

Encouraging use of complex language in preschoolers: a classroom-based storybook intervention study

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ABSTRACT

Preschoolers' exposure to abstract language (i.e. talk beyond the here and now) during shared reading is associated with language development. This randomized intervention study tested whether preschoolers' repeated exposure to simple and complex stories (as defined by the inferential demands of the story), and the extratextual talk associated with such stories, would lead to differences in language production during shared reading and to differential gains in vocabulary and narrative skills post intervention. An experimenter read scripted stories to 34 children (3;07–4;11) assigned to one of two story conditions (simple or complex) in small-groups, twice weekly over six weeks. Results showed that children in the complex story condition produced more complex language (as indexed by their mean length of utterance, use of mental and communication verbs, and use of subordinate clauses). However, post-intervention, children's vocabulary and narrative skills did not differ between conditions. Specific kinds of stories and corresponding extratextual talk by adults may not only increase children's exposure to rich and challenging input from the extratextual talk, but can also provide valuable opportunities for children to produce complex language. Theoretical and methodological implications are also discussed.

Previous research shows that how much parents and teachers engage in abstract talk during shared-book reading with their preschool-age children is positively associated with children's vocabulary and narrative development (DeTemple, 2001; Dickinson & Porche, 2011; Dickinson & Smith, 1994; Hindman et al., 2008). Given the potentially important role of abstract talk during shared reading, researchers have focused on examining the role of different kinds of picture books on abstract talk during shared reading. These studies show that genre moderates the amount and types of abstract talk used by caregivers with their children (e.g., Anderson et al., 2004; Potter & Haynes, 2000; Price et al., 2009; Torr & Clugston, 1999). However, it is not yet known whether controlled and repeated exposure to specific genres and their associated reading styles (for example, in terms of the levels of abstract extratextual talk) can lead to differential gains in children's language development. In a recent observational study, it was shown that complex stories (as defined by the level of inference required to comprehend the story) facilitated higher levels of abstraction in caregivers' extratextual talk during shared reading than did simple stories (Muhinyi et al., 2020). The present randomized intervention study tested the hypothesis that exposure to simple vs. complex stories and their associated levels of

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abstract talk (i.e., with complex stories facilitating more abstract adult-led discussions) would lead to differences in children's language production during shared reading and to differential gains in vocabulary and narrative skills post intervention.

Shared reading and preschoolers' language development

Shared reading plays an important role in preschool-age children's language development, accounting for an estimated 8% of variance in their language and literacy (Bus et al., 1995). In addition to the frequency of shared reading, the nature or *quality* of shared reading is also of importance (Fletcher & Reese, 2005; Zucker et al., 2013). Specifically, how much caregivers engage their children in extratextual talk (i.e., beyond simply reading the book text) has been found to be positively associated with children's vocabulary skills (Fletcher et al., 2008; Hindman et al., 2014), showing longer-term benefits than reading frequency alone (Zucker et al., 2013). Engaging children in concrete talk (also known as *immediate, contextualized, and low demand talk*) about the story, such as labeling and describing the pictures, has been found to promote infants' and young preschool-age children's language outcomes (Demir-Lira et al., 2018; Reese & Cox, 1999; Whitehurst et al., 1988, 1994). Concrete extratextual talk, which is focused on the page, refers to utterances such as "look at his red fur" and "what is that?" By contrast, talk that is abstract (also known as *decontextualized, non-immediate, high demand talk*), often involving reasoning, inference, and recall, is considered important for promoting children's language development in the preschool years and beyond (Blewitt et al., 2009; Dickinson & Smith, 1994; van Kleeck, 2008). Abstract extratextual talk during shared reading includes utterances such as "why did the fox do that?" and "how do you think he feels now?" It is as yet unclear why abstract talk promotes children's language development, but it may be through its greater lexical diversity and syntactic complexity (Rowe, 2012), and also through the fact that it is associated with greater back-and-forth between caregiver whereby the child is supported in producing more complex language and participating in the conversation (Muhinyi et al., 2020).

The role of abstract talk in language development

Observational studies report positive associations between caregiver use of different types of abstract extratextual talk during shared reading and preschool-age children's concurrent and later language development. DeTemple (2001) examined associations between adults' different types of extratextual talk (immediate vs. non-immediate) during shared reading and children's later language and literacy skills in a low-income sample of 54 families. Mother-child dyads were observed several times during shared reading when children were aged 3–5 years old, and children's language skills were assessed at kindergarten age (i.e., at 6 years) using the School-Home Early Language and Literacy Battery-Kindergarten (SHELL-K; Snow et al., 1995). In this sample, mothers' "immediate" talk was not significantly associated with children's later skills, whereas "non-immediate" talk was significantly positively related to children's later language and literacy skills (i.e., superordinates, story comprehension, emergent literacy, and receptive vocabulary). More recently, Hindman et al. (2008) found that both parent and teacher "decontextualized" talk during shared reading at the start of the preschool year predicted children's expressive vocabulary at the end of the preschool year, whereas "contextualized" talk was negatively associated with later expressive vocabulary. In their sample, decontextualized talk was a stronger predictor of later skill for children with lower initial language skills. In another study, how often teachers in preschool classrooms involved 4-year-old children from low-income backgrounds in "analytic talk" during shared reading predicted receptive vocabulary and story comprehension one year later (Dickinson & Smith, 1994), and receptive vocabulary into the fourth grade (Dickinson & Porche, 2011).

Several experimental studies also indicate gains in children's vocabulary and narrative skills from shared reading involving abstract extratextual talk (Blewitt et al., 2009; Grolig et al., 2020; Reese & Cox, 1999; van Kleeck et al., 2006). In an influential study, Reese and Cox (1999) conducted a six-week

intervention to investigate the relative benefits of three different styles of extratextual talk during shared reading on children's language development. Preschoolers were randomly assigned to one of three intervention groups, in which they participated in one-to-one shared reading with an adult who used: 1) a *describer style* (highly contextualized, focused on the describing the pictures; 2) a *comprehender style* (focused on the meaning of the story, and thus more abstract); or 3) a *performance-oriented style* (similar to the *comprehender style* but with discussion occurring after the story had been shared). Children's vocabulary, print, and story comprehension skills were assessed at pre- and posttest. Interestingly, the results showed that the *describer style* (i.e., highly contextualized language use) was most beneficial for children's vocabulary and print skills. However, once children's initial vocabulary skills were taken into account, the *describer style* led to greater vocabulary gains for children with lower initial skills, whereas the *performance-oriented style* led to greater gains for children with higher initial skills. Together, these observational and experimental studies suggest an important role for a wide range of features characteristic of abstract talk in promoting children's developing language abilities.

