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# Comparing parent-child interaction during wordless book reading, print book reading and imaginative play

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## Abstract

This study investigated differences in adult-child language interactions when parents and their three-to-four-year old children engage in wordless book reading, text-and-picture book reading and a small-world toy play activity. Twenty-two parents recorded themselves completing each activity at home with their child. Parent input was compared across contexts, focusing on interactive and conceptual domains: use of open prompts, expansions or extensions of children's utterances, and use of decontextualised (abstract) language. Use of linguistic expansions was greater during book reading than toy play. Parents used open questions and added contingent conceptual information more often when reading wordless books than in both other conditions. Findings suggest that wordless books may combine the benefits of open-endedness and linguistic content based around a narrative. Parents' use of abstract language also varied by condition. This study extends understanding of the role of activity context in shaping children's language learning environments.

**Keywords:** oral language; wordless books; parent-child interaction; abstract language; activity contexts

## Introduction

Early language provides a critical foundation for academic and socio-emotional development. Preschool language skills predict cross-domain performance on entering school (Morgan et al. 2015) and children's language at school entry is one of the strongest predictors of academic achievement at the end of primary school (Pace et al., 2019). Children with poor language at age five are twice as likely to be unemployed in later life than children with typically developing skills (Law et al., 2009). Early language also predicts psychosocial and mental health outcomes in adulthood (Schoon et al., 2010). Yet many children do not meet expected levels of language at school entry, with variation in the linguistic input provided by parents understood to be a key explanatory factor (Rowe, 2012).

It is well documented that specific interactive contexts shape parent-child communication in different ways, with shared book reading and play the most frequently studied,

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due to their common use at home (Hoff, 2006; Holme et al., 2022). For example, parents have been found to ask more *wh*-questions and use more diverse vocabulary during reading than toy play (Salo et al., 2016). Books also offer rich potential for conceptual language due to their symbolic nature, as well as opportunities for discussion and inference about characters and plot (Ziv et al., 2013). As a result, book sharing is a frequent component of parent-delivered early language interventions, such as dialogic reading programmes which support adult-child conversation based on shared texts. Evaluations of such programmes demonstrate significant improvements in young children's expressive and receptive language skills (Dowdall et al., 2019).

While most shared reading interventions use traditional text-and-picture books, wordless picture books are emerging as an additional means of facilitating high-quality adult-child interactions. Wordless books are more unstructured and open-ended than traditional books due to the absence of a set text to read, and early studies suggest they may elicit more interactive adult-child conversations and child contributions (e.g., Petrie et al., 2023). Since the story is more open to interpretation, they also offer more opportunity for inference and other cognitively-challenging talk (e.g., Chaparro-Moreno et al., 2017). A small number of intervention studies have shown benefits for child language outcomes through use of wordless books (e.g., Grolig et al., 2020). However, not enough is known about how they compare with text-and-picture books in eliciting parent language input. Similarly, although many studies have compared text-and-picture book reading with play, equivalent comparisons have not been drawn between wordless books and play.

The goal of the current study was to investigate the linguistic input naturally provided by parents when sharing a wordless book with their preschool child, compared with text-and-picture book reading and a toy play activity. Greater insight into the ways in which interaction quality differs between these contexts will support our understanding of how wordless books influence parent-child interaction, and the mechanisms through which this occurs. It will also provide practical information to guide the development of parent intervention programmes, and the ways in which parent-child activities might be combined to elicit different types of adult language input.

### *Adult input quality*

Research to date indicates that wordless books may elicit higher quality language-supporting interactions than text-and-picture books for some domains of adult input. In particular, studies suggest promise in encouraging parents to use interactive and responsive strategies which promote child communication; and that patterns of conceptual (decontextualised) talk may differ when sharing wordless and traditional picture books. Before summarising this literature, we consider the importance of interactive and conceptual adult input in shaping children's oral language development.

In line with social interactionist theories of language acquisition (Chapman, 2000; Vygotsky, 1962), research shows that young children learn from interactions which are socially contingent, and which engage them in back-and-fore conversational exchanges (Romeo, Leonard et al., 2018). Parents' use of prompts – particularly questions – to elicit communication is associated with increased language skills in young children (Hoff-Ginsberg, 1985, 1986; Levickis et al., 2014; Rowe et al., 2017). Open-ended prompts, which allow for an extended response and more than one possible answer, may be particularly beneficial (Cabell et al., 2015; Mascareño et al., 2017). Research shows that

they encourage children to use longer phrases and make more narrative contributions than closed questions (de Rivera et al., 2005; Kuchirko et al., 2016; Lee & Kinzie, 2012), which typically have one pre-determined response and can be answered with only a few words.

As well as allowing children to rehearse language, prompts offer opportunities for children to receive feedback on their contributions within the socially meaningful context of a conversation (de Rivera et al., 2005; Tompkins et al., 2017). For example, adults may contingently EXPAND (recast<sup>1</sup>) a child's language by repeating some or all of their words and adding new information, while retaining the basic meaning expressed by the child. This additional information could be linguistic (e.g., morpho-syntactic, phonological) or conceptual (e.g., semantic) (Cleave et al., 2015; Rezzonico et al., 2014). For example, in response to 'dog eat bone' a parent might expand the initial phrase into a syntactically complete sentence ('yes, the dog is eating the bone') or add conceptual information (e.g., 'the dog is eating the tasty bone'). Expansions are hypothesised to support language development by providing a contingent model of elements the child has not yet mastered (Cleave et al., 2015). Their use by parents predicts language growth in young children with typical and atypical language development, including increases in the production of syntactic and morphological forms and mean length of utterance (Cleave et al., 2015; Nelson et al., 1996; Paul et al., 2018). Adults may also contingently EXTEND children's utterances without repeating the child's original words or semantic context (Paul et al., 2018). Extensions may add new linguistic or conceptual information. For example, in response to 'look bird!' a parent might respond 'I can see him, he's eating a wriggly worm'. Alternatively, extensions may serve a purely interactive function to encourage further communication (e.g., Girolametto & Weitzman, 2002). For example, in response to 'I eating' and parent might respond with the prompt 'what are you eating?' to elicit more information from the child.

