kidd, 2021; Romeo et al., 2018), as well as socioemotional development (e.g., Gómez & Strasser, 2021), and is likely more conducive to child outcomes and story comprehension than are frequent and disjointed prompts.

In terms of making the adoption of dialogic reading techniques more feasible to families, another promising direction might involve investing in tools to help ease the burden on parents during book reading, thereby precluding a need to memorize complicated strategies altogether. Indeed, some children's books come with dialogic questions already included in the text, or in the inside flap of the book (e.g., as is the case with books provided by The Imagination Library). In one promising example with lower-SES families, Troseth et al. (2020), created an eBook with an embedded dialogic questioning character who provided well-timed prompts for parents to use

with their child while reading the book. Compared to an unmodified version of the eBook, both parents and children talked more about the story, with more advanced and varied language. And, future research capitalizing on innovations in Artificial Intelligence may lead to applications or other programs that can generate dialogic prompts for any book, precluding a need for access to special books or expert knowledge entirely.

Childhood literacy skills are a strong predictor of overall success in school and work, and understanding how to best facilitate their development can potentially help address pervasive opportunity gaps, and resulting achievement gaps, that exist throughout development. Research on this topic promotes equality and offers an avenue for increasing educational achievement for children who may not be benefitting from typical intervention techniques. My hope is that this work will provide the foundation for future investigations into optimizing early literacy interventions for all families.

References

Barratt-Pugh, C., & Rohl, M. (2015). 'Better Beginnings has made me make reading part of our everyday routine': Mothers' perceptions of a family literacy program over four years. *Australasian Journal of Early Childhood, 40*(4), 4-12.

Barton, P. E., & Coley, R. J. (2007). The family: America's smallest school (ED498878). ERIC. https://files.eric.ed.gov/fulltext/ED498878.pdf

Biemiller, A. (2006). Vocabulary development and instruction: A prerequisite for school learning. *Handbook of Early Literacy Research, 2*, 41-51.

Bingham, G. E. (2007). Maternal literacy beliefs and the quality of mother-child book-reading interactions: Associations with children's early literacy development. *Early Education and Development, 18*(1), 23-49.

Bracken, S. S., & Fischel, J. E. (2008). Family reading behavior and early literacy skills in preschool children from low-income backgrounds. *Early Education and Development, 19*(1), 45-67.

Bus, A. G., & Van Ijzendoorn, M. H. (1995). Mothers reading to their 3-year-olds: The role of mother-child attachment security in becoming literate. *Reading Research Quarterly*, 998-1015.

Bus, A. G., Van Ijzendoorn, M. H., & Pellegrini, A. D. (1995). Joint book reading makes for success in learning to read: A meta-analysis on intergenerational transmission of literacy. *Review of Educational Research, 65*(1), 1-21.

Datavyu [Computer Software]. Retrieved from http://datavyu.org.

Davis-Kean, P. E. (2005). The influence of parent education and family income on child achievement: The indirect role of parental expectations and the home environment. *Journal of Family Psychology, 19*(2), 294-304.

Dickinson, D. K., & Morse, A. B. (2019). *Connecting through talk: Nurturing children's development with language*. Paul H. Brookes Publishing.

Debaryshe, B. D. (1993). Joint picture-book reading correlates of early oral language skill. *Journal of Child Language, 20*(2), 455-461.

DeTemple, J., & Snow, C. E. (2003). Learning words from books. In A. van Kleeck, S. A. Stahl, E. B. Bauer (Eds.), *On reading books to children: Parents and teachers* (pp. 16-36). Lawrence Erlbaum Associates Publishers.

Donnelly, S., & Kidd, E. (2021). The longitudinal relationship between conversational turn-taking and vocabulary growth in early language development. *Child Development*, *92*(2), 609-625.

Dowdall, N., Melendez-Torres, G., Murray, L., Gardner, F., Hartford, L., & Cooper, P. J. (2020). Shared picture book reading interventions for child language development: A systematic review and meta-analysis. *Child Development, 91*(2), e383-e399.

Duncan, G. J., & Magnuson, K. (2011). The nature and impact of early achievement skills, attention skills, and behavior problems. *Whither Opportunity*, 47-70.

Farkas, G., & Beron, K. (2004). The detailed age trajectory of oral vocabulary knowledge: Differences by class and race. *Social Science Research, 33*(3), 464-497.

Flack, Z. M., Field, A. P., & Horst, J. S. (2018). The effects of shared storybook reading on word learning: A meta-analysis. *Developmental Psychology, 54*(7), 1334.

Froiland, J. M., Peterson, A., & Davison, M. L. (2013). The long-term effects of early parent involvement and parent expectation in the USA. *School Psychology International, 34*(1), 33-50.

Gershon, R. C., Wagster, M. V., Hendrie, H. C., Fox, N. A., Cook, K. F., & Nowinski, C. J. (2013). NIH toolbox for assessment of neurological and behavioral function. *Neurology*, *80*(11), S2-S6.

Gioia, G. A., Espy, K. A., & Isquith, P. K. (2003). BRIEF-P: Behavior rating inventory of executive function–preschool version [Measurement instrument]. Psychological Assessment Resources.

Gómez, E., & Strasser, K. (2021). Language and socioemotional development in early childhood: The role of conversational turns. *Developmental Science*, *24*(5), e13109.

Hanushek, E. A., Peterson, P. E., Talpey, L. M., & Woessmann, L. (2019). The unwavering SES achievement gap: Trends in US student performance. (ED606000). ERIC. https://files.eric.ed.gov/fulltext/ED606000.pdf

Hargrave, A. C., & Sénéchal, M. (2000). A book reading intervention with preschool children who have limited vocabularies: The benefits of regular reading and dialogic reading. *Early Childhood Research Quarterly, 15*(1), 75-90.

