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Teachers' use of questions during shared book reading: Relations to child responses

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ABSTRACT

This study examined the extent to which preschool teachers used different types of questions during classroom-based shared book reading. Our goals were to describe the question wording teachers use to elicit child responses and to consider sequential relations between types of question wording and student responses. Participants included 96 preschool and kindergarten teachers who read aloud a standard narrative text to their whole class of students. All the sessions were video-recorded, transcribed and then coded by trained coders. During reading, teacher total extra-textual utterances included 23.74% questions ($n = 5207$ questions). The wording of these questions mostly included *Wh-question* forms (who, what, when, where) or question forms that required only a yes/no response. Yet sequential analyses demonstrated that less frequently occurring question forms, such as *Why-questions* and *How-procedural* questions elicited longer, multiword responses from students. Results further suggested that students readily answered most questions accurately; although, *Why-questions* produced more inaccurate student responses, this level of challenge is likely appropriate. Unfortunately, most teacher questions were easy for children to answer accurately or with a single word, thereby indicating teachers are not demonstrating Vygotskian principles (1978) of adjusting their questioning techniques to a level of challenge that is just above children's overall level of mastery. Important implications of these findings are discussed for educators as well as curriculum developers.

1. Introduction

Shared book reading is a commonly utilized and important activity in preschool classrooms. A wide body of literature suggests that shared book reading activities offer a naturalistic context for facilitating and supporting young children's language and literacy development (Dickinson & Smith, 1994; Justice, McGinty, Piasta, Kaderavek, & Fan, 2010; Zucker, Cabell, Justice, Pentimonti, & Kaderavek, 2013). For example, the shared book reading context provides opportunities to enhance children's vocabulary, listening comprehension skills, general world knowledge, print knowledge, and understanding of story structure (e.g., Hargrave & Sénéchal, 2000; Piasta, Justice, McGinty, & Kaderavek, 2012).

Many of the opportunities to learn about these foundational aspects of language and literacy within a shared book reading session transpire through interactive dialogue between the teacher and children. Several studies have suggested that, in general, adopting interactive techniques that encourage children to actively participate in the shared book reading activity can impart significant and positive effects on children's language and literacy skills (Hargrave & Sénéchal, 2000; Walsh & Blewitt, 2006). For example, dialogic reading is an extensively studied, interactive book reading technique that features intentional adult questioning strategies, that has been shown to impact children's vocabulary (e.g., Opel, Ameer, & Aboud, 2009; Wasik & Bond, 2001), and, expressive language skills (e.g., Hargrave & Sénéchal, 2000; Lonigan & Whitehurst, 1998). Teachers, parents, as well as education professionals like speech language pathologists (McFadden & Trujillo, 1999; Ezell, Justice, & Parsons, 2000) frequently engage in shared book reading activities with young children. The present study aimed to examine the different types of questions teachers use during shared

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book reading and perhaps more importantly, children's responses to those questions, both in terms of the accuracy and the length of responses.

1.1. Theoretical framework of questioning to support comprehension

One rationale for utilizing interactive book reading sessions is grounded in sociocultural theory (e.g., Vygotsky, 1978), with respect to the notion that children optimally learn during a collaborative activity (i.e., shared book reading), that involves a guide or a teacher who can scaffold and support a child's understanding of a given topic and general listening comprehension skills. As outlined by Vygotskian frameworks, children benefit from learning interactions in which adults adjust the learning activity to be just beyond the child's level of current ability but not so advanced that learning is unattainable (Danis, Bernard, & Leproux, 2000; Vygotsky, 1978). For example, when reading with toddlers teachers may ask questions that have very limited set of possible responses, such as "Is she sad?" in order to support children's understanding of a story event; however, with older pre-kindergarten children whose comprehension skills are more advanced, teachers may ask "Why do you think she's crying?" in order to support children's abilities to make inferences beyond the story text. Some researchers categorize questions as open versus closed by identifying whether a wide range or a narrow set of responses are appropriate in that context.

1.2. Interactive techniques during shared book reading

Evocative techniques during shared book reading and other activities provides opportunities for young children to practice linguistic competence. Though teacher comments (Barnes, Dickinson, & Grifenhagen, 2017) are a valuable part of shared book reading, the current study focused on teacher questions designed to elicit a verbal response from the children. Responding verbally and engaging in turn-taking conversation allows children to practice newly acquired vocabulary and to verbalize their ideas with increasing syntactic complexity (e.g., Dale et al., 1996; Justice, Weber, Ezell, & Bakeman, 2002; Yoder, Davies, Bishop, & Munson, 1994). For example, in a free-play context, de Rivera et al. (2005) found that preschoolers used more multiword utterances following open-ended questions and topic continuing questions as compared to closed questions. In another play-based study, Yoder et al. (1994) examined four- and five-year-old children with developmental delays under two conditions; in condition one, adults asked children topic-continuing questions, and in condition two, adults offered topic-continuing comments only to children. Yoder and colleagues found that the first questioning condition elicited longer multiword utterances from the children compared to the condition in which adults only made comments. In the specific context of shared book reading, Lonigan, Anthony, Bloomfield, Dyer, and Samwell (1999) found that dialogic reading, an interactive book reading technique which incorporates questions that begin with closed and recall prompts and then move into more complex and open questions and prompts as children become increasingly familiar with texts, was more effective in improving children's descriptive use of language as compared to a traditional shared book reading technique. Justice et al. (2002) reported similar results specific to the shared book reading condition in that preschoolers were more likely to respond to prompts (statements that carried any obligation for the child to respond, such as questions and elicitation prompts such as cloze technique), compared to comments (statements that carried no or low obligation for children to respond) during parent–child book reading sessions.