How abstract talk may promote language development

The literature above identifies several mechanisms through which abstract talk during shared book reading with both parents and teachers might promote young children's language development. Using abstract talk exposes children to more complex syntax and sophisticated vocabulary (e.g., Curenton et al., 2008; Demir et al., 2015), such as constructions involving mental and communication verbs (e.g., "he *believes* he is by himself," "he *answered* the chicken"). Abstract talk also provides opportunities for children to gain a deeper understanding of word meaning, beyond simply associating a word with its referent (Blewitt et al., 2009). For example, a labeling utterance such as "that's a cougar" provides an opportunity for the child to associate the label (cougar) with its referent, whereas an utterance such as "cougars eat chickens" provides information about an attribute of the referent, thus having the potential to strengthen the child's semantic network. In addition, caregiver use of abstract language may benefit language development through encouraging children's own production of complex language, such as mental state verbs and subordinate clauses (e.g., Curenton & Justice, 2004). Crucially, when engaging in such discourse, children are not only exposed to more complex language, but also have the opportunity to repeat or spontaneously produce it, both of which are important parts of the learning process. For example, when caregivers ask "why" questions, children are prompted to practice producing replies with complex structures (e.g., because he thinks he is hiding from the bear). From a social interactionist perspective (e.g., Vygotsky, 1978), such language might be particularly important for language development in the preschool years (e.g., 3- and 4-year-olds) because by this age children have built a basic vocabulary and are ready to learn more complex forms of language.

The role of picture-book genre in extratextual talk

Given the role of abstract language during shared reading in language development, an area of increasing research interest has been to investigate the role of picture-book genres in caregiver language use (Aram, 2008; van Kleeck, 2003). Importantly, picture books serve not only as a source rich vocabulary through their text (Montag et al., 2015), but also as a context for extra-textual conversations involving abstract language to occur (Demir-Lira et al., 2018; DeTemple, 2001). A substantial body of work now indicates that picture books can moderate the amount and type of abstract talk that caregivers use with their children. For example, reading informational books with preschool-age children has been shown to promote more abstract talk, such as explanations about concepts, when compared to storybooks (e.g., Anderson et al., 2004; Potter & Haynes, 2000; Price et al., 2009; Torr & Clugston, 1999). In addition, *within* the storybook genre, caregiver language has been shown to differ as a function of differing story characteristics, such as the amount of text and the presence of pictures (Greenhoot et al., 2014; Muhinyi & Hesketh, 2017).

A recent study documented the effects of story complexity (as defined by the inferential demands of the story) on caregivers' abstract language use with preschoolers during one-to-one shared reading (Muhinyi et al., 2020). Compared to simple stories, complex stories facilitated more extratextual talk and a greater overall level of abstraction, driven by utterances involving explanations and predictions about the plot. Interestingly, caregivers used none or very few of these two types of "higher level" abstract talk when sharing simple stories (although they engaged in a similar amount of concrete talk, such as labeling and descriptions, and "lower level" abstract talk, such as basic inference, evaluation, and text-to-life references). These results suggest that complex stories provide a platform for more, and higher-level, abstract talk with preschoolers.

If some kinds of books are better at eliciting language-promoting kinds of input, then the choice of book used in shared-reading interventions may be an important factor in determining the quality of language children hear during shared reading. Similarly, both the variety of books available to children and the kinds of books frequently shared may play important roles in children's exposure to high quality extratextual talk during shared reading (Luo et al., 2019). However, experimental work is needed to assess whether repeated exposure to specific kinds of books can lead to differential effects on children's language skills. In a recent study, Greenhoot et al. (2014) showed that illustrated and non-illustrated storybooks affected parent-child interaction differently, with illustrated stories leading to more interactive reading. In addition, children exposed to the illustrated story were better able to recall that same story one week later, and differences in children's recall were partially accounted for by observed differences in parent-child interaction. Existing work has also shown that adults engaging in scripted extratextual talk based on distinct and naturally occurring reading styles can lead to gains in children's language outcomes after a six-week intervention (Reese & Cox, 1999). However, to our knowledge, research has not yet shown whether repeated exposure to specific kinds of stories and their associated levels of abstract extratextual talk can lead to differential effects on children's vocabulary and narrative skills.

The present study

Our goal was to test the relative effects of exposure to two kinds of stories (complex and simple) and their associated extratextual talk on children's language production during shared reading and on their vocabulary and narrative skills post intervention. Three- and four-year old children were randomly assigned to one of two experimental conditions (simple or complex) for a six-week shared reading intervention. In both conditions, an experimenter read stories to small groups of children and engaged in extratextual talk that was scripted within the stories (based on a similar study design by Reese & Cox, 1999). The simple condition consisted of stories that did not contain a false belief, and were accompanied by scripted extratextual talk that contained no predictions or explanatory talk (although it did contain concrete talk and lower level abstract talk such as basic inference and text to life references). By contrast, the complex stories contained a false belief, and were accompanied by scripted extratextual talk that contained a greater number of abstract utterances (driven by the inclusion of explanations and predictions). Importantly, the experimenter did not simply read the text, but engaged in extratextual talk with the children by using printed scripts. Crucially, we had documented the types of extratextual talk caregivers use when sharing simple and complex stories in a previous study (Muhinyi et al., 2020). In the present study, our goal was to assess the effect of the story genre and concomitant extratextual talk since these occur together in a naturalistic context, and not to tease apart individual effects. Both the stories used and the scripted extratextual talk were based on an earlier observational study documenting caregivers' naturally occurring extratextual talk when sharing these two kinds of stories with preschool-age children (Muhinyi et al., 2020). In the present study, a non-reading control group was not needed because our hypothesis concerned the relative effects of two kinds of stories and their associated extratextual talk on children's language outcomes, rather than the general effects of shared reading on language outcomes. We chose to focus on 3- and

4-year old children because abstract input at this age, both during group shared-book reading and in other contexts, been shown to support language development (Dickinson & Porche, 2011; Dickinson & Smith, 1991; Rowe, 2012), and language gains at this age are likely to be important for school readiness.