Little, R. J. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association*, *83*(404), 1198-1202.

Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of Biomedical Informatics*, *42*(2), 377-381.

Hart, B., & Risley, T. R. (1995). *Meaningful differences in the everyday experience of young American children*. Paul H Brookes Publishing.

Horowitz-Kraus, T., Hutton, J. S., Phelan, K., & Holland, S. K. (2018). Maternal reading fluency is positively associated with greater functional connectivity between the child's future reading network and regions related to executive functions and language processing in preschool-age children. *Brain and Cognition*, *121*, 17-23.

Howse, R. B., Lange, G., Farran, D. C., & Boyles, C. D. (2003). Motivation and self-regulation as predictors of achievement in economically disadvantaged young children. *The Journal of Experimental Education*, *71*(2), 151-174.

Huebner, C. E., & Meltzoff, A. N. (2005). Intervention to change parent–child reading style: A comparison of instructional methods. *Journal of Applied Developmental Psychology, 26*(3), 296-313.

Huebner, C. E., & Payne, K. (2010). Home support for emergent literacy: Follow-up of a community-based implementation of dialogic reading. *Journal of Applied Developmental Psychology, 31*(3), 195-201.

Hughes, P. E. (1999). Start early, finish strong: How to help every child become a reader. (ED434332). ERIC. https://files.eric.ed.gov/fulltext/ED434332.pdf

Jimenez, M. E., Mendelsohn, A. L., Lin, Y., Shelton, P., & Reichman, N. (2019). Early shared reading is associated with less harsh parenting. *Journal of Developmental & Behavioral Pediatrics, 40*(7), 530-537.

Landry, S. H., Smith, K. E., Swank, P. R., Zucker, T., Crawford, A. D., & Solari, E. F. (2012). The effects of a responsive parenting intervention on parent–child interactions during shared book reading. *Developmental Psychology, 48*(4), 969.

Lawson, K. (2012). The real power of parental reading aloud: Exploring the affective and attentional dimensions. *Australian Journal of Education*, *56*(3), 257-272.

Leseman, P. P. M., & De Jong, P. F. (1998). Home literacy: Opportunity, instruction, cooperation and social-emotional quality predicting early reading achievement. *Reading Research Quarterly, 33*(3), 294-318.

Lever, R., & Sénéchal, M. (2011). Discussing stories: On how a dialogic reading intervention improves kindergartners' oral narrative construction. *Journal of Experimental Child Psychology, 108*(1), 1-24.

Lyytinen, P., Laakso, M. L., & Poikkeus, A. M. (1998). Parental contribution to child's early language and interest in books. *European Journal of Psychology of Education*, *13*(3), 297-308.

Manz, P. H., Hughes, C., Barnabas, E., Bracaliello, C., & Ginsburg-Block, M. (2010). A descriptive review and meta-analysis of family-based emergent literacy interventions: To what extent is the research applicable to low-income, ethnic-minority or linguistically-diverse young children? *Early Childhood Research Quarterly, 25*(4), 409-431.

Mendelsohn, A. L., Dreyer, B. P., Tamis-LeMonda, C. S., & Ahuja, P. (1999). Validity of StimQ, a scale for assessing the cognitive home environment. *Journal of Developmental & Behavioral Pediatrics*, *20*(5), 399.

Mendelsohn, A. L., Huberman, H. S., Berkule, S. B., Brockmeyer, C. A., Morrow, L. M., & Dreyer, B. P. (2011). Primary care strategies for promoting parent-child interactions and school readiness in at-risk families: the Bellevue Project for Early Language, Literacy, and Education Success. *Archives of Pediatrics & Adolescent Medicine, 165*(1), 33-41.

Mol, S. E., Bus, A. G., De Jong, M. T., & Smeets, D. J. (2008). Added value of dialogic parent–child book readings: A meta-analysis. *Early Education and Development, 19*(1), 7-26.

Neuman, S. B., & Moland, N. (2019). Book deserts: The consequences of income segregation on children's access to print. *Urban education*, *54*(1), 126-147.

Neuman, S. B., & Roskos, K. (2005). Whatever happened to developmentally appropriate practice in early literacy?. *Young Children*, *60*(4), 22.

National Institute of Child Health & Human Development [NICHD] – Early Child Care Research Network (2005). *Child care and child development: Results from the NICHD study of early child care and youth development*. Guilford Press.

O'Farrelly, C., Doyle, O., Victory, G., & Palamaro-Munsell, E. (2018). Shared reading in infancy and later development: Evidence from an early intervention. *Journal of Applied Developmental Psychology*, *54*, 69-83.

Pearson Education (2002). *Read together, talk together* [Intervention Kit]. Pearson Early Learning.

Perkins, S. C., Finegood, E. D., & Swain, J. E. (2013). Poverty and language development: Roles of parenting and stress. *Innovations in Clinical Neuroscience, 10*(4), 10-19.

Pillinger, C., & Vardy, E. J. (2022). The story so far: A systematic review of the dialogic reading literature. *Journal of Research in Reading*, *45*(4), 533-548.

RStudio [Computer Software]. Retrieved from http://www.rstudio.com/.

Reardon, S. F., Robinson, J. P., & Weathers, E. S. (2008). Patterns and trends in racial/ethnic and socioeconomic academic achievement gaps. *Handbook of Research in Education Finance and Policy*, 497-516.

Reese, E., Leyva, D., Sparks, A., & Grolnick, W. (2010). Maternal elaborative reminiscing increases low-income children's narrative skills relative to dialogic reading. *Early Education and Development, 21*(3), 318-342.