1.3. Evidence supporting the use of specific questioning techniques

The body of research focused on teacher questions during book reading is generally conclusive with respect to the positive effects on children's language and literacy skills (e.g., Ewers & Brownson, 1999; Hargrave & Sénéchal, 2000; Walsh & Blewitt, 2006; Wasik & Bond, 2001). However, what is less clear in regards to questions is exactly which types of questions are most beneficial for children during the preschool period. Different studies that have examined the types of questions that facilitate children's learning during shared book readings have categorized them in various ways – according to the level of cognitive demand required to answer the questions (e.g., Blewitt, Rump, Shealy, & Cook, 2009; Walsh & Blewitt, 2006), whether the questions were literal or inferential (e.g., Zucker, Justice, Piasta, & Kaderavek, 2010; Ard & Beverly, 2004), knowledge building questions (e.g., Hassinger-Dass et al., 2016), vocabulary questions (Walsh & Blewitt, 2006), questions that encourage making connections within the text (Jimenez, Filippini, & Gerber, 2006) or whether the question was open- or close-ended in terms of the response required (e.g., Wasik et al., 2006; Whitehurst et al., 1988). However, the present study only focuses on the types of question wording used by the teachers, specifically, wh-style questions, and yes/no-style questions. Importantly, we moved away from these broad categories to more specific question forms within these categories. Based on the question wording, we categorized *Why-, Wh-* (Who, What, When), and most *How-question* forms as wh-style questions and *How-many*, *Auxiliary-fronted*, and other *Yes/no- question* forms as yes/no-style questions. The present study seeks to add a unique and authentic perspective of the nature and frequency of the talk that occurs between teachers and children by focusing on the different types of questions used by the teachers and the actual responses children provide.

1.4. Teachers' use of questions during shared book reading

Despite the research base substantiating the positive effects from questioning techniques, there is surprisingly little descriptive research focused on the early childhood classroom context to describe teachers' typical questioning practices during shared book reading sessions. Hargrave and Sénéchal (2000), found that teachers used very few *Yes/no-* and *Wh-questions* prior to receiving specific training to do so. After receiving dialogic reading training, the intervention group ($n = 3$) increased their use of questions overall, but specifically asked significantly more *Wh-questions* compared to those in the "business as usual" control group. In an observational study with a much larger sample size, Gest and colleagues (Gest, Holland-Coviello, Welsh, Eicher-Catt, & Gill, 2006) found that out of the 37 teachers observed during a book reading session, on average, teachers had 10.70 extra-textual utterances; of those, 2.72 were questions, or approximately 25% of all utterances. This was at a lower frequency than statements that were comments or answers to children's questions ($M = 6.33$), but higher than directives ($M = 1.66$). Results from these studies indicate that without explicit direction and training, teachers' questions comprise about 25–35% of their utterances within classroom shared book reading sessions (Gest et al., 2006; Massey, Pence, Justice, & Bowles, 2008; de Rivera, Girolametto, Grenburg, & Weitzman, 2005). Although these studies provide some preliminary information regarding the overall proportion of questions by teachers, further exploration of the specific linguistic forms of questions was not included. Moreover, given the variability in the texts read aloud and in the time teachers/children spend sharing a book it is important to look at rate of questions per minute. To that end, the present study makes a substantial contribution to the literature on current

shared book reading practices by providing descriptive information on the proportion and rate of different question forms during typical shared book reading sessions from a large, heterogeneous sample of prekindergarten and kindergarten teachers across two states.

1.5. Child responses to teacher questions

In a recent review of shared book reading interventions, Walsh and Hodge (2016) noted a conspicuous lack of studies analyzing children's actual responses to teacher questions. Among the twelve studies included in their review, only two analyzed children's responses to questions as dependent variables, as opposed to using their scores on standardized language or vocabulary tests (Lee, Kinzie, & Whittaker, 2012; Walsh & Rose, 2013). An early study by Dickinson and Smith (1994), however, highlighted the importance of examining the ways in which children respond and interact with teachers during shared book readings. Their data from 25 classrooms indicated that interactive reading style facilitated more child talk, which ultimately was associated with greater vocabulary gains. Dickinson and Porsche (2011) in a follow-up study, found that these effects of pre-school teachers talk on children's outcomes were sustained through kindergarten until fourth grade. The teachers' analytic and corrective talk and the children's mean length of utterance at age three, predicted children's vocabulary as late as Grade 4 (Dickinson & Porsche, 2011), indicating that children's length of utterance in early childhood is an important predictor of their later language skills. Thus, careful and deliberate examination of how teacher questions yield differential child response lengths can provide critical information for teachers to optimally engage their students in shared book readings. The present study uses a simple dichotomous coding scheme in order to examine the length of children's responses to the different types of teacher questions.

