

**The effect of prompts on the shared reading interactions of parents and children
with Down syndrome**

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This study examined the effect of prompts on the shared reading interactions of parents and young children with Down syndrome. Eight parents and their children with Down syndrome (aged 4 years, 7 months to 6 years, 9 months) were recorded reading two books together, one of which included 12 question prompts which parents were instructed to ask their child during reading. Though there was considerable variability, parents and children engaged in significantly more extra-textual talk when reading books with embedded prompts than during typical reading. In addition, children showed greater participation, and produced significantly more words and a greater range of words, when reading books with embedded prompts. Prompts had no effect on the complexity of child language. Embedded prompts significantly enhanced the interactions that occurred between parents and young children with Down syndrome during shared book reading and created more opportunities for parents to support their child's language development. Though further studies are needed, the findings reported here have potentially important implications for the development of shared reading interventions to support language development in young children with Down syndrome.

Keywords: Down syndrome, shared reading, parent-child interactions, language development

The effect of prompts on the shared reading interactions of parents and children
with Down syndrome

Down syndrome (DS) is the most common genetic cause of intellectual disability, affecting an estimated one in 792 live births (de Graaf, Buckley & Stotko, 2015). There is considerable variability in the degree of cognitive disability with IQs that range from 30 to 70 (Chapman, 1999). Though abilities vary widely, most individuals with DS demonstrate significant and broad delays in all language domains, with particular deficits in grammar and expressive vocabulary (Abbeduto, Warren & Connors, 2007; Chapman, 1997; Laws & Bishop, 2004; Næss, Lyster, Hulme, & Melby-Lervåg, 2011). Impaired speech intelligibility is also common in DS (Eggers & van Eerdenbrugh, 2018; Kent & Vorperian, 2013). Speech and language delays emerge at an early age and place constraints on subsequent learning and development including literacy acquisition (e.g. Burgoyne, Duff, Clarke, Buckley, Snowling & Hulme, 2012; Hulme, Goetz, Brigstocke, Nash, Lervag & Snowling, 2012). Moreover, speech and language difficulties are arguably the greatest barrier to achieving independence and inclusion in the community (Chapman & Hesketh, 2000). Finding strategies to support early language development for children with DS is therefore of critical importance.

It is well established that variations in parent-child interactions, including the frequency and quality of parental linguistic input, play a significant role in children's language development (see Roberts & Kaiser, 2011). Transactional models of development (e.g. Sameroff, 2009) emphasise the role that both the child and the adult play in shaping the qualities of these interactions. In line with this view, the presence of a language delay is likely to influence the nature of parent-child interaction. Children who have limited spoken language skills may be less likely to initiate communicative interaction and/or respond to requests. In turn, parents may reduce the complexity of their linguistic input and the use of language learning strategies to limit the linguistic demands on the child (e.g. Crowe, 2000;

Venker, Bolt, Meyer, Sindberg, Weismer & Tager-Flusberg, 2015; Venuti, de Falco, Esposito, Zaninelli, & Bornstein, 2012). Opportunities for parent-child interaction, and for parents to respond to and expand children's language, may then be less frequent. Strategies that target parent-child interactions to facilitate reciprocal interaction and encourage children's participation may therefore play an important role in early language intervention (Roberts & Kaiser, 2011; Rondal & Buckley, 2003; Venuti et al., 2012).

This study examines the interactions that occur between parents and children with DS during shared book reading. Sharing books is a natural and meaningful sociocultural activity (Vygotsky, 1978) that promotes important foundations for language learning such as joint attention and interest (Tomasello & Farrar, 1986). As such, shared reading activities provide an ideal environment for fostering language development (see e.g. Reece, Sparks & Leyva, 2010). Recent studies show that parents use more semantically and syntactically rich language during shared reading than in non-book reading interactions (Demir-Lira, Applebaum, Goldin-Meadow, & Levine, 2019; Noble, Cameron-Faulkner, & Lieven, 2018). Although only small effects of shared book reading on children's language are reported in a recent meta-analysis (Noble, Sala, Peter, Lingwood, Rowland, Gobet, & Pine, 2019), a range of factors enhance its effects. Whilst the frequency of book sharing is an important predictor of vocabulary development (Bus, van Ijzendoorn, & Pellegrini, 1995), the quality of the interaction that takes place between the adult and the child during shared book reading drives language growth (e.g. Mol, Bus, de Jong, & Smeets, 2008). Shared book reading is most effective when parents encourage the child to actively participate in verbal interaction during reading (Huebner & Meltzoff, 2005). A number of studies demonstrate that parents' use of strategies (e.g. asking questions during reading) which encourage the child to engage in extra-textual talk during shared reading leads to significant gains in children's language and literacy skills (see e.g. Bierman, Welsh, Heinrichs, Nix, & Mathis, 2015; Burgoyne, Gardner,