Richter, A., & Courage, M. L. (2017). Comparing electronic and paper storybooks for preschoolers: Attention, engagement, and recall. *Journal of Applied Developmental Psychology*, *48*, 92-102.

Robbins, C., & Ehri, L. C. (1994). Reading storybooks to kindergartners helps them learn new vocabulary words. *Journal of Educational Psychology, 86*(1), 54-64.

Romeo, R. R., Leonard, J. A., Robinson, S. T., West, M. R., Mackey, A. P., Rowe, M. L., & Gabrieli, J. D. (2018). Beyond the 30-million-word gap: Children's conversational exposure is associated with language-related brain function. *Psychological Science*, *29*(5), 700-710.

Sénéchal, M., & Cornell, E. H. (1993). Vocabulary acquisition through shared reading experiences. *Reading Research Quarterly*, 360-374.

Sénéchal, M., Ouellette, G., & Rodney, D. (2006). The misunderstood giant: On the predictive role of early vocabulary to future reading. In D. K. Dickinson & S. B. Neuman (Eds.), *Handbook of literacy development* (Vol. 2, pp. 173 - 182). Guilford.

Scarborough, H. S., & Dobrich, W. (1994). On the efficacy of reading to preschoolers. *Developmental Review, 14*(3), 245-302.

Shonkoff, J.P. (2011). Protecting brains, not simply stimulating minds. *Science, 333*(6045), 982-983.

Simsek, Z. C., & Erdogan, N. I. (2015). Effects of the dialogic and traditional reading techniques on children's language development. *Procedia – Social and Behavioral Sciences, 197*, 754-758.

Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research, 75*(3), 417-453.

Song, S., Su, M., Kang, C., Liu, H., Zhang, Y., McBride-Chang, C., . . . Shu, H. (2015). Tracing children's vocabulary development from preschool through the school-age years: An 8-year longitudinal study. *Developmental Science, 18*(1), 119-131.

Tableau Desktop [Computer Software]. Retrieved from https://tableau.com.

Towson, J. A., Fettig, A., Fleury, V. P., & Abarca, D. L. (2017). Dialogic reading in early childhood settings: A summary of the evidence base. *Topics in Early Childhood Special Education, 37*(3), 132-146.

Trivette, C. M., Dunst, C. J., & Gorman, E. (2010). Effects of parent-mediated joint book reading on the early language development of toddlers and preschoolers. *Center for Early Literacy Learning*, *3*(2), 1-15.

Troseth, G. L., Strouse, G. A., Flores, I., Stuckelman, Z. D., Russo Johnson, C. (2020). An enhanced eBook facilitates parent-child talk during shared reading by families of low socioeconomic status. *Early Childhood Research Quarter*ly, *50*(1), 45-58.

Van Steensel, R., McElvany, N., Kurvers, J., & Herppich, S. (2011). How effective are family literacy programs?: Results of a meta-analysis. *Review of Educational Research, 81*(1), 69-96.

Walberg, H. J. (1984). Families as partners in educational productivity. *Phi Delta Kappan*, *65*(6), 397-400.

Whitehurst, G. J., Falco, F. L., Lonigan, C. J., Fischel, J. E., DeBaryshe, B. D., Valdez-Menchaca, M. C., & Caulfield, M. (1988). Accelerating language development through picture book reading. *Developmental Psychology, 24*(4), 552-559.

Whitehurst, G. J., & Lonigan, C. J. (1998). Child development and emergent literacy. *Child Development, 69*(3), 848-872.

Wing-Yin Chow, B., & McBride-Chang, C. (2003). Promoting language and literacy development through parent–child reading in Hong Kong preschoolers. *Early Education and Development, 14*(2), 233-248.

Zuckerman, B., & Needlman, R. (2020). 30 years of Reach Out and Read: Need for a developmental perspective. *Pediatrics*, *145*(6).

Appendices

Appendix A *Dialogic Reading Instruction Materials*

A1 "CLASSIC CONDITION"

A1.1 Training video: https://osf.io/zup8g

A1.2 Reference sheet:

"CROWD" questions:

- Completion
- Recall
- Open-ended
- Who, what, where, when, why
- Distancing

The "PEER" sequence:

- Prompt
- Evaluate
- Expand
- Repeat

A1.3 Example of take-home book's brochure:

Outside of pamphlet (note that this side is the same for all three conditions):

Corduroy by Don Freeman

Summary:
Corduroy is a bear who lives in the toy department of a big store. A little girl wants to buy him, but her mother refuses: she has spent too much money already, and the bear is missing a button on his overalls. That night, Corduroy goes on a search through the store for a button. He becomes lost in the furniture department and is taken back to the toy department. The next day the little girl comes back with money she has saved and buys Corduroy. She takes him home and sews a button onto his overalls.

The Little Learners Lab

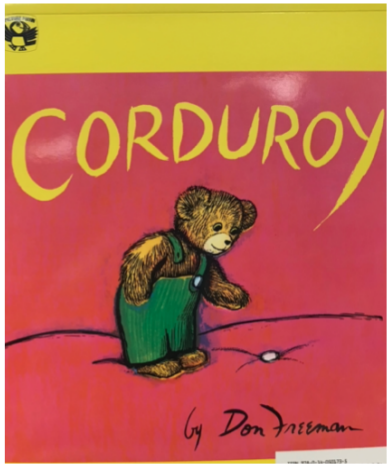
The ultimate goal of our research is to develop new approaches to early education and intervention that will optimize outcomes for all children!