1.6. The present study

The present study addresses a critical gap in our current knowledge about shared book reading practices in prekindergarten and kindergarten classrooms. Shared book reading is a common, often daily activity that can facilitate young children's language learning and development. Many teachers are encouraged to utilize interactive reading practices, specifically, Wh- questions, as these questions tend to elicit longer responses by requiring more comprehensive answers (e.g., de Rivera et al., 2005; Yoder et al., 1994). Given that shared book reading sessions vary greatly in terms of the duration of reading and the types of texts selected, examining the rate of questions asked provides important information that might be used to compare across reading sessions. Outside of intervention studies, however, little evidence is available to understand current practices in shared book reading with respect to the rate and frequency of questions within shared book readings. Even less is known about children's responses to those questions. The present study provides an in-depth descriptive analysis of teachers' question types based on question wording, and more importantly, the nature of children's responses. Specifically, we draw on data from 96 unique classroom shared book reading sessions to address the following three research questions: a) what is the proportion and rate of different types of teacher questions during a typical shared book reading session? b) to what extent do types of teacher questions differentially relate to the accuracy of children's responses? and c) to what extent do types of teacher questions differentially relate to length of children's responses? Based on the reports in the literature, we hypothesize that teachers are likely to ask Yes/no-style questions, more frequently than Wh-style questions like *Why-questions* etc. (e.g., Zucker et al., 2010). Given the nature of the questions, we hypothesized that children are likely to answer Yes/no-style questions with higher accuracy, but with single-word utterances; in contrast, we expected child responses to Wh-style questions may comprise of multiple words yet less accurate.

2. Methods

Participants in this study were enrolled in a larger study of shared book reading practices in early childhood classrooms. The data in the present study was collected across two academic school years and is a subset of a larger study.

2.1. Teachers

Participants in this study included 82 prekindergarten and 14 kindergarten teachers from South Central and Midwest states in the U.S. Teachers were eligible to participate if (a) most of their students were between the ages of 3;0 and 5;6 at study onset, and (b) teachers predominantly communicated in English in the classroom. Approximately 85% of the teachers reported their demographic data. Among these, 65% of teachers ($n = 88$) had earned a bachelor's degree or higher. Of the 82 prekindergarten teachers, just over one-half ($n = 45$) had 5 or more years of experience. Most of the kindergarten teachers ($n = 11$) also had over five years of kindergarten teaching experience. Of all the teachers, 21% reported their ethnicity as Hispanic/Latino; and 57% reported their race as White/Caucasian, 25% as Black/African-American, 3% reported as "Other," 2% as Native American, and 1% as Asian. Less than one-third of teachers (n = 27) taught in classrooms that included at least one developing language learner (DLL), and 20 teachers taught in classrooms that included at least one child with an IEP.

2.2. Children

On average, classrooms included 17 children ($SD = 5.28$, *Range* = 7–28) who participated in the book reading sessions examined in this study. A subset of 2–4 children per classroom ($n = 301$) children were randomly selected to participate in more detailed data collection for the larger study. The background demographics for this subsample are provided to contextualize findings. The average age of participating children was 53.65 months ($SD = 8.40$). The sample included slightly more boys ($n = 165$; 55%) than girls. Only one parent reported that their child had an IEP. Full demographic information is presented in Table 1.

After obtaining consent from the teachers, consent for the children in their classes was obtained from the parents. Eligibility criteria for children were: a) between the ages of 3;0 and 5;6; b) exhibit generally typical development (i.e., have no known diagnosis of severe cognitive impairment, autism, sensorineural hearing loss, vision difficulties, or traumatic brain injury); and c) speak English adequately to participate in the study assessments. This last criterion was determined by information from the parents, as well as scoring above – 2SD of the age-based mean on the Expressive Vocabulary subtest of the Clinical Evaluation of Language Fundamentals – Preschool (Semel, Wiig, & Secord, 2004).

2.3. General procedures

Research staff distributed study and recruitment information over the summer and fall of each school year via email, flyers, and phone calls. Teacher participation entailed a) completing a brief questionnaire regarding their education background and experience, b) reading a researcher-provided text to their classroom using usual classroom and book reading procedures which would be video-taped, and c) completing a brief exit interview after the shared book reading. Participating teachers were videotaped at a

Table 1
Child subsample demographics.

	N	Percentage
Ethnicity		
African–American/Black	100	33.00%
Caucasian	75	25.00%
Native Hawaiian/Pacific Islander	64	21.00%
Asian	15	5.00%
Native American Indian	2	0.50%
Other	2	0.50%
Not reported	43	15.00%
Race		
Hispanic/Latino	71	23.00%
Non-Hispanic/Latino	187	62.00%
Not reported	43	15.00%
Primary home language		
English	277	92.00%
Spanish	16	5.00%
Not reported	8	3.00%
Level of maternal education		
High school or less	50	16.00%
Some college, no degree	61	20.00%
Associate's degree	26	9.00%
Bachelor's degree	68	23.00%
Master's degree	44	15.00%
PhD or terminal degree	21	7.00%
Not reported	31	10.00%

time that was convenient for them in the fall of the 2015–16 or 2016–17 school year. Participating teachers received books for their classroom, and participating children who completed assessments each received a book as well.

After completing the brief questionnaire, teachers were provided with the book for the shared book reading session. All teachers read the same book to their class as they normally would; *Kingdom of Friends* (Pentimonti & Zucker, 2015) is a 25-page narrative text about two friends who argue at playtime but learn how to resolve their problems and become friends again. Teachers were only given a short synopsis of the story in advance to familiarize them with the storyline and content and were given the actual book to review 5 min before the reading was scheduled. After the book reading session, the teachers were asked four interview questions to determine whether the book reading session reflected their typical reading practices. When asked, "Were the adults and students in your classroom today your regular group?" 84 (88%) of teachers replied "yes." During the book reading observation 45% of teachers rated themselves as very comfortable, 37% as mostly comfortable, 7% a little uncomfortable, and 11% very uncomfortable. When asked to consider how this reading session compared to how they normally read book aloud, most teachers (47%) rated this as very similar or mostly similar (40%) to typical reading practices, whereas only 13% felt the observed book reading session was a little different from usual. No teachers felt that the reading session was very different from typical reading sessions with their class. Finally, when asked about their students' behavior during the videotaped read aloud, 55% of teachers rated this as very similar to typical student behavior, 26% as mostly similar, 12% as a little different, and 7% as very different from typical student behavior.