Whiteley, Snowling, & Hulme, 2018; Mol et al., 2008). Though based on a smaller number of studies, these strategies also appear to increase verbal participation for children with language delays (e.g. Crain-Thorson & Dale, 1999; Crowe, Norris, & Hoffman, 2004).

Previous research has identified a range of open-ended questions which adults can use to effectively encourage greater communication during shared reading (see What Works Clearinghouse, 2007). These include ‘wh- questions’ (e.g., Who is this? What is she doing?); sentence completion prompts (e.g., You cant catch me Im the.....(gingerbread man)); and distancing prompts where the adult supports the child to make links between the storybook and the child’s experiences (e.g., What do we take to the beach?). Question prompts can also be categorised as literal or inferential. Literal questions tap information that is present in the picture or the story, where inferential questions ask children to go beyond the immediate context and reason about feelings, causal events, and word meanings (van Kleeck, Vander Woude, & Hammett, 2006). Inferential questions are more challenging as they decontextualize the talk; nonetheless they are considered to extend children’s abstract thinking and encourage more complex language and have been shown to facilitate the language development of pre-school age children (e.g., van Kleeck et al., 2006).

Shared book reading as a context for supporting language development aligns well with several features of the DS phenotype. Storybooks provide a concrete, visual support for learning which plays to the relative strengths in visuo-spatial memory and supports verbal short-term memory difficulties that are common in individuals with DS (e.g. Jarrold, Baddeley & Phillips, 1999). Books can be revisited multiple times providing opportunities for repetition and thereby supporting generalisation and consolidation of learning (Chapman, Sindberg, Bridge, Gigstead, & Hesketh, 2006). In addition, children with DS are motivated by social interaction (Fidler, 2006). Thus, shared book reading is a promising context for promoting language development in DS (Jordan, Miller, & Riley, 2011).

Parent surveys suggest that shared book reading is a regular feature of the home learning environment for many children with DS, and that children generally have positive attitudes to books and to reading (Al Otaiba et al., 2009; Ricci, 2011; van Bysterveldt, Gillon, & Moran, 2006; van Bysterveldt, Gillon, & Foster-Cohen, 2010a). However, like other children with delayed language skills (Crowe, 2000) children with DS are likely to take a passive role during shared reading activities and are less likely to participate verbally (van Bysterveldt et al., 2010a). In turn, adults are likely to assume a directive role and limit the linguistic demands on their child: For example, they may focus on reading the text, pointing to and commenting on pictures, and use few questions focusing on those which can be answered using a non-verbal or yes/no response (Crowe, 2000; Trenholm & Mirenda, 2006). Findings ways to support parents of young children with DS to use strategies that facilitate children's active participation during shared book reading may therefore be particularly useful (van Bysterveldt et al., 2010a).

Beyond parent surveys, there are very few studies that have examined shared book reading in DS and much of this work has been observational (e.g. Miles & Chapman, 2002; Engevik, Næss, & Hagtvet, 2016). However, two previous studies conducted by van Bysterveldt and colleagues, suggest that parent-child shared book reading may be an effective intervention context for young children with DS. In these studies, parents were trained to use shared book reading to support the development of their pre-school child's letter knowledge, phonological awareness (van Bysterveldt et al., 2006) and speech articulation (van Bysterveldt et al., 2010b). Shared book reading was only one component of intervention (integrated with therapy delivered by a speech and language therapist and computer-based support) which makes it impossible to determine the specific effects of book reading interactions in these studies. Nonetheless, these studies suggest that targeting parent-child

interactions in the context of shared book reading can enhance cognitive development in children with DS.

In this study we evaluated the effect of a simple experimental manipulation on the interactions that occur between parents and young children with DS during shared book reading. Parents were asked to read two books with their child, one of which had been modified to include a series of 12 question prompts which parents asked their child during reading. We examined the extent to which embedded question prompts facilitated the child's active participation in the shared reading interaction. We predicted that parents and children would engage in more extra textual talk, and that children would participate more and produce more language, when reading the book with embedded prompts than when reading the unmodified storybook.