We hypothesized that exposure to complex stories and the scripted higher levels of challenging, abstract language used by the experimenter would lead to more complex language production during shared reading. We also hypothesized that exposure to the complex stories and higher levels of challenging, abstract language by (as compared to simple stories with lower levels of scripted abstract language) would lead to greater vocabulary and narrative skills (operationalized by sentence length and complexity) at posttest. We also expected that that exposure to the simple stories and simpler scripted experimenter talk would lead to greater gains for children with lower language abilities. This prediction was based on earlier work suggesting that abstract talk may be less beneficial for children with lower initial vocabulary skills (Reese & Cox, 1999). We theorized that such children may be more likely to benefit from a simpler plot surrounded by less demanding, more concrete extratextual talk in line with their current abilities.

Material and methods

Participants

Thirty-four children (16 boys and 18 girls) participated, ranging in age from 3;07 to 4;11 ($M = 51.79$ months, $SD = 5.34$ months). Children's language abilities ranged widely from standardized scores of 89 to 138 ($M = 105.06$, $SD = 11.12$), as assessed by the British Picture Vocabulary Scale (BPVS-II; Dunn et al., 1997). Children were recruited from the preschools (nursery and reception classes) of two schools in the Greater Manchester area. The mean age was 46.36 months ($SD = 1.34$) in nursery classes and 55.60 ($SD = 3.36$ months) in reception classes. Both schools were in areas of social and economic disadvantage (as indexed by the English Indices of Multiple Deprivation; English Indices of Multiple Deprivation (IMD), 2015). Ethical approval was obtained from the University Research Ethics Committee (UREC) at the University of Manchester (Ref. 2017–2523–3638). All parents provided informed consent. Schools were compensated with a book voucher worth £100 for their participation. In School A, seven children were drawn from nursery classes and seven from reception. In School B, eight children were drawn from nursery and fourteen from reception. All children were White, English-speaking, and monolingual. Thirty-six children were recruited and assigned to groups, but one child missed the posttest because they were absent on the testing days, and another child refused to participate in the intervention beyond the first session. Therefore, the final sample comprised 34 children.

Materials

Ten stories (five simple and five complex) were used. Based on previous work (Muhinyi et al., 2019), story complexity was operationalized by the inferential demands of the story. Complex stories were defined as those involving a false belief central to the plot, whereas simple stories involved no instances of false belief. There was variation among the books as would be expected from commercially available rather than experimentally-designed books, but they were judged as highly similar in terms of their age appropriateness (for preschoolers) and other main features (e.g., style, use of color, layout, number of pages and words, protagonists were animals) by the first author and another researcher who is a trained speech and language therapist. Crucially, we selected a pool of ten books rather than just one or two from each genre (simple or complex as defined by the presence or absence of false belief) so that we could attribute any effects to the genre as opposed to one particular story. Titles are provided in [Appendix A](#). An analysis of the textual complexity of four of the ten books (two from each condition) is provided in Muhinyi et al. (2020). Commercially available books were selected from

high-street bookshops, as these were considered representative of those available for preschool-age children in the UK.). Stories were selected by the first author, and their assignment to the simple and complex categories was verified by another researcher who was also a trained speech and language therapist. The stories were reported as unfamiliar by all of the participating children.

Procedure

The study consisted of three phases: pretest, intervention, and posttest. Data collection during each phase was conducted in a quiet room adjoining the classrooms. Pretest was conducted during the two weeks before the intervention phase (prior to random assignment to groups). Both pretest and the intervention were conducted by the first author. Posttest was conducted in the week following the intervention by another researcher who was blind to the study aims and to group allocation.

Pretest and posttest assessment

The testing procedure was as follows:

- (A) *Receptive vocabulary skills.* The British Picture Vocabulary Test 2nd edition (BPVS-II; Dunn et al., 1997) was used to measure children's receptive vocabulary. The BPVS is a published standardized assessment with UK-based norms for 3- to 16-year-olds. It involves the examiner saying a word and prompting the child to point at the corresponding picture from a set of four on each page. The test comprises two practice trials and 14 sets of pictures each containing 12 test items (a total of 168 items). Testing begins at the set indicated in the manual for the child's age (usually their basal level), and ends when the child reaches their ceiling level (eight or more errors in a set). Raw scores are then calculated and converted to standardized (UK-normed) scores and percentile ranks. Administration time was approximately 10–15 minutes. This assessment was selected as it is quick to administer and has been used widely as a measure of children's vocabulary skills.
- (B) *Story retelling ability.* The Bus Story (Renfrew, 1995) was used to assess children's narrative retelling abilities. This assessment involves the researcher reading out a 168-word story while presenting 12 corresponding pictures (three per page). The child is then asked to retell the story using the pictures as cues. To make this activity more appealing, the researcher asked the child to retell the story to a puppet toy. Children's narrative retellings were audio-recorded on an MP3 device. Based on the Bus Story manual, children's narrative retellings were scored for length (the mean length of utterance for the longest five sentences produced) and complexity (the number of instances of subordination produced). The Bus Story has good retest reliability. Administration time was approximately 10 minutes.

Intervention phase

Within each classroom (nursery and reception), children were randomly assigned to one of two conditions (simple or complex stories). Children were then randomly assigned to 11 small groups of 3–4 children. Children's characteristics by reading condition are summarized in Table 1. The

Table 1. Children's sex distribution, mean age, and initial vocabulary by book condition.

Condition	Males/females	Age in months		BPVS standard score	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Simple	6/11	50.88	5.37	105.06	12.71
Complex	10/7	52.71	5.31	105.06	9.66

Note. BPVS = British Picture Vocabulary Scale. *N* = 34.