In relation to the conceptual content of adult input, decontextualised language is understood to be particularly beneficial (Rowe, 2012). Decontextualised language goes beyond the 'here and now' to address abstract topics, explanations, hypotheticals or meanings. Children who hear more decontextualised language from adults tend to use more abstract talk themselves (Dickinson & Tabors, 2001). Parents' use of abstract language also predicts young children's vocabulary, narrative and syntactic skills (Demir et al., 2015; DeTemple, 2001; Leech et al., 2018; Rowe, 2012) and their academic language proficiency during adolescence (Uccelli et al., 2019). Underpinning much research on decontextualised language is the 4-level framework proposed by Blank et al. (1978) [see Supplementary Materials Table A3, for example of studies]. Language at Level 1 (MATCHING PERCEPTION) requires children to use perceptually available information to identify or label characters and objects shown in the illustrations. Level 2 (SELECTIVE ANALYSIS AND INTEGRATION OF PERCEPTION) involves identifying or describing specific features (e.g., 'The giraffe has a long neck') or linking perceptually available components such as objects and actions (e.g., 'He is kicking the ball'). Level 3 (REORDER/INFER ABOUT PERCEPTION) involves children processing non-present information (e.g., inferring a character's motivation or emotions) or re-ordering perceptions that are perceptually present in order to summarise. Finally, Level 4 (REASONING ABOUT

<sup>1</sup>Some literature distinguishes between expansions and recasts, defining a recast as an utterance in which the adult's response changes the voice/modality/grammatical form of the child's utterance and noting that expansions do not change sentence modality (Baker & Nelson, 1984; Chapman, 2000; Paul et al., 2018).

REPRESENTATION/PERCEPTION) requires children to consider relationships between non-present components (e.g., reasoning, explaining).

### *Adult input quality with wordless books compared to text-and-picture books*

Studies to date indicate that wordless books may elicit higher quality interactive input from adults than text-and-picture books. For example, they may prompt more conversation-stimulating strategies, including greater use of questions (Chaparro-Moreno *et al.*, 2017; Petrie *et al.*, 2023; Schick *et al.*, 2021; Smadja *et al.*, 2019) and encourage adults to be more linguistically responsive to children – for example, responding to their questions, expanding their language or prompting them to give further information or explain their thinking (Chaparro-Moreno *et al.*, 2017; Nielsen, 2012; Petrie *et al.*, 2023). The interactive advantages of wordless books are understood to derive from the absence of a scripted text. Adults and children are required to construct the story together, conferring a more active role upon the child as co-teller. The unconstrained and open-ended nature of wordless books may also allow adults to elaborate and interact more freely with their children, leading to richer conversations and greater parent responsivity.

Although the interactive benefits of wordless books have been demonstrated, gaps in evidence remain. One such gap relates to questioning. As noted, open-ended prompts are known to be particularly beneficial for child language. Although wordless books have obvious potential for encouraging open-ended dialogue, only one comparative study has considered open and closed questions separately, finding that teachers asked more of both types during wordless picture book reading (Smadja *et al.*, 2019). This is unsurprising, since the analysis assessed absolute question frequency. As wordless books do not have text to read, the absolute quantity of conversational (extra-textual) talk will naturally be greater than when reading a text-and-picture book, and likely to include more questions of all types. Also necessary is to consider whether the PROPORTION of prompts which are open-ended is higher in wordless book sharing than when reading books with text.

The current study aimed to fill this gap in the context of parent (rather than teacher) talk. It examined use of open versus closed prompts, extending current research by testing whether wordless books elicit a greater PROPORTION of open prompts than text-and-picture books, rather than a greater NUMBER. It also sought to corroborate the small number of existing comparative studies by examining whether wordless books prompt greater use of contingent responses (expansions, extensions) than text-and-picture books (Chaparro-Moreno *et al.*, 2017; Nielsen, 2012; Petrie *et al.*, 2023). It aimed to extend prior research by considering the nature of these contingent responses, distinguishing between INTERACTIVE EXTENSIONS (building on the child's utterance by prompting a further response), LINGUISTIC EXPANSIONS (repeating the child's words and adding new linguistic information) and CONCEPTUAL EXPANSIONS/EXTENSIONS (building on the child's utterance to add new conceptual information).

Prior research has also highlighted the potential of books for eliciting conceptually-challenging abstract language, due to their symbolic nature and opportunities for discussion and inference about characters and plot. Studies comparing wordless and text-and-picture books have found that they elicit similar levels of decontextualised language (Schick *et al.*, 2021; Ziv *et al.*, 2013) when ALL adult talk is included in the comparison – that is, both narration (reading the text or 'telling' the wordless story) and elaboration on the narrative. However, studies which consider only adults' ELABORATIONS on the narrative suggest that wordless books may encourage more

frequent and cognitively-challenging talk, including references to cognitive processes (Ziv et al., 2013: parents) and strategies to foster higher-order thinking and cognition (Chaparro-Moreno et al., 2017<sup>2</sup>: teachers). This may arise because the relationships between story components (objects, characters, actions) are implicit in a wordless book, requiring them to be described and prompting inferences about character feelings or motivations (de la Rie et al., 2020). As de la Rie et al. (2020, p.143) note, wordless books “more or less compel parents to engage in abstract talk”.

Studies using more fine-grained measures of abstract talk based on the Blank et al. (1978) 4-level framework have concluded that, in fact, the two book contexts elicit DIFFERENT patterns rather than one holding the advantage. One recent study found that wordless books encourage parents to use more extra-textual prompts at Levels 2 and 3 than text-and-picture books (Petrie et al., 2023). This is plausible, since Level 2 includes description of objects, characters or actions (e.g., ‘*Look at that huge brown bird!*’) while Level 3 includes inference and talk about non-perceptual states such as character’s feelings, emotions, thoughts or motivations. There were no differences for Levels 1 or 4. However, a second study comparing a traditional story book (extra-textual talk only) with a wordless prompting board<sup>3</sup> (all talk) found precisely the opposite pattern (de la Rie et al., 2020). The text-and-picture book elicited more parent-and-child utterances at Levels 2 and 3, while the prompting board elicited more utterances at Level 1 (e.g., labelling) and Level 4 (e.g., explaining, defining). Differences between typical wordless books and the (non-narrative) nature of the prompting board used in the latter study may underlie the different findings. It is likely that the former study, which carefully matched the wordless and text-and-picture books on a range of dimensions to minimise differences other than the presence or absence of text, provides more robust evidence.