Method

Participants

Eight children with DS (four females, four males) and their parents were recruited through regional DS parent support groups in two UK locations: North-West (Greater Manchester) and South-East (Hampshire). We recruited children aged between 4 and 6 years. This age group was selected as we reasoned that parents and children would still be likely to read books together at this age and children would be likely to have measurable expressive language skills. Participating children ranged in age from 4 years, 7 months to 6 years, 9 months (mean age 5 years, 4 months). Families could choose whether the mother or the father read the books with their child: in all parent-child dyads the participating parent was the child's mother. Ethical approval for the study was provided by the [university name] Research Ethics Committee (4760/001).

Materials and Procedure

Two storybooks were used in this study: *Mooncake* (Asch, 1987) and *Skyfire* (Asch, 1990). These books were chosen as they have been used effectively in previous studies of scripted shared book reading with young children with language impairment (van Kleeck et al., 2006). The books are similar in length, sentence complexity, and theme and include detailed and engaging pictures which provide opportunities for discussion. Twelve prompts were developed for each book, targeting a) Picture labelling (*What is that?*); b) Vocabulary (e.g. *What does 'chirped' mean?*); c) Linking text to general knowledge (*What else has wings and can fly?*); and d) Inferencing (*Why did Bear fall asleep?*). Picture labelling prompts correspond to literal language as they refer to information that is perceptually present and are therefore less cognitively challenging (van Kleeck et al., 2006). In contrast, the other forms of question each require information that is not directly available in the perceptual scene and therefore correspond to inferential language. Though we expected the inferential questions to be difficult, recent work demonstrates that children with DS are able to draw inferences when supported to do so by teachers during shared reading interactions (Engevik et al., 2016).

The prompts were embedded in the books at the point at which the prompt would be given and were evenly spread across the book. To embed the prompts, the books were scanned and prompts typed onto the relevant pages in a different colour and font to distinguish them from the text. The pages were then reprinted and bound in the format of the original book. Thus, the only difference between the original and modified books was the inclusion of the prompts in the modified book.

Data collection took place in the children's homes at a time convenient to the family. Parents were asked to read two books (*Mooncake* and *Skyfire*) with their child. Parents were given one book in its original form to illustrate typical shared reading practice (typical condition); this book was always read first. The second book was given in its modified form

to evaluate the effect of embedding prompts (prompted condition). Allocation of the two versions of the books was counterbalanced across families.

Parents were asked to read the books with their child as they normally would do. In the prompted condition, parents were asked to include the embedded prompts as they read the book with their child. Parents and children were video-recorded during each book reading i.e. 2 recordings per parent-child dyad (16 recordings in total). A digital camera was situated on a tripod placed in front of the parent and child. The researcher remained present to observe the interaction and operate the camera but was otherwise not involved in the shared reading interaction. Recording started when parents began reading and ended when the book and/or conversation about the book ended. No restrictions were placed on the duration of the interaction.

Parents were also asked to complete a short questionnaire consisting of 15 multiple choice and Likert-scale questions regarding shared book reading practices in the home (e.g. How often do you and your child read books together?; On a scale of 1 (does not enjoy) to 7 (really enjoys) how much does your child enjoy reading books with you?).

Transcription and coding: For each of the 16 recordings of parent-child shared reading interactions, verbatim transcripts were made of all maternal and child language using Systematic Analysis of Language Transcripts (SALT), a specialised software for transcribing and analysing language samples (Miller & Iglesias, 2012). All parent and child spoken language was divided into utterances. Each utterance was placed on a separate line in the transcription. Unintelligible words were recorded as [X] in the transcript: The proportion of unintelligible words ranged between 0 and 35.09% on transcripts of typical reading sessions (mean = 10.13%) and between 0% and 55.55% on transcripts of prompted reading sessions (mean = 13.67%). Transcripts were then compared with the video recordings by a second transcriber and any necessary corrections were made. A third researcher then checked these

transcripts, and analysed the speech signals using version 2.0.5 of Audacity® recording and editing software (Audacity Team, 2014). This provided precise onset and end timings for each utterance and for the pauses between utterances.