Table 2. Examples of the scripted extratextual utterances from two stories.

Condition	Examples of the extratextual utterances
Simple (<i>Stop monkeying about</i>)	Look at the ladybird crawling along. (p. 2) Can you see the water coming out of his trunk? (p. 4) <i>How do you think snake feels?</i> (p. 4) <i>Parrot is shocked!</i> (p. 6) <i>I don't think tiger thought that was very funny.</i> (p. 13) What's that? (p. 16) All the insects are crawling on the log, look. (p. 16) Are those all animals he was monkeying around with? (p. 24) Look they're swinging on jungle vines. (p. 24) <i>What was Little monkey swinging on before?</i> (p. 24)
Complex (<i>Look out Suzy goose</i>)	Look at all the geese honking. (p. 2) Which one is Suzy goose? (p. 4) <i>She isn't very happy.</i> (p. 4) <i>Why isn't Suzy goose happy with the other geese?</i> (p. 4) Do the woods look dark? (p. 6) <i>Does she think she is alone in the woods?</i> (p. 8) Who is following her? (p. 10) <i>Fox is following her because he wants to eat her for dinner.</i> (p. 10) And there's the wolf. (p. 14) <i>Does Suzy think she is by herself?</i> (p. 14) <i>She thinks she's by herself because the other animals are so quiet.</i> (p. 14) Now the bear is following them too! (p. 18) <i>Why are the animals all running away?</i> (p. 26) <i>She thinks she was by herself the whole time!</i> (p. 30)

Note. Abstract talk is shown in italics. Higher level abstract talk (explanations and predictions) is shown in bold.

experimenter read stories to children in small groups twice weekly (two or three books per session) using scripted reading styles (described below). Each reading session lasted approximately 10–15 minutes. In total, children in each condition were exposed to five different stories over six weeks (i.e., twenty-six readings involving five exposures to each story).

The key difference between the two story conditions was the stories themselves (simple, containing no false belief vs. complex, containing false belief) and the scripted extratextual talk. Scripted extratextual talk in the complex condition included a greater number of abstract utterances (i.e., explanations and predictions), and thus there was slightly more extratextual talk overall. By contrast, scripted extratextual talk in the simple condition contained no predictions or explanatory talk. The scripted extratextual talk was based on the findings of an earlier observational study that documented caregivers' naturally occurring extratextual talk when sharing simple vs. complex stories as defined in the present study (Muhinyi et al., 2020). Table 2 shows examples of the scripted extratextual talk (labeled as concrete or abstract) from each of the two conditions. Scripts were used to ensure that the experimenter engaged children across groups in each condition with the same extratextual talk, as in previous experimental shared-reading research (e.g., Reese & Cox, 1999). Small printed numbers were attached to the pages of the books, indicating to the experimenter the points in the story at which to read the comments and questions from the script. Set responses were prepared for children's spontaneous story-related initiations during the session (e.g., *Hmm, let's find out ... Okay... Oh wow ... Let's talk about that afterwards ...*). Regardless of the adequacy of children's responses to questions, the experimenter always provided the model answer to the questions posed. Scripts were changed after two readings of the book to keep the reading sessions interesting and naturalistic as children grew familiar with the stories. Thus, each story had three different scripts.

All sessions were audio-recorded to enable fidelity checking. Intervention fidelity checks were conducted by another researcher who was blind to the study aims. One randomly selected audio-recording from each week was checked to ensure that the reader adhered to the scripted comments and questions. Of a total of 68 utterances checked from six recordings, the reader omitted one utterance and read another utterance as a statement instead of a question (i.e., "there are the

butterflies” instead of “where are the butterflies?”). There were no other deviations from scripts involving a change in function or meaning. Scripted comments and questions were all read in the prescribed order, and the reader did not engage children in any non-scripted extratextual talk about the story.

Children’s language production during shared reading

To allow us to test the hypothesis that children’s language production would be stimulated to a greater degree in the complex condition, we examined a subset of the audio-recorded reading sessions from the final readings of each story (involving sessions from weeks five and six). The three final readings were selected from each of the small groups, resulting in a sample of 33 individual readings (approximately 20% of the overall data). These audio-recorded reading sessions were transcribed by the researcher in Codes for Human Analysis of Transcripts (CHAT) format (MacWhinney, 2000). Utterances that were not related to the book reading were excluded (i.e., off-topic utterances). Transcripts were verified by another researcher unaware of the study aims. Automated analyses were conducted to provide an index of children’s language production in the shared-reading sessions by using Computerised Language Analysis (CLAN) software (MacWhinney, 2000). Two measures of literate language were calculated: the number of temporal, conditional, and causal subordinate adverbial clauses, and the number of mental and communication verbs. The specific measures were selected because they are key features of literate language and narrative development, and because these were the kinds of complex language use particularly emphasized by the stories and extratextual talk in the complex condition. In addition, an initial examination of the transcripts indicated that these were the main types of subordination that occurred across transcripts. Examples from the transcripts are shown in [Appendix B](#).

In addition to the two features of literate language, children’s mean length of utterance (MLU) was computed to provide a global index of syntactic complexity during the shared-reading sessions. The number of temporal and causal clauses and the number of mental and communication verbs were obtained by creating by running *FREQ* in combination with wordlist files. The wordlist files for mental and communication verbs and for temporal and causal subordinating conjunctions were compiled based on previous work examining children’s use of literate language features (Curenton & Justice, 2004; Petersen et al., 2010). In addition, a wordlist generated from all transcripts was manually examined to identify any additional mental or communication verbs not already on the list. Examples are shown in [Appendix C](#). Subordinating conjunctions that were not followed by a clause (i.e., those with no verb) were not counted. Finally, we had CLAN calculate word tokens and word types to provide an index of the amount of language used and lexical diversity.

As in earlier work by Dickinson and Porche (2011), the present analysis was conducted at small-group level because it was not possible to attribute verbal contributions to individual children from the audio-recordings. However, we are confident that the small group readings involved all of the children, as the experimenter who was experienced in reading to small groups of children did not report that any single child had dominated the discussion for any of the sessions.