Nonetheless, the mixed findings illustrate both the highly contextualised nature of cognitively challenging talk, and the need for further research to understand how such talk varies across book contexts. Our study seeks to provide such evidence by comparing parents’ extra-textual talk in wordless and text-and-picture books at different levels of abstraction (Levels 1-4). To the best of our knowledge it will be one of the first to compare the level of cognitive challenge in parental extra-textual talk (i.e., ALL talk in the wordless book condition, including unscripted story narration, versus EXTRA-TEXTUAL talk in the text-and-picture book condition, excluding reading of the text).

### *Adult input quality during wordless book reading compared with play*

As noted, a number of studies have compared text-and-picture book reading with play, concluding that book reading elicits parent speech which is lexically richer, and which includes more wh-questions and decontextualised language (Salo et al., 2016; Sorsby & Martlew, 1991). To date, only one study has compared WORDLESS book reading with a toy play context (Rezzonico et al., 2014). This study found that parents of children with Developmental Language Disorder used more linguistic expansions (recasts) during wordless book interactions than during an unstructured symbolic play activity using a

<sup>2</sup>This study in fact considered all talk, including reading of the text in the text-and-picture book condition and narration in the wordless book condition. However, the measure of cognitive challenge focused on interactive strategies designed to foster children’s concept development (e.g. use of open-ended questions or encouraging children to relate concepts to previous experiences) and can therefore be viewed as an assessment of adult elaborations beyond the narrative.

<sup>3</sup>A prompting board is a complex picture around a theme, depicting a scenario.

Playmobil® toy set. This suggests that wordless and text-and-picture books might share some advantages over toy play in relation to interactive linguistic input, perhaps because they provide greater scaffolding and a narrative structure (whether scripted or not). However, it is also plausible that wordless books and toy play may share some advantages over text-and-picture books due to their common features. For example, their open-ended and child-led nature may elicit more parent-child conversation, or encourage parents to use more open questions or interactive extensions.

No studies to date have compared parents' use of decontextualised language across wordless book reading and play. Studies comparing play with text-and-picture book reading suggest that books elicit more concrete input such as labelling (Choi, 2000; Hoff, 2003) and greater use of abstract language from parents (Sorsby & Martlew, 1991). However, is it notable that the latter study compared reading with a playdoh activity, which is highly concrete and non-symbolic. More abstract language may have been elicited by a symbolic play activity, such as imaginary toy play with small-world characters. Such play might, in a similar manner as wordless books, encourage adults and children to use Level 2/3 utterances relating to description of characters, scenes and actions; or to character motivations, intentions and feelings.

Further work is clearly needed, not only to compare wordless book with toy play, but to examine the profiles of all three contexts – wordless books, text-and-picture books and toy play – in the same study. Understanding the similarities and differences in interactions they elicit could significantly enhance our understanding of the mechanisms through which wordless picture books prompt specific types of parent input (e.g., the extent to which these arise from their open-ended nature, or from characteristics they share with text-and-picture books). The current study aims to meet this need by comparing parent input in wordless books, text-and-picture books and an imaginary toy play activity.

### Current study

The aim of the current study was to investigate differences in adult-child language interactions when parents and their three-to-four-year old children engage in wordless book reading, text-and-picture book reading and a small-world toy play activity. A sample of 22 parent-child dyads audio recorded themselves completing each activity at home. We addressed the following research question:

- How does parent input and parent-child interaction quality differ during wordless book reading as compared with text-and-picture book reading and toy play?

Specifically, are there variations between conditions on the following dimensions of parent input:

- a) The proportion of open-ended prompts used?
- b) Expansions or extensions of children's utterances (overall, interactive, linguistic, conceptual)?
- c) The proportion of utterances at each level of abstraction?

Our focus was on the parent-child dialogic interactions which occur naturally during these activities. We therefore included ALL talk in the toy play and wordless book conditions but only EXTRA-TEXTUAL talk in the text-and-picture book condition. We hypothesised that wordless books would outperform text-and-picture books on use of open prompts and



contingent responsiveness (overall, interactive, linguistic and conceptual) because their open-ended nature allows parents to elaborate and interact more freely with their children around the narrative. We also theorised that wordless books would prompt more overall, linguistic and conceptual expansions/extensions than imaginary play due to the scaffolding and structure provided by the narrative and illustrations; but that there would be no differences for interactive extensions (because both contexts confer an active role on the child) or open prompts (because both activities are open-ended).

In terms of abstract language, we hypothesised that wordless books would elicit greater input at Levels 2 and 3 than text-and-picture books; but that the profile of wordless books and toy play would look similar. We expected no differences between wordless and text-and-picture books at Levels 1 and 4; but that both book conditions would elicit greater input at Levels 1 and 4 than the toy play activity.

## Method

### Participants

Twenty-two parent-child dyads participated in this study. Dyads were recruited as part of a larger intervention study (unpublished observations), with the data reported here collected as part of the baseline assessments. Parents were recruited from the London boroughs of Bromley, Sutton and Bexley via their child's primary school nursery class using invitations circulated by the class teacher. The sample comprised 20 mothers and 2 fathers (mean age 36;6,  $n=18$ ). Parent socio-economic status (SES) was assessed using parent education level and scores from the English Indices of Multiple Deprivation (IMD) for the family postcode. The IMD is a measure of neighbourhood deprivation based on different domains (e.g., income, housing, employment). Parent SES was relatively high, with most parents educated beyond secondary (high school) education level (77.2%,  $n=17$ ) and just over one fifth (22.7%,  $n=5$ ) educated to postgraduate level. The mean IMD decile was 7.3 ( $SD = 2.3$ ), where 10 represents the least deprived neighbourhoods in England. Most parents ( $n=20$  of 22) reported that someone at home read with their child daily, with the remaining two participants reporting reading once or more each week.

Children (13 females, 9 males) were aged between 3;5 and 4;4 ( $M = 3;11$ ,  $SD = 0;4$ ). All parents reported that their child was typically developing (i.e., there were no reported developmental disabilities). Seventeen children were white, two Asian and three were from other or mixed ethnic backgrounds.