Each parent and child utterance was coded to differentiate between four broad categories of talk that occurred during shared reading: text reading, management talk, off-topic talk, and extra-textual talk. Text reading utterances were any parent or child utterances which corresponded to verbatim (or near verbatim) reading of the text. Management talk described any utterances that were related to managing the shared reading session including behavior management (e.g., “Can you sit down?”) and book handling instructions (e.g., “Turn the page”). Other utterances which were unrelated to the content of the story or to an interaction based on the story was coded as off topic talk (e.g., “Ignore the helicopter” (in response to noise coming from outside)). There were very few utterances coded as off-topic talk (14 child utterances and 16 parent utterances in total). As such, management talk and off topic talk were collapsed into one category. All parent and child utterances that reflected talking about the story, including questions (e.g., “What is he doing?”), comments (e.g., “He is running”) and responses (e.g., “Butterfly, good boy”) were coded as extra-textual talk. Codes were used to calculate the amount of time spent on each type of talk within each shared reading session.

In order to measure changes in children’s language production in the context of shared reading, each transcript was analyzed using the Computerized Language Analysis Program (CLAN; MacWhinney, 1995) to calculate total number of parent and child utterances, total number of words spoken by the child, mean length of utterance (in words; MLU) and number of different words spoken by the child during the shared reading interaction. We were also interested in exploring children’s relative participation in the shared reading sessions. The ratio of parent:child participation was calculated by dividing the

number of child utterances by the total number of utterances (sum of parent and child utterances) as in Crain-Thoreson & Dale (1999): A ratio of .50, reflects equal participation in the shared book reading session.

Reliability of coding: A sample of 44% of the transcribed data, in the form of entire transcripts, was selected for second-coding by a researcher independent to the study to ensure reliability. To err on the side of caution, entire transcripts which were thought to contain potential coding difficulties were chosen for second-coding rather than randomly selected sections of transcripts. This was to ensure that reliability of coding would be maximal. A high proportion of data was second-coded to ensure all categories of coding were represented. Agreement was measured using Cohen's kappa statistic (κ). Inter-rater reliability was high, $\kappa = .75$ (95%CI, .678 to .811), $p < .001$. In cases of disagreement, consensus was achieved through discussion.

Results

In this section we first present the data from the parent questionnaire as this provides some background context for the results from the shared reading interactions. Next, individual and group data from the shared reading interactions is presented. A series of (one-tailed) paired samples t-tests were performed on the main variables of interest in order to evaluate differences between the two shared reading conditions. We used one-tailed tests because we predicted *a priori* that the condition with embedded prompts would result in superior outcomes.

Parental Questionnaire

Parents reported reading to their child daily ($N=2$) or several times a day ($N=6$). Shared reading sessions typically lasted between ten and twenty minutes ($N=6$), or between twenty and thirty minutes ($N=2$). Parents rated their child's enjoyment of shared reading ($Mean = 6.50$, $SD = 0.76$) and their own enjoyment of shared reading as high ($Mean = 5.88$,

SD = 1.25; on a scale of 1 (does not enjoy) to 7 (really enjoys)). Difficulties which were perceived to affect book reading included difficulties with attention ($N=4$), hearing ($N=2$) and interest ($N=1$). No parent reported that difficulties with motor skills or vision affected shared reading experiences. Additional features of shared reading noted by parents were 1) the child's preference to re-read the same limited number of books over new books ($N=2$); 2) the child's preference to read alone rather than share books with the parent ($N=1$); and 3) difficulties managing shared reading sessions with more than one child ($N=2$).

Parents were asked to rate how much they focused on particular learning targets during shared reading with their child by ranking targets from 1 (most focus) to 5 (least focus). Enjoyment was the primary focus for all parents ($Mean = 1.00$, $SD=0.00$). This was followed by teaching the child to recognise words ($Mean = 2.75$, $SD=0.46$). Teaching children book concepts ($Mean=3.75$, $SD=1.67$) and talking about the meaning of the story ($Mean = 3.88$, $SD=1.36$) were ranked similarly. Teaching the meaning of new words was given the lowest ranking ($Mean = 4.25$, $SD=0.71$).

The shared reading session recorded for the study was rated as representative of a typical shared reading session ($Mean = 5.25$, $SD = 1.49$; where 7 = very like a typical shared reading session) though some particular differences were noted. Unusual features of the recorded session that were noted by parents included the opportunity for 1:1 interaction ($N=3$), the presence of the camera which was perceived to affect the child's participation ($N=1$), reading of a book with which the child was unfamiliar ($N=1$), and the child being able to maintain concentration ($N=1$). Parents reported that the books used in the study were fairly similar to those they usually read with their child ($Mean = 4.38$; $SD = 1.41$).