2.4. Video transcription and coding procedures

All video-recorded book reading sessions were fully transcribed using a digital media player and Microsoft Excel software. Each utterance spoken by teachers or children was transcribed on a separate row within the Excel spreadsheet, and marked according to the speaker: [R] for all reading lines, [T] for all teacher utterances, [C] for individual child utterances, and [Cs] for utterances by multiple children. All extra-textual talk, or talk that was not text reading, was segmented into utterances in accordance with the Communication Units approach (C-Units; Miller, Andriacchi, & Nockerts, 2016) whereby each utterance represented a grammatically complete stand-alone idea unit. Compound sentences, therefore, were split into two utterances (e.g., T: Come back to the carpet; T: so you can listen to the story with your friends).

Transcription started when the teacher began talking about the book and concluded when discussion turned to activities that were not related to the story. The average duration of reading sessions was 14.14 min (*SD* = 4.09, *Range* = 6.47–25.23). All talk during the book reading session was transcribed, even if not directly relevant to the book and story. Any unintelligible utterances were marked as "X." Training of transcriptionists entailed a review of a transcription manual and attendance at a one-hour training that included practice opportunities. Following the training sessions, transcribers transcribed two practice book reading videos independently. These transcriptions were checked against a master transcript for any disagreements. All transcribers met at least 85% agreement for accurate transcribing of teacher words (*M* = 94.48%), with a slightly lower agreement rate for child talk (*M* = 84.09%). However, because child talk was much more difficult to hear, as the camera was not directly focused on them, this level of agreement was considered acceptable. Agreement was also calculated to measure accuracy of separating talk into individual utterances. The average agreement on utterance breaks was once again high (*M* = 96.93%) for teacher talk, and slightly lower for child talk (*M* = 89.31%).

Following transcription procedures, each transcript was coded in the same Excel software using an adapted version of the Systematic Assessment of Book Reading 2.1 (Zucker, Pentimonti, Tambyraja, & Justice, 2017). A total of 7 relevant codes for form of teacher utterance (question) and 4 codes for children's responses (accuracy and length), were analyzed for the present study and are described in detail below. Several of the trained transcribers were trained to implement the questions coding scheme detailed below. Coders were trained to apply these codes in a four hour session by the second author. Training included provision of a detailed manual, video examples, group coding practice, and independent coding practice over a four-week period. The coders were then required to code two reliability transcripts and were required to demonstrate 85% agreement at this stage before coding study data. Good inter-rater reliability was achieved on coding 10% of the transcripts (*n* = 10) with an average agreement of 85.79%.

2.5. Coded variables

Data concerning the following types of codes were drawn from the coded transcripts to address the study aims: a) form of teacher questions, b) accuracy of child responses, and c) the length of utterance of children's responses.

2.5.1. Teacher questions – type and rate

All teacher extra-textual talk was coded for form of utterance, as either a comment, question, or directive. The question form of utterance was further categorized according to the form, or wording, of the question. The question types that were used by teachers to permit children to elaborate on a previous response or to request a child to repeat or clarify a previous utterance (e.g., "Yes, Jack?"), were eliminated from further analyses. In the present study, the rate and proportion of the aforementioned types of questions were coded, but after a preliminary analysis of the data, we re-coded all *How-questions* to reclassify them into 3 mutually exclusive and exhaustive subcategories. Thus, three types of Yes/no-style question codes were examined: (a) *Auxiliary-fronted yes/no questions* that were more formal yes/no questions that began with an auxiliary verb (e.g., "Do you think he looks happy?") (b) *Yes/no questions*, the less informal yes/no questions that did not begin with an auxiliary verb (e.g., "You think she's sad?"); and (c) *How-many*

Table 2
Sample questions and response codes.

Type of question	Example questions	Example responses
Yes/no-style question forms		
Auxiliary-fronted questions	"Does he look happy?"	"Yes"
Yes/no questions	"She is breathing fire?"	"Yes"
How-many questions	"How many colors does she have?"	"Three"
Wh-style question forms		
Wh-questions	"What did he do?"	"He made a picture"
Why-questions	"Why do you say friends?"	"Because they are playing together"
How-feeling questions	"How are they feeling now?"	"Mad"
How-procedural questions	"How did they become friends again?"	"They showed each other they are sorry"
Child accuracy		
Accurate response	"Is she being nice?"	"No!"
Inaccurate response	"What do you think will happen?"	"They are sad"
Child response length		
Single word response	"Are they friends again?"	"Yes"
Multiword response	"What can you tell me about friends?"	"Cats can be friends"

questions, counting questions that began with "how many." *How many questions* were coded in this category because of the single word responses they elicit, similar to *Yes/no questions*. The rate and proportion of four types of Wh-style questions was also coded: (d) *Wh- questions*, or any question that contained "what, where, which, or when" words within the question; (e) *Why-questions* that contained the word "why" within the interrogative; (f) *How-feeling*, – how questions that required children to make an inference, for example, "how do you think he is feeling?," and (g) *How-procedural* – how questions that targeted the manner of carrying out an act, for example, "how do you make-up with your friends after a fight?" A list of teacher questions, and children's responses along with examples is presented in Table 2. The code *How-feeling* was initially called "how-inferential" because by definition it could include any inferential question that began with "how". However, because all the questions included in this category ended up being related to the characters' emotional states, the name was modified to *How-feeling*. Of additional note, because of the specific theoretical interest in the ways in which teachers elicit child responses, only questions that actually garnered a child response to the text were included in the analysis. Thus, questions to clarify a response (e.g., "What did you say?") or call a child by name (e.g., "Henry?) were not coded as focal question forms.