Results

Preliminary analyses

There was no missing data for any of the language measures or demographic variables at pretest. At posttest, there was missing data from one child on all language measures because the child was absent on the testing days. In addition, one child refused to participate in the intervention beyond the first session (although pre- and posttest scores were still obtained for this child). Therefore, analyses were performed on the remaining cases ($n = 34$). Preliminary *t*-tests showed no differences in age or in

Table 3. Pretest and posttest means (standard deviations) by language measure and reading condition.

Test phase and measure	Reading condition	
	Simple <i>M (SD)</i>	Complex <i>M (SD)</i>
Pretest		
BPVS raw scores	48.53 (13.52)	49.76 (8.96)
Length score	7.71 (2.08)	8.14 (3.27)
Complexity score	1.47 (1.51)	2.00 (2.35)
Inferential story comprehension score	6.06 (2.82)	6.12 (2.23)
Posttest		
BPVS raw scores	49.18 (10.32)	49.82 (8.78)
Length score	7.87 (2.52)	8.78 (3.47)
Complexity score	2.00 (2.09)	2.47 (2.79)
Inferential story comprehension score	8.18 (3.97)	8.88 (3.04)

Note. $N = 34$. BPVS = British Picture Vocabulary Test. The inferential story comprehension scores were not used in subsequent analyses because of low Cronbach's Alpha on this measure.

pretest standardized BPVS scores by condition (see Table 1). Similarly, preliminary *t*-tests showed no pretest differences between condition on any of the three narrative measures (see Table 3).

Posttest BPVS scores, and the length and complexity scores at both pre- and posttest were not normally distributed. Untransformed scores were used in the models, as log and square root transformations did not greatly improve the distributions of these variables (and note that univariate normality of predictors and dependent variables is not assumed in linear mixed models). Residuals were approximately normally distributed.

Plan of analysis

The first hypothesis was that exposure to complex stories (accompanied by extratextual talk including higher levels of challenging, abstract language) would lead to more complex language production during shared reading. Linear Mixed-Effects Models (LMMs) were run to assess whether between-condition differences on each measure of language production were statistically significant, with random intercepts for small group and book titles (thereby accounting for the repeated observations within each small group of children and for differences among book titles within each condition). This hypothesis was tested at the level of small reading group, rather than individual child, and therefore it was not possible to include Age as a continuous predictor. Therefore, we included Class (nursery or reception) as a proxy for age in these analyses. Categorical predictors were deviation coded and continuous variables were mean-centered.

The second hypothesis was that the children in the complex story condition would develop better vocabulary, and narrative skills compared to those in the simple story condition. We also expected that initial language skills would moderate the effect of condition, with the simple condition leading to greater gains for children with lower preexisting language abilities. To address these hypotheses, LMMs were run with Group and School as a random factor (to account for clustering of individual children within small groups and schools). Separate models were run for the three posttest language skills, each including condition as a predictor (simple/complex), the relevant pretest skill as a control variable (e.g., complexity scores at pretest when estimating the effect of condition on posttest complexity scores), and an interaction term of pretest skill and condition. This approach allowed both the main and secondary hypotheses to be tested (i.e., main effects of condition when relevant pretest scores were controlled and interactions between pretest abilities and condition would support the study hypotheses). We also ran these models with Age in months as a predictor and tested possible interactions with Condition (not presented as the same pattern of results was yielded with no

significant interactions with condition). Complexity scores had a Poisson distribution (i.e., scores were derived from counts of the instances of subordination in children's narratives), and thus this dependent variable did not meet the assumptions of the LMM. Therefore, a Generalized Linear Mixed Model (GLMM), which allows modeling under the Poisson distribution, was used to assess the effect of condition on Complexity scores (although note that running this model as an LMM yielded the same pattern of results). Initial models were also run with interaction terms of School by Condition and Class by Condition (and Condition by Age in months) to test whether children responded differently to experimental condition based on school or class (or age). However, these terms were not significant and thus were not retained in the models.

Models were run in R version 3.5.2, using the lme4 package (version 1.1–19; Bates et al., 2015). Pseudo *R* squared estimates are presented for all models, as recommended by Nakagawa and Schielzeth (2013). These were computed using the r.squared GLMM function in the R package MuMIn package (version 1.40.4; Barton, 2018). The (G)LMM estimates for coefficients, *SEs*, and *t/z* values for the fixed effects are reported in Tables 4 and 6. *P*-values were obtained using the anova function of the car package (Fox & Weisberg, 2011). All model residual plots were checked for

Table 4. Descriptive statistics for children's language use by story condition.

	Simple		Complex	
	<i>M</i> (<i>SD</i>)	Range	<i>M</i> (<i>SD</i>)	Range
Subordinate clauses	0.33 (0.69)	0–2	5.73 (4.11)	0–14
<i>Causal</i>	0.28 (0.57)	0–2	4.00 (2.57)	0–8
<i>Conditional</i>	–	–	1.00 (1.13)	0–3
<i>Temporal</i>	0.06 (0.24)	0–1	0.73 (1.94)	0–6
Mental and communication verbs	2.28 (2.37)	0–8	5.73 (3.58)	0–13
<i>Mental</i>	1.94 (2.21)	0–8	5.07 (3.63)	0–13
<i>Communication</i>	0.33 (0.69)	0–2	0.67 (0.90)	0–2
Mean length of utterance	3.44 (0.89)	2.35–6.00	4.75 (1.26)	2.94–7.06
Word tokens	106.17 (36.18)	51–169	188.83 (81.08)	55–309
Word types	60.06 (17.40)	33–97	83.08 (24.88)	33–116

Note. No conditional clauses were produced in any of the sessions in the simple condition.

Table 5. Results of five (G)LMMs testing effects of condition and class on children's language use during shared-book reading.