Shared reading interactions

First we examined the duration of the shared reading sessions (total time) and the amount of time spent on each type of talk (reading, management talk and extra-textual talk)

(see Table 1). For reading time, management time, and extra-textual time we calculated a proportional score to express the amount of time spent on each type of talk as a percentage of the total duration of the shared reading session; these scores are therefore reported as percentage scores. As can be seen in Table 1 the total duration of the shared reading sessions, and the relative amounts of time spent on each type of talk, vary widely across the dyads. For the majority of the dyads ($N=5$), shared reading sessions are longer in the prompted condition than in the typical reading condition, though the extent of this difference varied widely. For all but one dyad (dyad 6), the relative amount of time spent on extra-textual talk increased in the prompted condition relative to the typical reading condition though again there was considerable variability: differences in relative proportion of time spent on extra-textual talk ranged between -18.45 (dyad 6) and 44.39 (dyad 2). We examined whether the proportion of extra-textual talk differed between the two conditions using a (one-tailed) paired-samples t-test performed on the mean scores in each condition. As a group, just under a third of the typical shared reading session focused on extra-textual talk (28.26%) which increased to just under half of the session in the prompted condition (44.45%); a difference which was significant ($t(7) = -2.47, p = .022, d = .87$).

Next we examined the scores on the measures of child language in the two shared reading conditions (see Table 2). As can be seen in Table 2, most of the children produced more language (i.e. a greater number of utterances and words) and a greater range of language (i.e. higher number of different words) in the prompted condition relative to the typical reading condition. Relative participation also increased for most children ($N=6$), though the extent of the difference between conditions varied widely (between -.02 and .27). In contrast, there was very little difference in children's MLU between the conditions. A series of (one-tailed) paired samples t-tests showed that, as a group, children produced significantly more utterances ($t(7) = -2.59, p = .018, d = .92$) and a significantly greater

number of total words ($t(7) = -2.42, p = .023, d = .86$) and different words ($t(7) = -2.60, p = .018, d = .92$) in the prompted condition than in the typical reading condition. Children's relative participation in the session also increased significantly in the prompted condition ($t(7) = -2.34, p = .026, d = .83$). There were no significant differences in MLU ($t(7) = -0.43, p = 0.34, d = .15$).

Discussion

This study examined the effect of prompts on the shared reading interactions of parents and young children with DS. Specifically, we examined whether embedding prompts in storybooks facilitated reciprocal interactions and higher levels of child participation and language production during parent-child shared reading. The data showed considerable variability between the eight parent-child dyads. As a group, parents and children spent a significantly greater proportion of the shared reading session engaging in extra-textual talk when they read the book with embedded prompts than when the book did not include embedded prompts. The book with embedded prompts also led to increased levels of child participation in the shared reading interaction: Children produced more language, and the language they produced was more diverse, when reading the book with embedded prompts. Prompts had no effect, however, on the complexity of language that children produced (MLU in words).

The findings from this study suggest that supporting parents of young children with DS to ask their child questions about the story during shared book reading activities promotes extra textual talk and the child's active participation. A large number of studies demonstrate that enhancing adult-child shared reading interactions in this way leads to significant gains in language and literacy for typically developing children and children with language impairment (see e.g. Bierman et al., 2015; Burgoyne et al., 2017; Crain-Thorson & Dale, 1999; Crowe et al., 2004; Mol et al., 2008). To our knowledge, the effect of this form of

intervention on the language skills of children with DS has yet to be empirically evaluated. Our data suggest that it is possible to enhance the shared reading interactions of parents and children with DS with an experimental manipulation that is relatively simple and easy to implement. Further research is needed to establish whether the changes in interaction that are observed here lead to significant growth in children's language abilities. We believe that it is reasonable to speculate that they might.

It is important to note that there were considerable individual differences and these have important implications for supporting individual families to enhance their shared reading interactions. First, the nature of shared reading interactions when reading unmodified books (i.e. typical reading condition) differed widely across participants. For example, dyads 3 and 4 spent more than one third of the interaction engaged in extra-textual talk when reading the unmodified book. Thus, extra-textual talk is not necessarily an unusual feature of the interactions that occur between parents and young children with DS during shared reading. Endorsement of good practice would be valuable where it already exists and it may be possible to enhance this practice further: the prompted book led to an increase in extra-textual talk even when this occurred naturally. Parents who do not use, or infrequently engage in extra-textual talk, may benefit from encouragement and support to do so.