We also recorded the start and stop times of the entire reading session to calculate the rate at which questions were asked. The rate of teacher questions was calculated as number of teacher questions per minute.

2.5.2. Accuracy and rate of child responses

Children's responses to teacher questions were coded for accuracy/appropriateness. The first child response that immediately followed the teacher question was coded, whether the question was directed to a particular child or the whole group. The responses were categorized in the following two ways: The code of *Accurate/Acceptable* was given to responses that were either fully correct or less precise but still acceptable (e.g., *T: What is this?* [Points to airplane] *C: A flying thing*). The code of *Inaccurate* was given to responses that were either completely inaccurate or too ambiguous or illogical to be considered an acceptable answer (e.g., *T: What is this?* [Points to airplane] *C: A dog. or T: What do you see? C: See*). Only child utterances that directly followed a teacher question were coded for accuracy. The rate of accurate and inaccurate responses was calculated as number of accurate and inaccurate responses per minute.

2.5.3. Length of child responses

All child utterances were coded for a simple length metric. *Single word/Basic utterance* was applied to any child utterance that was only one-word long or an article and one word (e.g., C: "Yes," "*A dragon*"). This also included utterances with false starts (e.g., *C: "The, the, the dragon").* Utterances that contained at least two words received the *Multi-word utterance* code (e.g., *C: All night*; *C: I know my ABCs*). Note that these utterance could vary substantially in length (e.g., two words to 16 words). This decision to use a dichotomous coding scheme was based on the recommendations by Bakeman and Quera (2011), in order to keep the codes mutually exclusive and the coding scheme organized and relatively simple for the purpose of sequential analysis.

2.6. Analytic strategy

Descriptive statistics were calculated in order to address our first research question and to provide context to the results of subsequent sequential analyses, which were used to answer the other two research questions. Sequential analysis is a methodology used to examine potential dependencies between behaviors that unfold sequentially over time (see Bakeman & Gottman, 1997; Bakeman & Quera, 2011; McComas et al., 2009). For the purpose of this study, sequential analysis was used to determine whether specific types of teacher questions were sequentially related to influence the accuracy and the length of children's responses during shared book reading. To examine this influence, data were analyzed with the Generalized Sequential Querier (GSEQ; Bakeman & Quera, 1995) using a lag 1 sequential method. Lag 1 sequential analysis asks whether the presence of one code increases the probability of the "target" code occurring immediately after. Data from all 96 classrooms were pooled to calculate the probability of event sequences.

To determine whether the sequential patterns observed among teacher questions and children's responses was beyond the chance occurrence, we first examined Chi-Square tests for contingency tables. Next, we examined transitional probabilities of pooled data across classrooms using two sequential analysis test statistics: the adjusted residuals, and Yule's *Q* (Bakeman & Gottman, 1997) for the two dependent variables – the accuracy and the length of children's responses. Adjusted residuals indicate the extent to which an observed joint frequency differs from chance with the underlying assumption of independence and normality. However, behaviors that occur sequentially during social interactions cannot be assumed to be independent. Therefore, we also used the Yules's *Q* as a measure of effect size. The Yule's *Q* is an index of effect size that varies from +1 to −1, with 0 indicating no effect and positive values indicating the target event occurs after the given event more often than chance (and the inverse for a negative value). The strength of a Yule's *Q* can be interpreted as follows: *Q* from 0 to ±0.29 is negligible; ±0.30 to ±0.49 moderate; ±0.50 to ±0.69 substantial; and ±0.70 very strong (Bernard, 2000).

Table 3
Descriptive statistics for teacher questions and children's responses.

Codes	Frequency	Proportion (%)	Rate[a]
Yes/no-style question forms			
Auxiliary-fronted questions	1446	27.00	1.06
Yes/no questions	1232	24.00	0.91
How-many questions	21	0.40	0.01
Wh-style question forms			
Wh-questions	2149	41.00	1.59
Why-questions	160	3.00	0.11
How-feeling questions	135	2.59	0.10
How-procedural questions	64	1.22	0.04
Total teacher questions	5207	24.50	3.85
Child accuracy			
Accurate response	2968	85.55	2.24
Inaccurate response	501	14.44	0.38
Child response length			
Single word response	2208	63.61	1.58
Multiword response	1263	36.39	0.90

Note. $N = 96$ teachers and their students.
[a] Rate represents the number of each type of question that occurred per minute of the session.

Table 4
Response accuracy: adjusted residuals and Yule's Q for sequential analysis.

Question types	Adjusted residuals		Yule's Q	
	Accurate	Inaccurate	Accurate	Inaccurate
Yes/no-style question forms				
Auxiliary-fronted questions	3.53**	−3.53**	0.21	−0.21
Yes/no questions	3.14**	−3.14**	0.25	−0.25
How-many questions	−1.69	1.69	−0.45	0.45
Wh-style question forms				
Wh-questions	−5.15**	5.15**	−0.27	0.27
Why-questions	−2.95**	2.95**	−0.35	0.35
How-feeling questions	2.54**	−2.54**	0.51	−0.51
How-procedural questions	−0.71	0.71	−0.18	0.18

** $p < 0.01$.

3. Results

The present study examined the types of questions teachers ask during shared book reading and to analyze children's responses to those questions. Prior to conducting the sequential analyses, we determined the overall number of utterances by teachers and children in the complete dataset. Overall, a total of 22,921 extra-textual utterances were transcribed, out of which 23.74% were teacher questions. Some question types among these were used by teachers to permit children to elaborate on a previous response or to request a child to repeat or clarify a previous utterance (e.g., "Yes, Jack?"). These questions ($n = 235$) were eliminated from further analyses. Thus, a total of 8676 extra-textual utterances were analyzed for the purpose of this study: 5207 teacher questions and 3469 child responses. The number of teacher questions ranged from 1 to 165 per classroom with an average of 55.14 questions per teacher ($SD = 35.67$). Descriptive statistics are reported in Table 3.