Multilingual families were eligible for participation in the intervention study provided they were confident to engage with intervention materials and activities (e.g., sharing wordless books) mainly in English. Parents were asked to self-report the amount of English spoken at home on a 5-point scale (1 = heritage language only, 5 = English only) with a mean of 4 for the sample overall. Seven reported speaking a language other than English at least some of the time at home. Parents were also asked to self-report their English language skills on a 5-point scale (1=poor, 5=fully fluent). Mean scores for the sample were 4.5 (spoken English), 4.7 (English comprehension) and 4.5 (English reading).

### Materials

#### Activity resources

Two books were used: *Pancakes for Breakfast* by Tommy dePaola (wordless) and *Chapatti Moon* by Pippa Goodhart (text-and-picture). The wordless book was selected first on the

basis that it was age-appropriate (e.g., in length, complexity, content), representative of contemporary preschool books, and had potential for promoting conversation and decontextualised language (e.g., talk about character motivations or feelings); and that a narrative could be clearly inferred from the illustrations. Four potential text-and-picture books were selected on the same basis. Initial book selections were made by the research team using a simple assessment framework reflecting the criteria listed, and drawing on their collective expertise in child language development and children's literature.

We then asked four individuals with expertise in early language development, parenting interventions and speech-and-language therapy to rate the extent to which each book was similar to *Pancakes for Breakfast* on a range of dimensions (e.g., theme; illustrations; narrative complexity and structure; opportunities for discussion about emotions, feelings and opinions; opportunities to make connections to the child's life). Two books received the same score: *LuLu Loves Flowers* (Anna McQuinn) and *Chapatti Moon*. *Chapatti Moon* was selected because it shared a food-related theme with *Pancakes for Breakfast*. The final wordless and text-and-picture books differed slightly in length (*Chapatti Moon* 30 pages, *Pancakes for Breakfast* 28 pages). Dependent variables were calculated as proportions of adult extra-textual talk to control for any differences in the length of the reading session caused by variation in book length.

A set of Playmobil® toys reflecting a playground theme was used for the play activity, selected on the basis that it was typical of toys available to preschool children, would be meaningful to children, and included characters as well as objects to enable talk about character actions, motivations and feelings. The set comprised characters (children, adults), an octopus-shaped roundabout, a slide, a dinosaur-shaped rocker, a bench and a flower. Children engaged with these toys well during the pilot.

### *Child language measure*

The British Picture Vocabulary Test 2<sup>nd</sup> edition (BPVS-II: Dunn *et al.*, 1997) was used as a measure of children's receptive vocabulary knowledge and included as a covariate in the main analysis. The assessment involves the researcher reading a word and asking the child to point to one of four pictures which corresponds to that word. There are two practice trials followed by 14 sets of 12 items. The test was administered according to the manual and raw scores used.

### *Procedure*

We met parents in small groups within their child's early education setting. Parents completed consent forms and demographic questionnaire. They were given an audio recorder and asked to complete the three activities with their child at home over a 4-day period. While recording independently at home is less controlled than inviting parents into a lab setting for observations, the home setting is thought to facilitate a more natural and authentic interaction. Parents were provided with a clear instruction sheet, designed so that dyads completed the activities in counterbalanced order which varied randomly between participants, to eliminate possible order effects. They were asked to complete each activity as they normally would, reading or playing for 5-10 minutes, or as long as the activity naturally continued. They were asked to record the first time they completed the activity and record the entirety of the session. Mean recording lengths were as follows: text-and-picture ( $M=9m39s$ ;  $SD=3m32s$ ), wordless ( $M=10m52s$ ;  $SD=4m14s$ ), toy play



( $M=16m8s$ ;  $SD=9m34s$ ). The BPVS was administered by a researcher within the early education setting during the 4-day period in which the recorded activities were being completed.

### *Transcription and coding*

Audio recordings were transcribed in Codes for Human Analysis of Transcripts (CHAT) format using the Computerised Language Analysis programme (CLAN; MacWhinney, 2000). A maximum of 10 minutes was transcribed for each recording with the aim of increasing comparability in recording length. Following transcription, mean recording lengths were as follows: text-and-picture ( $M=8m19s$ ;  $SD=1m46s$ ), wordless ( $M=8m32s$ ;  $SD=1m59s$ ), toy play ( $M=9m35s$ ;  $SD=1m0s$ ). The focus of this analysis was on the extent to which specific features of different activity contexts directly shape parents' use of dialogic strategies. That is, within a given period of time, do some contexts elicit greater use of certain strategies than others. This approach has a precedent within the literature (e.g., Røe-Indregård et al., 2022). It contrasts with studies (e.g., de la Rie et al., 2020) which have examined adult input across recordings of different lengths to capture absolute child input across different activity contexts.

Three transcripts were produced for each dyad: one per activity. Utterance boundaries were defined by the presence of one of the following: a complete syntactic unit; a pragmatically complete unit or response; a terminal intonation or stress; or a silence for 2 seconds or longer (Ratner & Brundage, 2021). Two transcripts for each activity were coded by a second rater and compared to ensure consistency in transcription. Consistency was assessed by one of the raters by eye e.g., checking for consistency in the application of utterance boundaries and in the interpretation of words and phrases. Each utterance contained no more than one main clause plus any dependent clauses. Each parent utterance was then coded in CLAN, firstly into three mutually-exclusive categories: reading (for the text-and-picture book only), content-related talk (i.e., relating to the activity being completed) and non-content-related talk. This latter category included acknowledgements (e.g., *'I think you're right'*), rejections (e.g., *'not quite'*), child management (e.g., *'put that down please'*) and utterances relating to print or book conventions (e.g., *'This book is called Pancakes for Breakfast'*). Only content-related utterances were further coded, meaning that the text-and-picture condition excluded reading of the text.

The number of adult utterances was calculated as the total number of content-based utterances. Three further coding schemes were then applied: prompts; expansions/ extensions; and levels of abstraction. To control for remaining differences in recording length, dependent variables were calculated as proportions of total adult or child talk as relevant. This approach has precedent within the 'comparing contexts' literature (e.g., Salo et al., 2016).