Second, though the embedded prompts encouraged more extra-textual talk and more child language on average, this was not the case for all dyads. Dyad 6, for example, spent less time engaging in extra-textual talk, and the child participated less and produced less language, when reading the book with embedded prompts. It is worth noting that this child was the youngest in the sample (by 3 months), and that, across the sample, this dyad spent the highest proportion of the shared reading sessions on management talk (22.53% in the typical reading condition and 37.98% in the prompted condition). This child may have been at a developmental level which required additional support to maintain attention and behaviour

during the shared reading interactions. Given that the prompted book was always read after the unmodified book, attentional difficulties were more likely to impact on interactions in the prompted condition. That difficulties maintaining attention may impact on shared reading interactions was also highlighted in responses to the parent questionnaire. The implication of this is that some parents would potentially need additional support and guidance to effectively manage their child's attention and behaviour during shared reading interactions as noted elsewhere (Jordan et al., 2011).

On a related note, two parents informally commented that some of the embedded questions were too challenging for their child and expressed concern that this was potentially demotivating. DS is associated with sensitivity to failure and avoidance of challenging tasks (Fidler & Nadel, 2007) and it is important to ensure that tasks are tailored to the appropriate level for individual children's abilities. Nonetheless, questions which are more cognitively challenging provide important opportunities for adults to model, scaffold and extend children's language development (Engevik et al., 2016). Thus, rather than reducing linguistic expectations, parents should be supported to develop their child's language by focusing interactions within the child's *zone of proximal development* (Vygotsky, 1978): engaging children in talk, and referring to ideas which are more complex than children would necessarily produce or comprehend alone but not beyond their capabilities when supported. The implication here is that training should support parents to use a range of questions that vary the cognitive and linguistic demands they place on the child, and to use strategies which support the child to answer more complex questions than they are able to answer independently.

In line with earlier research (Al Otaiba et al., 2009; Ricci, 2011; van Byserveldt et al., 2006; 2010a) responses to the parent questionnaire indicated that parents and children with DS frequently read books together and that this is an enjoyable activity for both participants.

The questionnaire data also suggested that, when reading books with their child, parents focus on teaching their child to read words and understand book concepts; talking about the meaning of the story and new vocabulary appears to be receive relatively less attention. Teaching children with DS to read from an early age is an important element of early intervention but good practice should also incorporate meaning-making activities such as teaching children new words (see e.g. Burgoyne, Baxter, & Buckley, 2014). Shared book reading is potentially one important context in which parents can support this. Supporting parents to recognise the value of shared reading interactions for promoting language learning and comprehension may be an important first step in enhancing adult-child interactions.

There are important limitations to the current study which should be noted here. The sample is small though it is comparable to other studies of shared reading in children with DS (e.g. $N=7$; Engevik et al., 2016; van Bysterveldt et al., 2006; $N=10$; van Bysterveldt et al., 2010b) and children with language impairment (e.g. $N=6$; Crowe et al., 2004). A larger sample size, coupled with detailed background information about the participants including language and/or non-verbal cognitive abilities (as measured by standardised assessments) would be useful in order to make claims about the generalisability of the findings. Furthermore, the findings illustrate only two examples of shared reading interactions per dyad, and whilst these were recorded in the child's home environment and were rated as similar to typical shared reading sessions, the presence of the researcher and the camera may have influenced the nature of the interaction. Less overt ways of capturing the nature of parent-child interactions, and recording multiple shared reading interactions, would be useful.

In line with other studies (e.g., Isbell, Sobol, Lindauer, & Lowrance et al., 2004; McGinty, Justice, Zucker, Gosse, & Skibbe, 2012), we used mean length of utterance (MLU) as an indicator of the syntactic complexity of children's speech. It is important to note that the embedded prompts had no effect on the complexity of child language when measured in

this way. This is consistent with findings from research with children with language impairment (McGinty et al., 2012) and is likely to reflect the persistence of grammatical impairments in this group and in children with DS (Abbeduto et al., 2007; Chapman, 1997; Laws & Bishop, 2004; Næss et al., 2011). Alternative forms of specific and targeted intervention such as that reported by Baxter, Hulme, Rees, and Perovic (2019) are clearly necessary to support grammatical development. However, MLU does not indicate the *content* of speech; that is, whether an utterance is literal, inferential, or reflective of more abstract thinking. Future work could usefully include additional qualitative coding of language content to reflect these different levels of comprehension to determine whether or not they are affected by embedded prompts.