Contact Us

615-875-2977

littlelearnerslab@vanderbilt.edu

my.vanderbilt.edu/littlelearnerslab/



READING *CORDUROY*

By Don Freeman

Inside of pamphlet (note that this side is condition-specific):

Use "CROWD" prompts to start a conversation about the book:

- Completion
- Recall
- Open-Ended
- Wh- Questions
- Distancing

Here are some examples:

- Who is this? (This is Corduroy.)
  Where does Corduroy live? (He lives in a toy department at a big store.)
  What are these toys? (The other toys are a clown, a rabbit, a doll, and a giraffe.)
- Who are these people? (This is Lisa and her mother.)
  What are they doing? (They are shopping.)
  What does Lisa want? (She wants Corduroy.)
- Where is Lisa taking Corduroy? (She is taking him home.)
- Whose room is this? (This is Lisa's bedroom.)
  What is happening in this picture? (Lisa is sewing a button onto his overalls.)
- What is Lisa doing here? (She is hugging Corduroy.)

Continue the conversation by using the "PEER" Sequence:

- Give open-ended **prompts** on each page. Give wh- **prompts** about objects or activities in the pictures. Use your finger to point to what you are asking about.
- **Evaluate** your child's response.
- **Expand** it by giving more information.
- Ask your child to **repeat** the correct answer.

Be sure to talk about objects and actions your child brings up, too.

Take your time looking at the pictures!

Remember, **dialogic reading** just means that you and a child are having a conversation about a book.

After reading, ask: *Do you have special toys that are your friends? How do you play with them?*

Reread *Corduroy* again and again, leaving more and more of the "reading" or retelling to your child.

A1.4 Experimenter script for reading "Good Night, Gorilla"

This script is the same for both the "Classic" and "Simplified" condition. Please note that the experimenter tried to hit these main points on each page, but was flexible and did allow for following the child's lead when relevant.

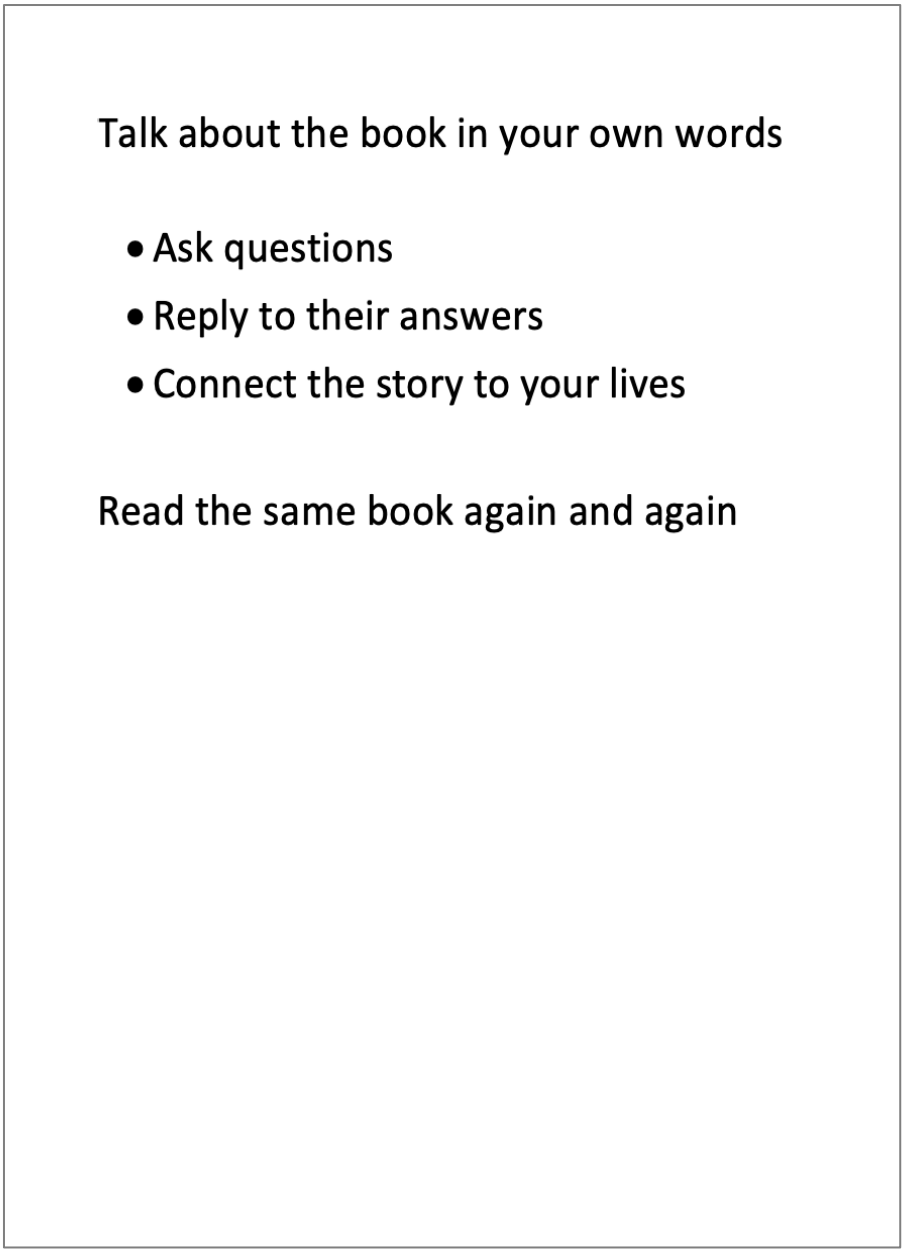
PAGE CONTEXT	SCRIPT	PEER/CROWD ELEMENT
Gorilla, in its zoo cage, is reaching for the key ring on the zookeeper's belt.	● Where are the gorilla and the guard? ● … That's right! (*OR* Hmm, I think…) they're at the zoo! What kinds of zoo animals did we play with a few minutes ago? ● … Wow! And it looks like the gorilla is reaching for the guard's keys! What do you think she is going to use them for?	W- QUESTION EVALUATE + DISTANCING) EXPAND + OPEN-ENDED
Gorilla is sneaking out of the cage and tip-toeing behind the zookeeper.	● Oh my goodness! What is the gorilla doing?! ● … Yeah! *OR* Hmm, it looks like… she is escaping! ● … Do you know what "escape" means? ● … Right! *OR* good guess! Escape means to "get out" of somewhere. So, can you tell me again what 'escape' means one more time?	W- QUESTION EVALUATE EXPAND EVALUATE + REPEAT
Guard (and gorilla) are passing the elephant in its zoo cage.	● The guard is saying goodnight to the ___? ● … That's right! (*OR* Hmm, I think…) he's saying goodnight to the elephant! ● What do you think is going to happen next? ● … Ooh! It would be funny if *(repeat what they said)* happened! Let's see …	COMPLETION EVALUATE OPEN-ENDED EXPAND
Gorilla, followed by elephant, is unlocking the lion's cage.	● Hey! How do you think the elephant got out of her cage? ● …Yeah! *(OR* Wow!) I think the gorilla let the elephant out of her cage! ● …And what is the gorilla doing now? ● … That's right! (*OR* I think that…) The gorilla is letting the lion out of his cage! The guard doesn't even notice -- What a sneaky gorilla!	OPEN-ENDED EVALUATE W- QUESTION EVALUATE + EXPAND
Gorilla, followed by the elephant and lion, are letting out the hyena and giraffe.	● *(after reading text)* What other animals is the gorilla helping to escape? ● … Yeah! (*OR* Hmm…) I see a giraffe, a hyena, and look -- there is a little mouse! ● … What is the mouse holding?! ● … Yeah! (*OR* Hmm…) it looks like a banana!	RECALL EVALUATE + EXPAND W- QUESTION EVALUATE