3.1. Types of teacher questions and child responses

The first research question concerned the rate and proportion at which teachers ask different types of questions (i.e., *Wh-questions, Yes/no questions, Why-questions*, etc.). As can be seen from Table 3, the most frequent questions that the teachers asked were *Wh-questions* (1.59 questions per minute) and formed 41.00% of the overall questions, followed by *Auxiliary-fronted Yes/no questions* (1.06/min) which formed 27.00% of overall questions, closely followed by the other category of *Yes/no questions* (0.9/min), forming 24.00% of the total questions. The least frequent forms of questions were *How-many* and *How-procedural questions* asked at the lower rates of 4.00% and 3.00% of overall questions (0.17 and 0.11 per minute) respectively. When combining these micro question forms into two larger Wh-style versus Yes/no-style question categories, Yes/no-style questions comprised just a slightly larger proportion of teacher questions (51.83%) than the Wh-style questions (48.17%). Children's responses were overwhelmingly accurate (85.55%), with a rates of 2.24 per minute, with only 0.38 inaccurate answers per minute (14.45%). More responses consisted of a single word (63.61%), at a rate of 1.63 per minute, than multiword (36.39%), at a rate of 0.93 per minute.

3.2. Sequential relationship between teachers' questions and accuracy of children's responses

The second research question concerned the dependence of the accuracy of children's responses upon the type of question the teacher asked. In other words, do children respond more accurately to certain types of questions than others? Note that these relations represent the first child to respond to a teacher question, which may have been directed to the whole class or to a single child. Overall, it was evident that the focal children found the teachers' questions easy to answer given that most of their answers were accurate (85.55%), but sequential analysis can uncover which questions presented some challenge. The adjusted residuals and the Yule's Q from the sequential analysis of teacher questions and children's responses are summarized in Table 4, with a significant deviation from chance for the overall contingency table, χ^2 (6, 96) = 49.27, $p < 0.01$. Adjusted residuals showed that the associations between the type of teacher question and the accuracy of children's responses were different from chance for all event sequences of interest, except for the *How-Many* and *How-Procedural-questions*, which were not significantly different from chance (see Table 4).

When asked Yes/no-style questions, children's responses were mostly accurate. Specifically, given an *Auxiliary-fronted yes/no question*, children were more likely to produce an accurate response ($p < 0.01$), though the effect sizes were small (Yule's $Q = 0.21$). The second category of *Yes/no questions* mimicked these results, where children were significantly more likely to respond accurately ($p < 0.01$), again, with a small effect size (Yule's $Q = 0.25$). However, children's responses to *How-many questions* were more likely to be inaccurate, with a moderate effect size (Yule's $Q = 0.45$).

Children found the Wh-style questions only slightly harder to answer. Specifically, given *Wh-questions*, children produced more inaccurate responses, but the effect size was small (Yule's $Q = 0.27$). Given *Why-questions*, children produced more inaccurate responses than accurate ones, and the effect size was moderate (Yule's $Q = -0.35$).

The adjusted residual for children's response accuracy to *How-questions* was not found to be statistically significant. Within the category of *How-questions*, children responded differently to different questions: they responded to *How-feeling questions* accurately, with a substantial effect size (Yule's $Q = 0.51$), but the *How-procedural questions* elicited more inaccurate than accurate responses, but with a negligible effect size (Yule's $Q = -0.18$). It should be noted that the results for the *How-many* and *How-procedural questions* were affected by violation of the normality assumption due to relatively small sample sizes, and therefore these results should be interpreted with caution.

3.3. Sequential relationship between teachers' questions and the length of children's responses

The third research question aimed to examine the relationship between the type of questions asked by the teachers and the length

Table 5
Response length: adjusted residuals and Yule's Q for sequential analysis.

Question types	Adjusted residuals		Yule's Q	
	Single word	Multiword	Single word	Multiword
Yes/no-style question forms				
Auxiliary-fronted questions	17.65**	−17.65**	0.72	−0.72
Yes/no questions	5.57**	−5.57**	0.31	−0.31
How-many questions	0.30	−0.30	0.09	−0.09
Wh-style question forms				
Wh-questions	−17.74**	17.74**	−0.61	0.61
Why-questions	−10.71**	10.71**	−0.88	0.88
How-feeling questions	5.37**	−5.37**	0.71	−0.71
How-procedural questions	−5.70**	5.70**	−0.84	0.84

** $p < 0.01$.

of children's responses to examine if certain types of teacher questions are more likely to elicit multi-word responses from children. Single-word responses were defined as one word or an article with a noun, whereas multi-word responses varied in length. Descriptively, utterance length for the multi-word responses ranged from 2 to 16 words, with a mean of 4. The adjusted residuals, and the Yule's *Q* from the sequential analysis of teacher questions and children's responses are summarized in Table 5, with a significant deviation from chance for the overall contingency table, χ^2 (6, 96) = 585.14, $p < 0.01$. Adjusted residuals showed that the associations between the type of teacher question and the length of children's responses were different from chance for all event sequences of interest, except for *How-many questions* that showed no significant relation.