### *Open and closed prompts*

First, content-related parent utterances were coded to reflect use of open and closed prompts (Table 1). This category largely comprised questions but, following Siraj-Blatchford and Manni (2008), we also included statements designed to actively elicit a child response. For example, we included pseudo-wonder statements (*'I wonder if....'*) as open prompts, and completion prompts (e.g., *'Oh look he's picking up the....'*) as closed prompts. In most cases, prompts were categorised as open or closed based on each

**Table 1.** Coding scheme for open and closed prompts (codes mutually exclusive)

Code	Definition	Example
Open prompt	A question, or a speculative statement which actively invites the child to speak, which a) has more than one or a small number of restricted suitable response/s; and b) to which the adult does not necessarily know the answer.	<i>A: How would you feel if you'd been stirring and stirring all day?</i> <i>A: I wonder if she thinks 'hmm they're making a big noise!'...</i>
Closed prompt	A question or a statement which actively invites the child to speak and which has one or a small number of suitable responses.	<i>A: Is it a magic chapatti?</i> <i>A: Do you prefer the slide or the bench?</i>

Note. See [supplementary materials](#) for further detail and sources.

utterance in isolation. Occasionally, when it was unclear whether the parent intended the prompt to be open or not, we used the wider context of the transcript to support the judgement. To code a prompt as open-ended, we sought to establish whether the parent offered or accepted more than one answer or probed for another response after the child answered (Siraj-Blatchford & Manni, 2008). One fifth of transcripts (representing a mix of activity contexts) were randomly coded by a second coder and inter-rater reliability calculated using the Jamovi (2.2.5) Meddecide package. Exact agreement was 93.3% (unweighted  $\kappa = .89$ ). Disagreements were resolved through discussion and final agreed codes amended as appropriate. Two variables were calculated for analysis: the proportion of extra-textual content-related utterances which were prompts, and the proportion of prompts which were open-ended.

### *Expansions and extensions*

Second, parents' content-related utterances were coded to reflect whether they represented an expansion or extension of a child's utterance provided within two utterances of the child's original utterance. Parent utterances categorised as expansions/extensions were then further coded to reflect whether they were interactive, linguistic or conceptual (Table 2). These three codes were not mutually exclusive meaning that one utterance could be coded to one, two or all three categories. For example, in Table 2 below, the response "A big, brown bird" (in response to "A bird!") is given as an example of a linguistic expansion. However, it would also be coded as a conceptual expansion because additional semantic information is provided (big, brown). The number of child utterances was then used to calculate three dependent variables: the proportion of children's utterances which were interactively extended, which were linguistically expanded and which were conceptually expanded/extended. A fourth dependent variable (overall contingent responsiveness) reflected the total proportion of child utterances which had been extended or expanded via any means. One fifth (20%) of transcripts were randomly coded by a second coder, resulting in 84.3% exact agreement

**Table 2.** Coding scheme for contingent responses – expansions and extensions (codes not mutually exclusive)

Code	Description	Example
Interactive extension	Adult extends child's preceding* utterance using an elicitation (question or comment) related to the child's utterance, to encourage further conversation.	C: <i>Spinning</i> A: <i>Is it a roundabout?</i>
Linguistic expansion	Adult extends child's preceding utterance* by repeating some or all of the child's words and adding new morphemes, words or phrases, while maintaining the basic meaning expressed by the child.	C: <i>Tree!</i> A: <i>A tree.</i> C: <i>A bird!</i> A: <i>A <u>big, brown</u> bird.</i>
Conceptual expansion/ extension	Adult extends child's preceding utterance* by adding new conceptual information or ideas. May or may not include repetition of the child's original words.	C: <i>Mummy can we have pancakes?</i> A: <i>Maybe <u>tomorrow</u>.</i> A: <i>Who do you see now?</i> C: <i>The cat and the dog</i> A: <i>Yes, they look <u>sleepy</u>.</i>

\*Within two utterances of the child's original utterance.

Note. See [supplementary materials](#) for further detail and sources.

(unweighted  $\kappa = .63$ )<sup>4</sup>. Disagreements were resolved through discussion and final agreed codes amended as appropriate.

#### *Level of abstraction (decontextualised language)*

Finally, parents' content-related utterances were coded for level of abstraction using a framework based on that proposed by Blank et al. (1978) but also drawing on more recent adaptations. Particular work was required to adapt the framework for applicability across the different activity contexts, since the majority of work to date has considered inferential talk in book sharing contexts (Tompkins et al., 2013) and no study has used such a framework across the three contexts compared here. For example, 'talking in role as a character' was added to Level 3. The four mutually-exclusive levels as operationalised in the current study are outlined in Table 3. One fifth of transcripts were randomly coded by a second coder, resulting in 79.7% exact agreement (unweighted  $\kappa = .72$ ). Disagreements were resolved through discussion and final agreed codes amended as appropriate. Four proportion scores were calculated, reflecting the proportion of parents' content-related utterances at each level of abstraction.

#### **Analysis strategy**

Linear mixed effects models were used to investigate the effect of activity type on each dependent variable. Each model included activity type as a fixed effect and participant as a

<sup>4</sup>Relatively few utterances were coded as expansion/extensions. This led to a high prevalence for each rater assigning utterances to the 'no' category (69.6% of total codes awarded). Such a lack of symmetrical balance is known to produce a lower kappa statistic even where the percentage of exact agreement is high (Sim & Wright, 2005).

**Table 3.** Coding scheme for levels of abstraction (codes mutually exclusive)

Code	Types of parent input	Book examples	Toy play examples
Level 1: Matching perception	Notice, direct attention to or label objects or characters, or reference their location	<i>A: What's that?</i> <i>A: Where are the chillies?</i>	<i>A: That's a bench.</i> <i>A: Where is the dinosaur?</i>
Level 2: Selective analysis/integration of perception	Describe characteristics of objects or characters (e.g., size, colour). Link or integrate perceptually available elements, including describing character actions or actions made by the adult or child in relation to objects/characters.	<i>A: He's a bit small, isn't he?</i> <i>A: What's she putting into her bowl?</i>	<i>A: The lady has brown hair.</i> <i>A: Oh look, they're in a big pile on the floor!</i>
Level 3: Reorder/infer about perception	Make inferences (including character attributions). Make judgements or evaluations. Describe emotions, preferences or desires. Talk in role as character. Recall information presented earlier. Identify similarities/ differences between perceptible elements, or between perceptible and non-perceptible elements. Draw comparisons between the book or play and the child's life.	<i>A: Do you think she's going to bed or just getting up?</i> <i>A: She looks a bit sad now, doesn't she?</i>	<i>A: Is that the Mummy?</i> <i>A: He is very dizzy!</i>
Level 4: Reasoning about perception	Make predictions. Provide explanations. Provide factual knowledge or definitions.	<i>A: Where is she gonna put them?</i> <i>A: He is licking his lips because he wants some milk to drink.</i>	<i>A: What's gonna happen if we spin it really fast?</i> <i>A: Why do they feel sick?</i>