Variable/Predictor	<i>b</i>	<i>SE</i>	<i>z/t</i>	<i>p</i>
Subordinate clauses				
Condition	2.87	0.60	4.82	<.001
Class	0.94	0.31	3.02	.003
Mental and communication verbs				
Condition	0.89	0.27	3.36	<.001
Class	0.20	0.27	0.73	.468
MLU				
Condition	1.27	0.57	2.25	.025
Class	0.81	0.40	2.02	.043
Word types				
Condition	21.78	10.91	2.00	.086
Class	5.00	10.91	0.46	.661
Word tokens				
Condition	81.22	36.08	2.25	.059
Class	5.78	36.08	0.16	.877

Note. GLMM = Generalized Linear Mixed Model. LMM = Linear Mixed-Effects Model. MLU = Mean Length of Utterance. For models predicting the number of subordinate clauses and the number of mental and communication verbs, *z* values from the GLMMs are presented. Models controlled for Class (nursery/reception) and were fitted with random intercepts for group and book title (i.e., allowing the intercept to vary by group and title). School was not significantly associated with any of the outcomes in initial models and thus was not included as a predictor in these analyses. There were no significant interactions between Condition and Class in subsequent models and so these are not presented.

Table 6. Results of three (G)LMMs predicting children's language skills by condition and initial language skill.

Outcome/predictor	<i>b</i>	<i>SE</i>	<i>t/z</i>	<i>p</i>
Posttest vocabulary				
Intercept	15.42	5.06	3.046	
Pretest vocabulary	0.54	0.12	4.610	< .001
Condition	0.98	9.44	0.104	.952
School	1.470	2.20	0.669	.504
Class	4.76	2.41	1.975	.048
Pretest vocabulary × Condition	-0.02	0.19	-0.118	.906
Posttest length				
Intercept	1.01	1.50	0.674	
Pretest length	0.66	0.15	4.391	< .001
Condition	-3.11	2.51	-1.237	.442
School	0.64	0.74	0.876	.381
Class	1.38	0.75	1.858	.063
Pretest length × Condition	0.46	0.31	1.511	.130
Posttest complexity				
Intercept	-1.50	0.75	-1.993	
Pretest complexity	0.21	0.07	3.219	.001
Condition	-0.52	0.50	-1.044	.296
School	0.06	0.38	0.165	.869
Class	0.96	0.42	2.266	.023
Pretest complexity × Condition	0.23	0.14	1.633	.103

Note. GLMM = Generalized Linear Mixed Model. LMM = Linear Mixed-Effects Model. For the model predicting posttest complexity, the *z* value for the GLMM is presented. Models were fitted with random intercepts for group (i.e., allowing the intercept to vary by group). We also tested for possible interactions between Age in months and Condition in subsequent models (not presented as the same pattern of results was yielded with no significant interactions with Condition, except that Age did not predict posttest complexity whereas Class did).

homoskedasticity, linearity, and the presence of outliers and influential data points (Tabachnick & Fidell, 2012). The final model for each of the posttest skills is summarized below.

Effect of story condition on children's language use

Table 4 shows the descriptive statistics for each of the measures of children's productive language by story condition. Mixed-effects models are summarized in Table 5. Children in the complex story condition as compared to the simple story condition produced significantly more subordinates ($M = 5.73$, $SD = 4.11$ vs. $M = 0.33$, $SD = 0.69$, respectively, $z = 4.82$, $p < .001$) and significantly more mental and communication verbs ($M = 5.73$, $SD = 3.58$ vs. $M = 2.28$, $SD = 2.37$, respectively, $z = 3.36$, $p < .001$), and had longer MLU ($M = 4.75$, $SD = 1.26$ vs. $M = 3.44$, $SD = 0.89$, respectively, $t = 2.25$, $p = .025$). In addition, children produced a greater number of word types and word tokens in the complex story condition, but the effects were non-significant. There was a significant effect of Class on subordinate clauses and on MLU, indicating that children in reception as compared to children in nursery produced significantly more subordinate clauses and had longer MLUs ($z = 3.02$, $p = .003$ and $t = 2.02$, $p = .043$, respectively). By contrast, the effect of Class on mental and communication verbs and word types and tokens was positive but non-significant ($z = 0.73$, $p = .468$). There were no significant interactions of Class and condition on any of the measures and therefore interaction terms were dropped from the models (all $ps > .10$).

Effect of story condition on children's vocabulary skills

This model accounted for approximately 67% of variance in children's posttest vocabulary skills ($R^2 = .67$). As shown in Table 6, Initial vocabulary skills and Class significantly predicted posttest vocabulary skills. Children in reception had better posttest scores than children in nursery when

initial vocabulary scores were controlled. Contrary to the hypotheses, neither condition nor the condition by initial skill interaction was a significant predictor of posttest vocabulary skills.

Effect of story condition on children's narrative length scores

This model accounted for 60% of variance in children's narrative length scores ($R^2 = .60$). As shown in Table 6, Initial length scores and Class significantly predicted posttest vocabulary skills. Children in reception had better posttest scores than children in nursery when initial vocabulary scores were controlled. Contrary to the hypotheses, neither condition nor the condition by initial skill interaction was a significant predictor of posttest length scores.

Effect of story condition on children's narrative complexity scores

This model accounted for 44% of variance in children's narrative complexity scores ($R^2 = .44$). As shown in Table 6, Initial Complexity was the only significant predictor of posttest complexity scores. Contrary to the hypotheses, neither condition nor the condition by initial skill interaction was a significant predictor of posttest complexity scores.

Discussion

Previous research shows that how much parents and teachers engage in abstract talk during shared-book reading with their preschool-age children is positively associated with children's vocabulary and narrative development (e.g., DeTemple, 2001; Dickinson & Porche, 2011; Dickinson & Smith, 1994; Hindman et al., 2008). This study tested whether preschoolers' exposure to simple and complex stories, and their associated extratextual talk, would lead to differences in language production during shared reading and to differential gains in vocabulary and narrative skills. Children were exposed to either simple or complex stories during experimenter-led shared-reading sessions in small groups for a period of six weeks. We hypothesized that children in the complex story condition would produce more complex language during shared-book reading than children in the simple story condition. Indeed, the results showed that children in the complex condition used more complex language, as indexed by longer MLUs and the production of more subordinates and more mental and communication verbs. We also hypothesized that relative to simple stories, complex stories would lead to greater gains in children's vocabulary and narrative skills, and that this effect would be moderated by children's initial skills. Contrary to this hypothesis, the complex story condition did not lead to greater gains in children's vocabulary or narrative skills on the measures used. Similarly, no interactions between initial language skill and condition were observed. We observed strong and consistent effects on children's language production. That is, the complex story condition elicited more complex language use from children, as indexed by their MLU, and by their use of subordinate clauses and mental and communication verbs.