Given Yes/no-style questions, children were more likely to produce single word utterances. Specifically, when asked *Auxiliary-fronted yes/no questions* children were more likely to use single words. The size of this effect was quite strong (Yule's $Q = 0.72$). Similar results were noted with the other category of *Yes/no questions*, though the effect size was smaller (Yule's $Q = 0.31$).

In contrast when asked Wh-style questions except the *How-feeling questions* (which yielded predominantly single word utterances), children were more likely to produce multiword responses. Given a *Wh-question*, children produced significantly more multiword responses, with a substantial effect size (Yule's $Q = 0.61$). When asked *Why-questions*, children produced significantly more multiword responses than single word responses and this effect size was strong (Yule's $Q = 0.88$).

When asked a *How-feeling question*, children were significantly more likely to answer using single words (e.g., sad, mad, etc.), with a strong effect size (Yule's $Q = 0.71$). Given a *How-procedural question*, children answered using multiple words, with a strong effect size (Yule's $Q = 0.84$). Thus, children responded with different lengths of utterances for the different types of *How-questions*, based on the function of the particular question.

4. Discussion

The primary goals of this study were to examine the different types of questions teachers ask during shared book reading, and to examine the sequential relationship between the type of questions asked and both the accuracy and length of children's responses. This study makes a unique contribution to the existing literature by examining the rate and proportion at which early childhood teachers asked different types of questions during classroom shared book reading and perhaps more importantly, by analyzing children's responses to those questions. Overall, teachers' extra-textual talk contained about 24% question forms. Study hypotheses were largely confirmed in that teachers asked *Yes/no questions* most frequently, followed by *Wh-questions*. As expected, children responded to some Yes/no-style questions slightly more accurately (*Yes/no questions*) than some Wh-style questions (e.g., *Why-questions*, *How-questions*). But not all Wh-style question forms were challenging and some Yes/no-style question forms (*How-many*) were more challenging. Thus, we cannot conclude that Yes/noversus Wh-style categories of questions systematically relate to question difficulty for preschool-age children who appear capable of responding accurately to the vast majority of questions. Children also used significantly longer utterances to respond to Wh-style questions than Yes/no-style questions. Implications for these findings are discussed below.

4.1. Types of questions

First, as stated, only about one-fourth (23.74%) of the teachers' extra-textual utterances were questions, a proportion similar to that reported in the literature previously (e.g., Gest et al., 2006; Hargrave & Sénéchal, 2000). Thus it appears that about a quarter of teachers' extra-textual talk consisted of questions; however, there is a large variability in the amount of questions asked by the teachers. Although research has shown that questioning during shared book reading positively impacts children's language and literacy gains and provides direct opportunities for children's involvement in the activity (Ewers & Brownson, 1999; Hargrave & Sénéchal, 2000; Walsh & Blewitt, 2006; Wasik & Bond, 2001), the proportion of questions that is most effective in impacting children's language outcomes is not known. Within this 24% of questions asked during shared reading, the questions that teachers ask do not appear to challenge children enough, given that they were able to answer the vast majority of the teacher questions accurately.

Although the content and purpose of asking questions cannot be separated from the questions forms, Wh-style and Yes/no-style questions pose different kinds of response requirements for the listener, including the length of response required and the cognitive demands required to give an appropriate response (e.g., Hart & Risley, 1995). More than half of the teachers' observed questions consisted of Yes/no-style questions like *Yes/no questions* and *How-many questions* (52.00%) that only require a narrow response. Our findings from a large sample of teachers are consistent with previous studies reporting that teachers typically tend to ask constrained questions more frequently than Wh-style and potentially higher-level questions, such as *Why- and How-questions* (e.g., Beck & McKeown, 2001; Zucker et al., 2010). One reason teachers may have asked proportionally more constrained questions might be that the text was unfamiliar to the children. It is possible that the teachers' questions would be more complex if they read a text that was familiar to the children. Another reason teachers may have asked more constrained questions might be that they are the easier questions to ask (Thompson, 1997). This explanation should be considered in light of the study procedures in which teachers had limited familiarity with the text they were asked to read aloud on the same day the text was given to them. Perhaps the types of questions they ask would change in the subsequent readings or if teachers had more time to increase their familiarity with the text. Another explanation is that teachers may falsely believe that young children cannot respond to open or complex questions, despite past research demonstrating preschoolers are capable of higher-level responses (e.g., Danis et al., 2000; Silva & Cain, 2015; van Kleeck, 2008). Future research could examine the effect of text familiarity, and content and background knowledge underlying the text, on types of questions teachers ask during shared book reading as well as teachers' beliefs about young children's capabilities to answer Wh-style questions.

Most of the teacher questions in the Wh-style category, that is, *Wh-questions*, *Why-questions,* and *How-procedural questions*, examined in the present study elicited overwhelmingly multiword responses. Most notable here are the *Why-* and *How-procedural questions* that were over 12 times more likely to prompt multi-

word responses than single word responses from the children. Thus these questions emerge as the strongest mechanisms for eliciting more extended verbal language from young students during shared book reading. In other words, asking Wh-style questions provides children with opportunities to use longer utterances and expressive language. These findings are in congruity with some previous reports in the literature (e.g., Yoder et al., 1994) where it has been observed that these types of questions tend to elicit more multi-word utterances (de Rivera et al., 2005) that are also more lexically diverse and syntactically more complex than those elicited by closed questions (Lee et al., 2012). Because they elicit longer utterances, Wh-style questions provide more opportunity for children to practice new vocabulary, and syntactic skills, and for teachers/adults to scaffold emergent language skills.