All the animals wait behind the zookeeper, in front of the armadillo's gate.	● Have you ever seen any of these animals before on tv or in a book *(or at the zoo, if they said earlier that they had been to the zoo before)?* ● … Cool! *(Acknowledge and add something to their unique reply)* ● … Why doesn't the guard notice the animals escaping? ● … That is a good guess! And now it looks like the gorilla is planning to open the armadillo's door with that key!	DISTANCING EXPAND OPEN-ENDED EVALUATE + EXPAND
Experimenter then hands off book to parent, who reads the rest of the pages		

A2 "SIMPLIFIED" CONDTION

A2.1 Training video: https://osf.io/gavwe

A2.2 Reference sheet:



A2.3 Example of take-home book's brochure

(see A1.3 for outside of pamphlet)

Inside of pamphlet (condition-specific):

Here are some ideas for how to start talking about a book:

- "Fill in the blank" questions
- "Who," "what," "where," "when," and "why" questions

Here are some examples:

- Who is this? (This is Corduroy.)
- Where does Corduroy live? (He lives in a toy department at a big store.)
- What are these toys? (The other toys are a clown, a rabbit, a doll, and a giraffe.)
- Who are these people? (This is Lisa and her mother.)
- What are they doing? (They are shopping.)
- What does Lisa want? (She wants Corduroy.)
- Where is Lisa taking Corduroy? (She is taking him home.)
- Whose room is this? (This is Lisa's bedroom.)
- What is happening in this picture? (Lisa is sewing a button onto his overalls.)
- What is Lisa doing here? (She is hugging Corduroy.)

Respond to your child's answers to keep the conversation going:

- Let them know if their answers are right or wrong.
- Add to what they said, and have them repeat the new things you say.
- Help them connect things from the story to their own lives.

Be sure to talk about objects and actions your child brings up, too.

Take your time looking at the pictures!

Remember, instead of just reading the words on the page, stop to talk with your child about the story and pictures *in your own words.*