These results suggest that children's opportunities to *practice using complex language* could be an important mechanism in the frequently observed association between caregiver abstract language use and children's later language development. This contributes to the extant literature by providing initial evidence of genre effects on complex language production in a controlled experimental situation. The findings also complement the body of previous research on the role of genre in language use (typically of caregivers) during naturalistic shared-book reading. Although we cannot draw conclusions about the presence of *learning effects* in our study, the types of language we observed children producing in the complex story condition are those needed for participation in primary school classrooms. Crucially, such stories afford the opportunity for abstract extratextual questions from caregivers, which prompt children to practice producing complex constructions. We suggest that abstract extratextual talk used by caregivers encourages children to use more complex structures in response to questions, as they attempt to formulate replies (e.g., adult: why did he do that? Child: he did it

because *he thought he was gone*), and it also exposes children to abstract talk which they may use as a model in their own language use (whether through spontaneous contributions, repetitions, or partial repetitions). These findings also have some important practical implications (see final section). A limitation of our study is that the child language production analyses were conducted at the level of small-reading group, rather than at the level of the individual child. It is possible that some children may have contributed more or used more complex language than others in the small groups. Future research should video-record the small-group interactions so that speech can be ascribed to individual children.

Why were the hypothesized intervention effects on vocabulary and narrative skills not observed at post-test? The first explanation to consider is that exposure to abstract talk during shared reading does not promote preschool-age children's language skills. However, given that the observational and experimental literature overwhelmingly suggests that abstract language is associated with gains in preschool-age children's skills, we believe this explanation is unlikely. Instead, we consider several other possible explanations for our results, since exploring these will be important for our understanding of the role of abstract language in child language development, and for the design of future shared-reading intervention research.

First, our study may have been underpowered due to small sample size. The number of children in each condition was comparable to that of other similar studies; for example, Reese and Cox (1999) compared the effects of three different reading styles on a range of outcomes using a sample of 48 children (i.e., 16 in each condition), and detected significant differences between conditions on a similar range of outcomes after six weeks' exposure. In addition, the differences in language scores between the conditions were so small that even if statistically significant these results would not have educational significance. Thus, we do not think this a very likely explanation. Yet, even so, we cannot rule out that an effect (if present) of the complex story condition on children's language skills might have been difficult to detect due to under-powering in our sample, especially given the fairly wide age range in our sample (3;07 to 4;11 years).

Second, the intervention period was short (six weeks). In their seminal experimental study with a similar sample size, Reese and Cox (1999) detected small-to-moderate significant effects of reading style on children's language outcomes following a similar duration and intensity of exposure. However, a recently published meta-analysis of 54 studies suggests that the overall effects of shared-reading interventions are small, especially when there is an active control group (Noble et al., 2019). Thus longer interventions may be needed to yield larger effects on children's language skills. We think this is a likely outcome: Given the robust effects of the intervention on children's language production in the exploratory analysis, it follows that meaningful effects on language development might be detected after a significantly longer intervention period.

A third potential explanation relates to the outcome measurements used in our study. We measured children's receptive vocabulary and narrative retell skills using two published measures designed to assess children's general abilities in these two areas. More targeted measures of children's vocabulary and narrative skills should be used in future studies, such as a narrative retell of a story that also includes selected target vocabulary from the intervention sessions. Such an approach could capture the possible learning effects in vocabulary and narrative skill, including those indicated by our exploratory analysis (i.e., longer utterances, and increased production of subordinate clauses and mental and communication verbs). Furthermore, a measure of theory of mind would give an indication of how many children had an understanding of the false belief stories, as this may in turn affect their ability to benefit from the complex stories and extratextual talk exposure.

A final consideration concerns the *style* of the extratextual talk used in this experimental study. It could be that the lack of a supportive style (i.e., the experimenter responded minimally to child responses and initiations) contributed to the lack of posttest differences between the two conditions. The degree of responsiveness to children's initiations and responses may play an important role in how much children are likely to benefit from exposure to abstract talk during shared reading. This is especially likely to be the case when sharing complex stories with plots that are

more challenging for children to understand. In line with social-interactionist theory (e.g., Vygotsky, 1978; Wood et al., 1976), a highly responsive and supportive use of abstract language (e.g., scaffolding in line with children's level of understanding as indicated by their responses) could help support children's communication gains arising from abstract extratextual talk about the complex plot. In support of this prediction, previous research in shared-reading shows that children learn new words better from abstract talk when these are encountered *after* concrete talk about the same referents (Blewitt et al., 2009).

Relatively little is known about how abstract talk unfolds during shared reading, but previous observational research on whole-class reading shows that challenging talk such as explanations often occurs in sequences of teacher-child talk (Gosen et al., 2013; Zucker et al., 2010). Such sequences are often characterized by teachers' topic-continuing questions and follow ups that prompt more elaborated responses from children (Gosen et al., 2013). In the present study, the experimenter adhered to scripts and did not provide any motivating or communication feedback on children's contributions. Anecdotally, it was observed that children responded to the experimenter's questions in both conditions (and this was further supported by the exploratory analyses). However, tailored feedback on children's contributions, in the form of follow up questions and comments to create a supportive discussion, may be needed for children to benefit optimally from challenging talk (Beck & McKeown, 2001; Muhinyi & Rowland, 2021). Research is still needed to uncover the most effective ways of scaffolding and supporting children's participation in abstract conversations in small-group shared-reading interventions.