Notwithstanding these limitations, the results of this study suggest that the interactions that occur between parents and young children with DS during shared reading can be enhanced in ways which are associated with gains in young children's language development. This warrants further research attention to evaluate the effects of training parents of young children with DS to use strategies such as asking questions during shared reading interactions on language development. We believe that such training may be an important way in which parents can support the early language skills of children with DS, and indeed for other children at a similar developmental level. Further research is needed to empirically evaluate this.

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Table 1. Duration of shared reading interactions (in seconds) and relative proportion of time spent on each type of talk by condition

| | Typical reading | | | | Prompted reading | | | |
|------------------|----------------------------|--------------------------|---------------------|----------------------|----------------------------|----------------------|----------------------|----------------------|
| Dyad | Total Time (secs) | %Reading Time | %Management Time | %Extra-Text Time | Total Time (secs) | %Reading Time | %Management Time | %Extra-Text Time |
| 1 | 208.79 | 50.14 | 17.97 | 31.89 | 398.94 | 54.18 | 7.96 | 37.86 |
| 2 | 358.55 | 72.77 | 10.62 | 16.61 | 476.50 | 33.07 | 5.93 | 61.00 |
| 3 | 776.79 | 50.36 | 9.77 | 39.87 | 682.46 | 31.59 | 3.14 | 65.27 |
| 4 | 397.03 | 38.98 | 18.11 | 42.91 | 981.06 | 30.21 | 16.50 | 53.29 |
| 5 | 242.23 | 54.30 | 14.25 | 31.45 | 594.89 | 47.65 | 5.54 | 46.81 |
| 6 | 509.16 | 49.45 | 22.53 | 28.02 | 261.74 | 52.46 | 37.98 | 9.57 |
| 7 | 1027.28 | 75.51 | 8.47 | 16.02 | 823.60 | 35.50 | 18.48 | 46.02 |
| 8 | 170.68 | 80.26 | 0.42 | 19.32 | 424.59 | 63.18 | 1.03 | 35.79 |
| Mean (SD) | 461.31 (300.73) | 58.97 (15.03) | 12.77 (6.95) | 28.26 (10.27) | 580.47 (239.00) | 43.48 (12.48) | 12.07 (12.13) | 44.45 (17.44) |

Table 2. Scores on child language measures by condition

| Participant | Typical reading | | | | | Prompted reading | | | | |
|------------------|--------------------------------|--------------------------------|------------------------------|--------------------------------|------------------------|--------------------------------|---------------------------------|------------------------------|--------------------------------|------------------------|
| | Utterances | Words | MLU | Different Words | Relative Participation | Utterances | Words | MLU | Different Words | Relative Participation |
| 1 | 26 | 38 | 1.46 | 21 | .29 | 45 | 57 | 1.27 | 34 | .31 |
| 2 | 27 | 50 | 1.85 | 32 | .43 | 80 | 120 | 1.50 | 64 | .49 |
| 3 | 76 | 94 | 1.24 | 49 | .37 | 69 | 82 | 1.19 | 36 | .45 |
| 4 | 37 | 53 | 1.43 | 24 | .31 | 150 | 240 | 1.60 | 66 | .43 |
| 5 | 17 | 18 | 1.06 | 14 | .26 | 70 | 80 | 1.14 | 46 | .37 |
| 6 | 35 | 57 | 1.63 | 23 | .27 | 23 | 36 | 1.57 | 11 | .25 |
| 7 | 46 | 109 | 2.37 | 53 | .47 | 89 | 220 | 2.47 | 90 | .45 |
| 8 | 1 | 1 | 1.00 | 1 | .09 | 30 | 50 | 1.67 | 30 | .36 |
| Mean (SD) | 33.13 (22.05) | 52.50 (35.84) | 1.51 (0.45) | 27.13 (17.28) | 0.31 (0.12) | 69.50 (40.17) | 110.63 (78.07) | 1.55 (0.42) | 47.13 (25.00) | 0.39 (0.08) |