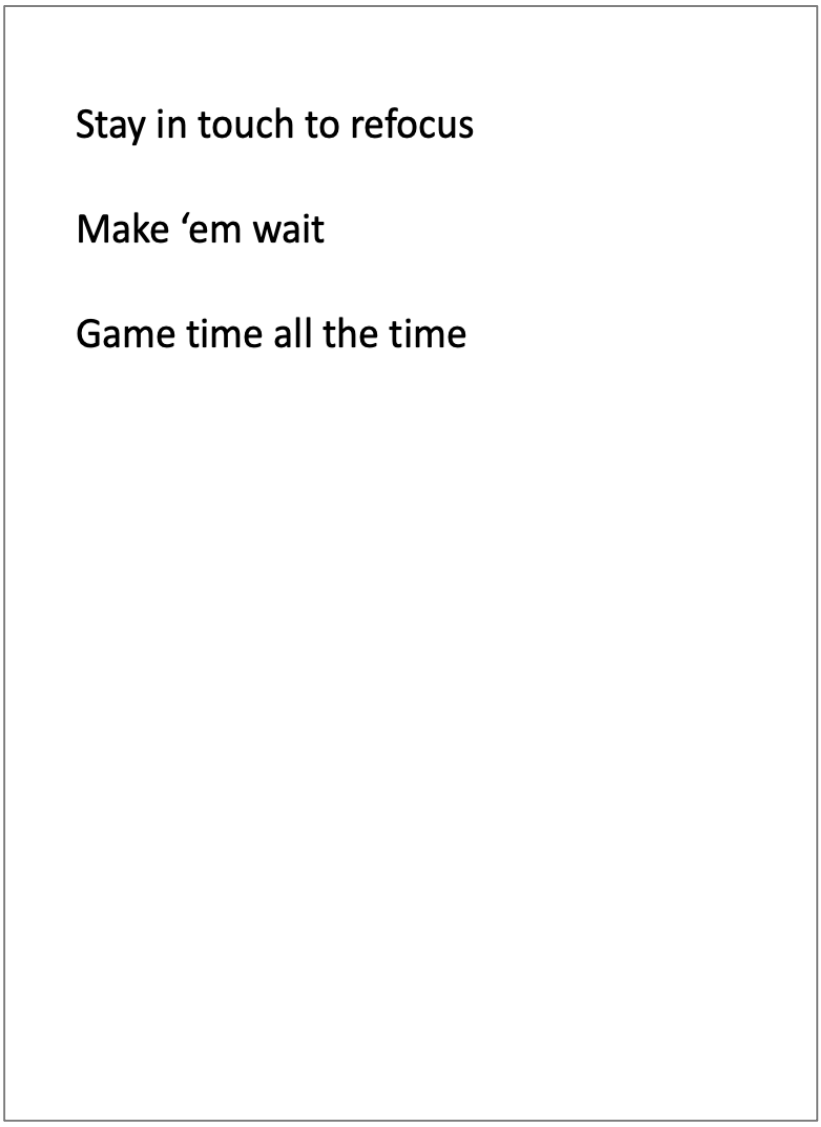
After reading, ask: *Do you have special toys that are your friends? How do you play with them?*

Reread *Corduroy* again and again, leaving more and more of the "reading" or retelling to your child.

A3 "ACTIVE CONTROL" CONDITION

A3.1 Training video: https://osf.io/at3bv

A3.2 Reference sheet:



A3.3 Example of take-home book's brochure

(see A1.3 for outside of pamphlet)

Inside of pamphlet (condition-specific):

Use reading as a time for your child to practice skills they will need in school.

Guide your child to stay in touch with their behavior, take action to refocus, patiently wait, and follow the rules!

Remember, instead of just reading the words on the page, engage with you child. Use your creativity in identifying how to use these tips in the most beneficial way for your child.

Reading Tips:

1. **Stay in touch to refocus**: Respond to your child's unfocused behaviors, set the goal of continuing reading, discuss refocus strategies, and take action to refocus (*help your child identify and control their behaviors)*.

   Have these conversations about the story characters and their experiences, too.

2. **Make 'em wait**: Create mini-situations that require your child to *practice patience* & discuss effective strategies for waiting (before book reading & at suspenseful moments).

3. **Game time all the time**: Create a "game" with specific rules at the start of reading, and stick with these throughout reading *to provide your child practice at following rules.*

Examples:

- "Oops, I need to get my water before we start reading because I'm thirsty. Please wait for me before opening the book so we can start reading together." (Discuss waiting strategies/child's experience of waiting.)
- "Let's play a game while we read! Everytime you see a human kid say, 'bloop!' and everytime I see a human adult I'll say 'woop!'" (Continue rule following throughout the story.)
- "How do you think the little girl felt when her mom said they couldn't buy the bear? What do you think she did so that she didn't get upset?"
- "Do you think the watchman is going to find Corduroy? (Make child wait for 30 seconds to a couple minutes before seeing what happens next.)
- "Stay in touch to refocus" with your child throughout the book according to their behavior/attention.

Appendix B *Parent Interview Questionnaires*

B1 SESSION 1 (BASELINE)

(Also see questions on the StimQ-P for additional baseline questions about home literacy practices).

These questions are about reading with your child.	
On a scale of 1 to 5, how much do you enjoy reading with your child?	◯ 1 - I don't like reading together very much ◯ 2 ◯ 3 - neutral ◯ 4 ◯ 5 - I really like reading together
When you read with your child, who usually chooses the book?	☐ Me ☐ My child ☐ Someone else *(please specify):* _____
How long do you usually read for?	_____
When you read together, how do you feel about not finishing the book?	◯ I am ok just reading a couple pages of a book with my child ◯ I usually try to get through the whole book
When you read together, do you usually...	◯ stop and talk about the pictures and story ◯ try to stick to reading the words of the book in order to keep the flow
Do you wish you had more time to read with your child(ren)?	◯ Yes ◯ No
Do any of the following prevent you from spending more time reading with your child(ren)? (Check any/all that apply)	☐ I'm too stressed ☐ My child is not interested ☐ My child is too young ☐ My child is too old ☐ I don't read well enough ☐ Our house is too chaotic/noisy ☐ I don't know how to get books to read ☐ It is too difficult to get books to read ☐ Other *(please specify):* _____

B2 SESSION 2 (1st FOLLOW-UP)

On a scale of 1 to 5, how much do you enjoy reading with your child?	◯ 1 - I don't like reading together very much ◯ 2 ◯ 3 - neutral ◯ 4 ◯ 5 - I really like reading together
When you were reading during the past couple weeks...	
How many days per week did you read together?	_____
How long did you usually read for (in one sitting)?	_____
When you read together, how do you feel about not finishing the book?	◯ I am ok just reading a couple pages of a book with my child ◯ I usually try to get through the whole book
Did you ever wish you had more time to read with your child(ren)?	◯ Yes ◯ No
What were some of the reasons you didn't get to read as much as you wanted to?	_____
These questions are about the reading tips we talked about last time.	
How often did you practice the reading tips we talked about last time?	◯ 1 - never ◯ ◯ 3 - about half the time ◯ ◯ 5 - every time
Which (if any) of the tips did you like using? (consult reference sheet)	_____
Which (if any) of the tips were hard to find ways to use? (consult reference sheet)	_____
Which (if any) of the tips did [CHILD] like answering? (consult reference sheet)	_____
Which (if any) did [CHILD] struggle with? (consult reference sheet)	_____