Note. See [supplementary materials](#) for further detail and sources.

random effect, resulting in a random intercept model allowing for variation in participant baselines. A random slopes model, which would have allowed participants to also vary in their response to the different conditions, was not possible due to the small sample size: the model would not converge. Models included the wordless book condition as the reference category, comparing this with means for the text-and-picture and toy play conditions. Although not included in the research questions, post hoc comparisons of the toy play and text-and-picture book conditions were conducted (with Holm's corrections) for the abstract language analyses to provide additional context.

Covariates were added on the basis of significant correlations with dependent variables. Details of relevant correlations are shown in the [supplementary materials](#). No significant correlations were identified for child age or parent education. Both the proportion of English spoken at home and children's BPVS scores were included in models for abstraction (L2, L3, L4), the proportion of utterances which were prompts, and the proportion of child utterances which were expanded or extended. In each case, a likelihood ratio test was used to determine whether adding the covariate significantly improved the model fit and, if so, whether this influenced the findings.

One participant was missing data for the wordless book activity. Since mixed models allow for unbalanced designs, the participant was included without these data. Child age was missing for two participants and child BPVS scores for one participant. Correlations to determine covariate inclusion were calculated based on available data. When child

BPVS scores were included as a model covariate, the participant with missing data was initially excluded from the model. Since inclusion did not influence the findings (further detail later), no strategies for dealing with missing data were required.

Linear mixed models were run with the GAMLj package in Jamovi (Gallucci, 2019; The Jamovi Project, 2021), which is based on the lmer4 package commonly used in R. All models used maximum likelihood estimation. Reported p-values were calculated using the Satterthwaite method for degrees of freedom. Since each model included two comparisons, a Bonferroni-adjusted significance level of 0.025 was calculated to account for the increased possibility of type-I error. Residual plots were visually inspected for obvious deviations from homoscedasticity or normality, and a Shapiro-Walk test for normality of residuals conducted. Box plots were visually inspected to identify possible outliers. Where one or more threats to model assumptions were identified, an additional robust mixed model was run using the rlmr function within Robustlmm (Koller, 2016). A robust version of lmer4, rlmr identifies individual data points with low robustness scores (e.g., outliers) and weights them accordingly using Huber weighting.

## Results

### Overall input

Overall adult content-related utterances were higher in the wordless book condition ( $M = 106.67$ ,  $SD = 27.46$ ), followed by the toy condition ( $M = 89.32$ ,  $SD = 38.02$ ) and the text-and-picture condition ( $M = 51.86$ ,  $SD = 29.94$ ). Children spoke most in the toy activity ( $M = 95.18$ ,  $SD = 28.51$  utterances) followed by the wordless book reading ( $M = 60.76$ ,  $SD = 25.48$ ), and least in the text-and-picture condition ( $M = 43.50$ ,  $SD = 26.75$ ).

### Use of prompts

Parameter estimates and estimated marginal means from the analytical models examining parents' proportion of open-ended prompts are presented Tables 4 and 5. For the original model, neither the overall model ( $p = .658$ ) nor any individual activity comparison was statistically significant. However, in the robust mixed model, the mean proportion of open prompts in the wordless book condition was significantly higher than in both other conditions ( $p = .02$ ). The variation in results seemed to be driven by a small number of participants with very low or high proportion scores. For example, one participant in each of the text-and-picture book and toy play conditions asked very few questions (one and two respectively), all of which were open-ended, resulting in proportion scores of 100%. These participants' data were weighted lower in the robust model. Results from the random effect showed no significant variance in intercepts between participants [ $SD = .05$ ,  $\chi^2(1) = .42$ ,  $p = .522$ ].

To provide additional context, a model was estimated for the overall proportion of parents' content related utterances which were prompts. This was non-significant ( $p = .762$ ), as were each of the paired activity comparisons (Tables 4-5), indicating that overall prompt use was similar across conditions.

### Contingent responsiveness (expansions and extensions)

The fixed effect of activity was statistically significant for overall contingent responsiveness ( $r^2 = .38$ ,  $p < .012$ ; covariates: proportion of English spoken at home, child BPVS score). Parents expanded or extended children's utterances significantly more often in