Practical implications for preschool interventions

This study has several clear practical implications for those developing and conducting shared-reading interventions in low-income preschool settings. Our findings demonstrate that a small-group shared-reading intervention, based on repeated readings of complex stories with scripted interactions, was successful in promoting children's production of complex language. Having the opportunity to practice using the kinds of language observed in this study (e.g., mental and communication verbs and causal and hypothetical constructions) is likely to support children's preparedness for formal primary school education. Thus, we encourage those developing and conducting shared-reading interventions in preschool classrooms to select stories that are compatible with the types of scripted interactions we used (e.g., a mixture of abstract and concrete talk, including "why" and "how" questions and explanatory statements); and to embed such scripts into complex stories as a method of increasing children's opportunities for producing complex language. We also encourage the use of follow ups to children's responses, which can provide feedback and modeling, and extend the conversation in meaningful ways (Beck & McKeown, 2001).

Our study also highlights the benefits of probing children's language use during shared-reading sessions, as a complement to more formal measures. One strategy could be to audio-record shared-reading sessions to observe change over time in individual children's language production, using a checklist of target constructions. This would be less time-consuming than conducting detailed transcription and analyses. Probing children's production skills during shared-reading sessions might be a useful and ecologically valid way to capture children's productive knowledge of specific and targeted forms of language.

Finally, the present study highlights a broader need to ensure that preschool-age children have access to a variety of picture books (Lugo-Gil & Tamis LeMonda, 2008; Luo et al., 2019). Book-gifting interventions and other schemes that increase children's access to books are warranted. Access to a variety of picture books, including informational and storybooks and a range of different kinds of books within each of these genres, is important. Specific kinds of stories may not only increase children's exposure to rich and challenging input from the extratextual talk, but can also provide opportunities for children to practice using complex language.

Conclusion

To our knowledge, this study is the first to test whether controlled and repeated exposure to specific kinds of picture-book stories and their associated levels of abstract extratextual talk leads to differential gains in children's language production and skills. We found that children in the complex story condition produced more complex language, as indexed by their mean length of utterance, use of mental and communication verbs, and use of subordinate clauses. However, we found no between-condition differences in children's vocabulary or narrative skills at posttest. Thus, the present study supports the idea that children's exposure to complex stories and their associated extratextual talk (i.e., a greater level of abstraction) might lead to gains in language development. However, it is likely that more targeted outcome measures and longer interventions are needed to demonstrate gains on standardized measures. The present study also provides a proof of concept: A preschool-based intervention based on repeated readings of complex stories with scripted interactions can be used to promote children's production of complex language. Having opportunities to practice using the kinds of complex language observed in this study is likely to benefit children's school readiness as they begin formal primary school education.

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Appendices

Appendix A: Titles of the ten stories used and plot summaries

Simple books (no false-belief theme):

Stop monkeying around (by Christine Swift and Sarah Wade; published in 2015 by Alligator Publishing Ltd) is about a monkey who is bored in the jungle and annoys the other jungle animals until he eventually finds a friend to play together with.

Polar bear paddle (by David Bedford and Karen Sapp; published in 2009 by QED Publishing) is about a polar bear who is unable to swim and eventually learns how to stay afloat.

Clumsy crab (by Ruth Galloway; published in 2016 by Little Tiger Press Ltd) is about a crab who has difficulty finding friends because of his pinchers but then uses them to rescue an octopus from some seaweed.

The bear who loved to dance (by Monika Filipina Trzpił; published in 2015 by Top That Publishing Ltd) is about a bear who isn't very good at dancing but enters an ice-skating competition and wins.

Hoppity skip Little Chick (by Jo Brown; published in 2016 by Little Tigers Press) is about a chick who plays in the farmyard with different animals and then returns home to find that her mum's eggs have hatched.

Complex books (false-belief theme):

Pond goose (Caroline Jane Church; published in 2004 by Oxford University Press) is about a fox who pretends to be a goose so that he can chase the geese on the hillside.

Don't cry Sly Fox (by Henriette Barkow and Richard Johnson; published in 2002 by Mantra Lingua Ltd) is about a chicken who tricks a fox into thinking he is eating chicken instead of vegetables.

Milo's pet egg (by Rebecca Elliott; published in 2010 by Bloomsbury Publishing Plc) is about a lemur who plays with an egg thinking that it is a rock until half way through the story when it hatches.

Look out Suzy Goose (by Petr Horáček; published in 2011 by Walker Books) is about a goose who is being followed through the woods by several animals and does not realize it until the end of the story.

The greedy dog (by Rosie Dickins; published in 2015 by Usborne Publishing Ltd) is about a dog who thinks he sees another dog and bone in a puddle, but actually it is his own reflection.

Appendix B: Examples of children's language use in the complex condition

*CHI: **I don't know if it's a good idea (be)cause if it falls it will break.**

*CHI: <and and> [/] and the egg will die.

*CHI: I'm gonna eat both of them.

*CHI: **if the fox eat Suzy_goose**, the wolf will eat the fox.

*CHI: and it's not going to work.

*CHI: and it's not going to work **(be)cause if they turn white it is gonna work.**

*CHI: and the snow (i)s xxx down.

*CHI: it's just his reflection.

*CHI: and <it> [/] **if that (wa)s just a bone it would go down .**

*CHI: he might fall into a river.

*CHI: but **if someone was there <like that> [/] lying down like that then they could have saved it if they was in the river.**

*CHI: so the fox doesn't see them.

*CHI: **well he can see him (be)cause he's a goose .**

*CHI: Pond_goose!

*CHI: upset. *CHI: he **knows** it's a crocodile in a crocodile+sitter.

*CHI: sad. *CHI: I **think** he'll be a bit &-er shocked.

*CHI: it's a egg.

*CHI: <I think the> [/] I **think** there's a croc inside it.

*CHI: yeh.

*CHI: no. *CHI: because he **thinks** it's dead heavy and can't lift it off the ground.

* CHI: **when they get dirty and the fox is chasing them again &-um the fox will see the other ones again.**

*CHI: &um (bec)ause they wanna get all dirty **so when they blend into the shadows the fox can't see them.**

*CHI: and Pond_goose **when it starts to snow he's scrubbing washing and he's clean.**

*CHI: and then **when the snow comes down he's gonna get the same colour again.**

Appendix C: Wordlist examples

Examples of mental verbs (referring to acts of thinking): *Think*

Know

Believe

Imagine

Feel

Forget

Examples of communication verbs (referring to acts of speaking): *Say*

Tell

Speak

Shout

Answer

Reply