******ONLY IF IN CLASSIC CONDITION ******** How often did you use "PEER" and "CROWD" to remember the skills to use?	◯ 1 - never ◯ ◯ 3 - about half the time ◯ ◯ 5 - every time
Did you use the brochures that we tucked in the books?	◯ Yes ◯ No
Did you think they were helpful?	◯ Yes ◯ No
Do you think your reading style has changed due to the reading tips we talked about?	☐ 1 - My reading style has not changed at all ☐ 2 ☐ 3 - My reading style has changed a little bit ☐ 4 ☐ 5 - My reading style has changed a lot

B3 SESSION 3 (2nd FOLLOW-UP)

On a scale of 1 to 5, how much do you enjoy reading with your child?	◯ 1 - I don't like reading together very much ◯ 2 ◯ 3 - neutral ◯ 4 ◯ 5 - I really like reading together
Why did you choose that number?	_____

When you were reading during the last few weeks...	
How many days per week did you read together?	_____
How long did you usually read for (in one sitting)?	_____
When you read together, how do you feel about not finishing the book?	◯ I am ok just reading a couple pages of a book with my child ◯ I usually try to get through the whole book

Did you ever wish you had more time to read with your child(ren)?	◯ Yes ◯ No
What were some of the reasons you didn't get to read as much as you wanted to?	_____

****ONLY IF IN CLASSIC CONDITION ****** How often did you use "PEER" and "CROWD" to remember the skills to use?	◯ 1 - never ◯ ◯ 3 - about half the time ◯ ◯ 5 - every time
Did you use the brochures that we tucked in the books?	◯ Yes ◯ No
Did you think they were helpful?	◯ Yes ◯ No

Do you think your reading style has changed due to the reading tips we talked about?	☐ 1 - My reading style has not changed at all ☐ 2 ☐ 3 - My reading style has changed a little bit ☐ 4 ☐ 5 - My reading style has changed a lot

Appendix C *Experimenter Fidelity Coding Scheme*

(used for dialogic reading conditions)

The experimenter was scored (0, 1, 2) on each of the following protocol dimensions, which were based on key parts of the parent training component of the intervention. N/A was used when if data were missing for a particular experimenter on a given dimension.

DIMENSION	**0**	**1**	**2**
1: Explanation of intervention video before watching	Experimenter does not provide an explanation before video	Experimenter provides an explanation other than that at the "2" level (e.g. "these are the reading tips I mentioned earlier").	Experimenter explains that she will be introducing some reading tips we are testing out / we want parents' feedback on.
2: Making use of breaks during intervention video	Experimenter does not ask parent if they have questions during the video breaks	Experimenter informs parent before the video that they can ask questions during the breaks	Experimenter asks if the parent has any questions during at least 1 video break
3: Engaging in post-intervention video conversation	Experimenter does not ask parent if they have any questions about the tips OR answer parent's tip-relevant question (if parent asks a question without prompting)	Experimenter asks parent if they have questions about the tips/or if they feel like this was new information If parent does: experimenter engages in conversation, but conversation does not provide a lot of space for parent to speak OR experimenter's answers are irrelevant, do not build on what the parent says about the tips. If parent does not have any questions or comments: experimenter moves on to GG prep without further discussion.	Experimenter asks parent if they have questions about the tips/or if they feel like this was new information If parent does: experimenter engages in back-and-forth conversation, where the experimenter provides space for parent to share AND provides an answer that is relevant to, and supports, the tips If parent does not have any questions or comments: experimenter follows up by asking whether the parent has questions or if they feel like this is new information (whichever question they didn't initially ask) and responds to their answer or, if parent does have anything to say/add, experimenter moves on to GG prep.

4: Preparing parent for book reading	Experimenter does not explain what will happen next with book reading at all.	Experimenter explains that they will read first half of the book and that parent will read second half OR experimenter notes that parent should practice tips during reading GG.	Experimenter explains that they will read first half of the book using the tips AND that parent will read second part to give the tips a try.
5: Engaging in post-book reading coaching	Experimenter does not ask parent how the book reading went, if they have any questions about the tips, or engage in any coaching.	Experimenter asks parent how they thought the book reading went and/or if they have questions about the tips. If parent has question: experimenter engages in back-and-forth conversation, but it does not provide a lot of space for parent to share OR experimenter's answers are irrelevant/contradictory to the tip If parent does not have a question (or gives a simple answer to how the book reading went): Experimenter does not facilitate coaching -OR- Experimenter provides coaching, but does not provide space for parent to share/experimenter does not ask them if they had questions or how the book reading went	Experimenter asks parent how they thought the book reading went and/or if they have questions about the tips. If parent has question: experimenter engages in conversation and provides space for parent to share AND experimenter's answer includes at least one statement that reinforces intervention content. If parent does not have a question (or gives a simple answer to how the book reading went): Experimenter facilitates coaching by making at least one statement that reinforces intervention content.
6: Suggesting that parent practice the tips at home	Experimenter does not suggest that parent practice the tips at home.	Experimenter explains that parent should practice the tips at home, but does not explain how to use the reading log AND/OR what the pamphlets contain -OR- Experimenter explains the reading log and pamphlets, and implies that they practice the tips, but does not explicitly say so.	Experimenter explains that parent should practice the tips at home, how to use the reading log, and what the pamphlets contain