**Table 4.** Parameter estimates from mixed effects models (reference group: wordless)

Effect	Estimate	SE	95% Confidence Interval		df	t	p
			Lower	Upper			
<b>PROPORTION OF PROMPTS WHICH WERE OPEN-ENDED (linear model)</b>							
(Intercept)	0.27	0.02	0.23	0.32	21.13	11.58	< .001
Text-and-picture	-0.04	0.05	-0.14	0.06	41.88	-0.73	0.471
Toy play	-0.04	0.05	-0.14	0.06	41.88	-0.82	0.414
<b>PROPORTION OF PROMPTS WHICH WERE OPEN-ENDED (robust model)</b>							
(Intercept)	0.30	0.03				11.43	<.001
Text-and-picture	-0.07	0.03				-2.37	.020
Toy play	-0.07	0.03				-2.35	.020
<b>PROPORTION OF CONTENT-RELATED UTTERANCES WHICH WERE PROMPTS</b>							
(Intercept)	0.41	0.02	0.38	0.45	21.30	24.34	< .001
Text-and-picture	0.02	0.04	-0.05	0.09	42.10	0.50	0.619
Toy play	-0.00	0.04	-0.08	0.06	42.10	-0.21	0.835
<b>OVERALL PROPORTION OF CHILD UTTERANCES EXPANDED OR EXTENDED</b>							
(Intercept)	0.26	0.02	0.22	0.30	20.4	14.08	< .001
Text-and-picture	-0.09	0.04	-0.16	-0.02	41.0	-2.64	0.012
Toy play	-0.09	0.04	-0.17	-0.03	41.0	-2.80	0.008
<b>PROPORTION OF CHILD UTTERANCES FOLLOWED BY <u>LINGUISTIC</u> EXPANSIONS</b>							
(Intercept)	0.07	0.01	0.05	0.09	21.7	7.69	< .001
Text-and-picture	-0.02	0.01	-0.05	0.01	43.2	-1.42	0.164
Toy play	-0.05	0.01	-0.07	-0.02	43.2	-3.46	0.001
<b>PROPORTION OF CHILD UTTERANCES FOLLOWED BY <u>INTERACTIVE</u> EXTENSIONS</b>							
(Intercept)	0.14	0.02	0.10	0.17	21.8	7.97	<.001
Text-and-picture	-0.03	0.02	-0.07	0.00	43.1	-1.78	0.08
Toy play	-0.02	0.02	-0.05	0.02	43.1	-0.83	0.41
<b>PROPORTION OF CHILD UTTERANCES FOLLOWED BY <u>CONCEPTUAL</u> EXPANSIONS/EXTENSIONS</b>							
(Intercept)	0.14	0.01	0.11	0.17	21.9	9.97	< .001
Text-and-picture	-0.06	0.02	-0.10	-0.02	43.3	-2.81	0.007
Toy play	-0.09	0.02	-0.14	-0.05	43.3	-4.19	< .001
<b>ABSTRACTION LEVEL 1</b>							
(Intercept)	0.12	0.01	0.10	0.14	22.35	11.59	< .001
Text-and-picture	0.10	0.02	0.05	0.15	44.16	4.10	< .001
Toy play	0.03	0.02	-0.02	0.08	44.16	1.17	0.246

Table 4. (Continued)

Effect	Estimate	SE	95% Confidence Interval		df	t	p
			Lower	Upper			
<b>ABSTRACTION LEVEL 2</b>							
(Intercept)	0.38	0.02	0.34	0.42	21.3	18.82	< .001
Text-and-picture	-0.11	0.04	-0.19	-0.03	42.0	-2.65	0.011
Toy play	-0.07	0.04	-0.15	0.01	42.0	-1.71	0.100
<b>ABSTRACTION LEVEL 3</b>							
(Intercept)	0.40	0.01	0.38	0.43	21.3	30.31	< .001
Text-and-picture	-0.09	0.03	-0.15	-0.04	42.0	-3.51	0.001
Toy play	0.07	0.03	0.01	0.11	42.0	2.51	0.016
<b>ABSTRACTION LEVEL 4</b>							
(Intercept)	0.09	0.01	0.08	0.11	21.3	12.20	< .001
Text-and-picture	0.10	0.02	0.07	0.13	42.0	6.22	< .001
Toy play	-0.02	0.02	-0.05	0.01	42.0	-1.28	0.208

wordless book reading than in both other conditions (Tables 4-5), a finding which was confirmed by a robust mixed model (see [supplementary materials](#)). The random effect component of the models showed no significant variance in intercepts between participants ( $SD = .05$ ,  $x^2(1) = 1.73$ ,  $p < .189$ ).

The proportion of variance explained by the model when covariates were not included (i.e., with activity context as the sole predictor) was 9 per cent ( $r^2 = .09$ ,  $p < .006$ ). Including the proportion of English spoken at home as a fixed effects covariate did not improve the model fit [ $x^2(1) = 6.23$ ,  $p < .05$ ] or influence the fixed effect parameters for condition. Including child BPVS scores did improve the model fit [ $x^2(1) = 7.34$ ,  $p < .01$ ] but did not impact the fixed effect parameters. The fixed effect for both covariates was statistically significant when each was entered as the sole covariate (BPVS  $p < .001$ , model  $r^2 = .34$ ; English  $p = .014$ , model  $r^2 = .24$ ). In the final model with both covariates, only the fixed effect for BPVS score was significant ( $p = .003$ ).

Individual models were estimated for linguistic expansions, interactive extensions and conceptual expansions/extensions. Significant effects were identified for linguistic expansions ( $r^2 = .11$ ,  $p = .005$ ) and conceptual expansions/extensions ( $r^2 = .16$ ,  $p < .001$ ). Individual activity comparisons showed that children's utterances were followed by linguistic expansions more often in wordless book reading than in toy play; and were conceptually expanded/extended more often in the wordless book reading than either of the other conditions (Tables 4-5). No significant differences were identified for interactive extensions.

### Use of abstract language

The overall fixed effect of activity was statistically significant in all four abstraction models: Level 1 ( $r^2 = .21$ ,  $p < .001$ ), Level 2 ( $r^2 = .33$ ,  $p = .025$ ), Level 3 ( $r^2 = .53$ ,  $p < .001$ ), Level 4 ( $r^2 = .59$ ,  $p < .001$ ), with proportion of English spoken at home and child BPVS score included as covariates in the L2, L3 and L4 models. Parameter estimates and estimated marginal