Although children had a slightly higher propensity to answer Wh-style questions inaccurately, these were generally small effect sizes; in contrast many Yes/no questions appeared easy for three- to five-year olds in this sample. The questions that appeared most easy were, *Yes/no-* and *Auxiliary-fronted questions* although the effect size is small (Yule's $Q = 0.23$, 0.20, respectively). Wh-style questions were only somewhat more challenging. For example, most Wh-style questions appeared to present enough challenge for an inaccurate response, but most effect sizes indicated small effects (Yules's *Q, Wh-questions* = 0.27; *How-procedural* $Q = 0.21$). One exception was *Why-questions*, which the children answered mostly inaccurately and the effect size is moderate ($Q = 0.44$) suggesting that this may be offering a reasonable but not overwhelmingly large level of challenge. Vygotskian principles (1978) of learning suggest that the adult should provide children with some easier tasks that they can complete accurately without assistance, but that learning is more likely to occur when you move beyond mastered concepts into ones that require some assistance to complete accurately. Some experts recommend that 60–70% of shared reading conversations be easy, but that 30–40% must present challenge for children to learn new concepts (e.g., van Kleeck et al., 2003). For educators who seek to improve children's listening comprehension and reasoning skills via shared reading experiences, they might welcome inaccurate responses, as this signals an opportunity for learning if the adult provides a responsive scaffold that gives hints in the form of a comment or reframes the initial question so that children can increase their knowledge (Pentimonti & Justice, 2010).

Taken together, these findings suggest current practices of questioning during shared book reading may not be challenging young students in two ways: (a) most questions are relatively easy to answer, suggesting insufficient opportunities for learning via teacher scaffolding when a question is answered inaccurately; and (b) do not place enough expressive language demands on children who are capable of producing multiword utterances (Brown, 1973; Miller & Chapman, 1981), yet are producing 63.61% single word responses. It should be noted that we coded the first child response, so there is a possibility that the questions are more difficult for children who did not respond first. In that case, teachers might make efforts to draw other children into the conversation, either through prompts or follow up questions. To improve questioning practices, these data suggest that educators and curriculum developers, should incorporate more *Why-, How-procedural*, and *Wh- questions* as these elicit more lengthy responses from children. *Why-questions* appear particularly valuable because they offer at least a moderate degree of challenge in terms of accuracy for improving reasoning and comprehension skills during shared reading while also eliciting multiword responses to develop children's oral language skills simultaneously.

In summary, the large sample of teachers in this study most frequently asked Yes/no-style questions during shared book reading, which elicited overwhelmingly accurate and predominantly single word responses from the children. Shared book reading is a rich linguistic experience which can potentially scaffold development of a variety of spoken language skills. Because spoken language skills in early childhood have been found to be predictors of later language, literacy and academic competencies in elementary school (Reese, 1995; Walker, Greenwood, Hart, & Carta, 1994; Weizman & Snow, 2001), they are important tools for teachers to use during shared book reading, in order to make a larger impact on children's language outcomes. Our study indicates that the types of questions asked by teachers direct children's language behavior. Therefore, in addition to building background knowledge and making connections via comments during shared book reading, including more *Why- and How-questions*, along with other *Wh-questions*, would provide children with richer opportunities for using language, not only for labeling, but also for the purpose of description and verbal reasoning. These results also have important implications for parents and professionals like curriculum developers, and speech language pathologists. Curriculum developers would need to design curricula that incorporate more Wh-style questions for the teachers to ask during shared book reading. Likewise, speech-language pathologists, who frequently consult with early educators are in a position to counsel and encourage teachers to include more *Wh-questions*, *Why-* and *How-procedural questions* in their shared book reading sessions.

4.2. Limitations and future directions

One of the limitations of the current study is that we did not examine the different types of *Wh-questions* (what, who, where, which and when) independently, which might affect children's responses differentially. Future studies could look at effects of different types of *Wh-questions* on the length and accuracy of children's responses.

We only examined one level of exchange between the teacher and the child in the current analysis and therefore our inferences are limited to single sequences in the conversations. It would be illuminating to conduct a lag 2 sequential analysis to examine how teachers respond to accurate and inaccurate responses; and whether or not they attempt to expand single word responses through follow up questions, recasting, scaffolding, etc.

We did not investigate the effect of questions that build a knowledge base, or make connections to personal experiences, inferential, literal and transfer questions on children's responses in the present study. Future work can investigate the effects of these questions on both the actual responses and children's overall language skills.

For the purpose of the present study we were only interested in the functional responses to questions and determining the extent to which questions evoke responses, but future research can also explore how children's general language levels associate with the types and frequency of teacher questions. Also, in the current study we did not examine the relationship between the children's language abilities, and the types of teacher questions during the book reading sessions. Future research could explore the possibility that the teachers are tailoring their questions to the level of support required by their students in order to successfully answer the questions.

5. Conclusion

We analyzed teacher questions and children's responses to them during shared book reading sessions in prekindergarten and kindergarten classrooms and found that only a fourth of the extratextual teacher talk consisted of questions and that the teachers asked Yes/no-style questions most frequently. Children tended to

respond to Yes/no-style questions with single words and to Wh-style questions with longer utterances. They found the Yes/no-style questions most easy to answer, and Wh-style questions only moderately challenging. These results suggest that teacher questions direct children's language behavior during shared book reading. Thus in order to elicit higher levels of verbal language from children, curriculum developers would need to incorporate more Wh-style questions in the curricula, in order for teachers to increase the amount of questioning in general, and, in particular, ask Wh-style questions like *Why- and How-questions* more frequently.

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