Appendix D *Reasons for Missing Data*

	Reason for Missingness (N = 144)				
	Attrition	Technical Issue	Exp Error	Attention / Compliance	Failed Task
Session 1 (Baseline) Measures					
"Little Cloud"	0	7	0	0	0
Parent Interview	0	16	0	0	0
Home Learning Environment	10	2	0	0	0
Child Cognitive Skill (NIH-ECB)					
PVT	17	0	0	9	0
FLANKER	26	0	0	13	16
DCCS	31	0	0	16	15
PICSEQ	30	0	0	11	18
"Good Night, Gorilla"	0	20	0	0	0
Experimenter Fidelity	0	38	1	0	0
Session 2 (1st Follow-Up) Measures					
"Little Cloud"	24	5	3	0	0
"Rabbits & Raindrops"	24	12	3	0	0
Parent Interview	23	15	0	0	0
Parent Literacy (NIH-CCC)					
PVT	31	1	0	0	0
ORR	31	2	2	0	0
Child Executive Function	33	0	1	0	0
Session 3 (2nd Follow-Up) Measures					
"Little Cloud"	38	5	1	1	0
"Oonga Boonga"	38	2	1	0	0
Parent Interview	38	0	0	0	0

Note. HLE = home learning environment; NIH-ECB = NIH Toolbox Early Childhood Cognition Battery; PVT = Picture Vocabulary Test ; FLANKER = Flanker Inhibitory Control and Attention Test ; DCCS = Dimensional Change Card Sort task; PICSEQ = Picture Sequence Memory Test; NIH-CCC = NIH Toolbox Crystallized Cognition Composite Score; ORR = Oral Reading Recognition Test.

Appendix E *Book Readability Characteristics*

These books were used in all three studies (and all 3 conditions).

	Words per Sentence	Characters per word	Flesch-Kinkaid Grade Level	Flesch Reading-Ease
Little Cloud	6.1	4.7	2.1	90.2
Good Night, Gorilla	2.4	4.7	0.4	96.3
Rabbits & Raindrops	4.4	4.1	0.4	99.7
Oonga Boonga	5.1	4.4	2.3	87.4

Appendix F *Frequency of specific PEER/CROWD components*

F1 "CLASSIC CONDITION"

		Baseline		*1st Follow-Up*		*2nd Follow-Up*	
		M	*SD*	*M*	*SD*	*M*	*SD*
CODE	Prompt	14.09	10.48	22.98	14.62	20.70	12.46
	Evaluate	9.69	8.61	17.91	13.39	12.28	8.22
	Expand	4.72	6.82	8.01	6.44	7.35	5.88
	Repeat	0.12	0.50	0.40	0.72	0.22	0.32
SUBCODE	Completion	2.11	2.91	1.98	2.14	2.63	2.02
	Recall	0.20	0.71	0.44	0.65	1.29	2.34
	Open-Ended	1.20	2.38	3.13	3.20	3.67	3.50
	W- Questions	4.26	4.24	8.52	6.48	4.96	3.72
	Distancing	0.77	1.28	2.83	3.13	2.97	2.78
	Total Utterances	52.89	30.75	75.16	34.44	62.87	29.60

Note. "Total Utterances" is the sum of all possible codes (i.e., PEER components and "other" utterances). The CROWD subcodes were applied to relevant 'prompt" and 'expand' utterances.

F2 "SIMPLIFIED CONDITION"

		Baseline		*1st Follow-Up*		*2nd Follow-Up*	
		M	*SD*	*M*	*SD*	*M*	*SD*
CODE	Prompt	15.01	10.56	22.59	9.30	20.01	10.89
	Evaluate	7.81	6.97	16.84	7.50	10.89	6.14
	Expand	5.09	6.06	8.48	5.74	6.09	4.12
	Repeat	0.32	1.19	1.44	7.07	0.35	0.61
SUBCODE	Completion	2.64	3.52	1.90	1.51	2.23	1.97
	Recall	0.14	0.61	0.62	0.79	0.80	1.22
	Open-Ended	0.82	1.25	2.71	2.60	2.87	2.16
	W- Questions	6.18	7.09	9.22	5.53	5.45	4.31
	Distancing	0.74	1.21	2.90	3.24	2.87	3.39
	Total Utterances	52.60	26.85	73.38	24.53	59.90	24.44

Note. "Total Utterances" is the sum of all possible codes (i.e., PEER components and "other" utterances). The CROWD subcodes were applied to relevant 'prompt" and 'expand' utterances.

F3 "ACTIVE CONTROL CONDITION"

		Baseline		*1st Follow-Up*		*2nd Follow-Up*	
		M	*SD*	*M*	*SD*	*M*	*SD*
CODE	Prompt	11.49	4.49	14.49	5.93	12.62	5.95
	Evaluate	5.16	4.24	7.41	5.41	5.48	4.24
	Expand	7.31	6.84	11.50	8.15	9.54	7.25
	Repeat	0.06	0.22	0.18	0.54	0.06	0.19
SUBCODE	Completion	2.93	2.25	2.49	1.84	3.07	2.33
	Recall	0.04	0.15	0.09	0.25	0.17	0.49
	Open-Ended	0.71	1.97	2.03	1.66	2.08	1.52
	W- Questions	4.08	3.41	6.30	4.43	4.64	4.88
	Distancing	1.79	1.93	1.92	3.87	2.00	3.71
	Total Utterances	52.14	22.42	62.24	21.06	52.63	24.04

Note. "Total Utterances" is the sum of all possible codes (i.e., PEER components and "other" utterances). The CROWD subcodes were applied to relevant 'prompt" and 'expand' utterances.