**Table 5.** Estimated marginal means from mixed effects models

Activity	Mean	SE	df	95% Confidence Interval	
				Lower	Upper
<b>PROPORTION OF PROMPTS WHICH WERE OPEN-ENDED (linear model)</b>					
Wordless	0.30	0.04	61.33	0.22	0.38
Text-and-picture	0.26	0.04	61.19	0.19	0.34
Toy play	0.26	0.04	61.19	0.18	0.33
<b>PROPORTION OF PROMPTS WHICH WERE OPEN-ENDED (robust model)</b>					
Wordless	0.30	0.03		0.25	0.36
Text-and-picture	0.23	0.03		0.18	0.28
Toy play	0.23	0.03		0.18	0.28
<b>PROPORTION OF CONTENT-RELATED UTTERANCES WHICH WERE PROMPTS</b>					
Wordless	0.41	0.03	61.30	0.35	0.47
Text-and-picture	0.43	0.03	61.10	0.37	0.48
Toy play	0.40	0.03	61.10	0.35	0.46
<b>OVERALL PROPORTION OF CHILD UTTERANCES EXPANDED OR EXTENDED</b>					
Wordless	0.33	0.03	58.8	0.27	0.38
Text-and-picture	0.23	0.03	58.1	0.18	0.29
Toy play	0.23	0.03	58.1	0.17	0.28
<b>PROPORTION OF CHILD UTTERANCES FOLLOWED BY <u>LINGUISTIC</u> EXPANSIONS</b>					
Wordless	0.09	0.01	53.4	0.07	0.11
Text-and-picture	0.07	0.01	52.0	0.05	0.10
Toy play	0.04	0.01	52.0	0.02	0.07
<b>PROPORTION OF CHILD UTTERANCES FOLLOWED BY <u>INTERACTIVE</u> EXTENSIONS</b>					
Wordless	0.15	0.02	41.8	0.11	0.20
Text-and-picture	0.12	0.02	40.3	0.08	0.16
Toy play	0.14	0.02	40.3	0.10	0.18
<b>PROPORTION OF CHILD UTTERANCES FOLLOWED BY <u>CONCEPTUAL</u> EXPANSIONS/EXTENSIONS</b>					
Wordless	0.19	0.02	54.4	0.15	0.23
Text-and-picture	0.13	0.02	53.1	0.09	0.17
Toy play	0.10	0.02	53.1	0.06	0.14
<b>ABSTRACTION LEVEL 1</b>					
Wordless	0.08	0.02	64.85	0.04	0.11
Text-and-picture	0.18	0.02	64.82	0.14	0.21
Toy play	0.11	0.02	64.82	0.07	0.14

Table 5. (Continued)

Activity	Mean	SE	df	95% Confidence Interval	
				Lower	Upper
<b>ABSTRACTION LEVEL 2</b>					
Wordless	0.44	0.03	60.0	0.38	0.50
Text-and-picture	0.33	0.03	59.6	0.27	0.40
Toy play	0.37	0.03	59.6	0.31	0.43
<b>ABSTRACTION LEVEL 3</b>					
Wordless	0.41	0.02	60.0	0.37	0.45
Text-and-picture	0.32	0.02	59.6	0.28	0.36
Toy play	0.48	0.02	59.6	0.44	0.52
<b>ABSTRACTION LEVEL 4</b>					
Wordless	0.07	0.01	60.7	0.04	0.09
Text-and-picture	0.17	0.01	60.4	0.14	0.19
Toy play	0.05	0.01	60.4	0.02	0.07

means are shown in Tables 4-5. The proportion of L2 and L3 utterances was significantly higher in the wordless condition than the text-and-picture condition. The proportion of L3 utterances was significantly higher in the toy play condition than the wordless book condition. Post hoc comparisons showed that the proportion of L3 utterances was also significantly higher in toy play than text-and-picture book reading (Pholm = < .001).

The proportion of L1 and L4 utterances was significantly LOWER in the wordless book condition than the text-and-picture book condition. Post hoc comparisons showed that the proportions of L1 and L4 utterances were also significantly lower in toy play than in text-and-picture book reading (L1 Pholm = .012, L4 Pholm = < .001). Robust mixed models were generated for L1, L2 and L4 models and revealed the same pattern (see supplementary materials).

The random effect component of the models showed no significant variance in intercepts between participants in any of the models: L1 ( $SD = .002$ ,  $x^2(1) = .09$ ,  $p = .760$ ), L2 ( $SD = .05$ ,  $x^2(1) = 1.25$ ,  $p = .264$ ), L3 ( $SD = .03$ ,  $x^2(1) = 1.21$ ,  $p = .271$ ), L4 ( $SD = .02$ ,  $x^2(1) = .832$ ,  $p = .362$ ).

The proportion of variance explained by each model when covariates were not included (i.e., with activity context as the sole predictor) were as follows: L1 ( $r^2 = .21$ ,  $p < .001$ ), L2 ( $r^2 = .09$ ,  $p < .006$ ), L3 ( $r^2 = .22$ ,  $p < .001$ ), L4 ( $r^2 = .37$ ,  $p < .001$ ). The largest proportion of variance explained was seen for the proportion of L4 utterances (37%). Adding the proportion of English spoken at home and child BPVS scores as fixed effect covariates significantly improved the model for L2 utterances [English  $x^2(1) = 4.91$ ,  $p < .05$ ; BPVS  $x^2(1) = 5.38$ ,  $p < .05$ ], L3 utterances [English  $x^2(1) = 5.34$ ,  $p < .05$ ; BPVS  $x^2(1) = 13.52$ ,  $p < .001$ ] and L4 utterances [English  $x^2(1) = 6.57$ ,  $p < .05$ ; BPVS  $x^2(1) = 12.25$ ,  $p < .001$ ]. However, their inclusion did not lead to any notable adjustments in fixed effects parameters or alter the significance of effects for condition. The fixed effect for both covariates was statistically significant in the L2, L3 and L4 models when each was entered as the sole covariate: L2 (BPVS  $p < .001$ , model  $r^2 = .29$ ; English

$p = .025$ ,  $r^2 = .18$ ), L3 (BPVS  $p < .001$ ,  $r^2 = .51$ ; English  $p = .022$ ,  $r^2 = .33$ ), L4 (BPVS  $p < .001$ ,  $r^2 = .56$ ; English  $p = .011$ ,  $r^2 = .47$ ). In the final model with both covariates, only the fixed effects for BPVS score were significant: L2 ( $p = .004$ ), L3 ( $p < .001$ ), L4 ( $p = .002$ ) when using a Bonferroni-adjusted significance level of 0.025.

## Discussion

This study investigated differences in adult-child language interactions when parents and their three-to-four-year old children engage in wordless book reading, text-and-picture book reading and a small-world toy play activity. Overall, children and parents spoke least in the text-and picture condition, perhaps because adults' direct reading of the text (removed for this analysis) limited time for extra-textual talk. More dialogic talk was seen in the two open-ended contexts: adults spoke most in the wordless book condition and children most in the toy play condition. This may reflect the highly child-led nature of play and the fact that book sharing, even in the collaborative storytelling context of wordless books, tends to be more adult-led. Although a wordless book is more open-ended than a book with text, the story elements are nonetheless defined to some extent by the illustrations. In contrast, during play children have full agency to choose their own plot and lead the direction of both play and conversation.

### *Use of prompting, expansions and extensions*

As predicted, parents expanded or extended their children's utterances significantly more often in the wordless book condition (33% of child utterances) than in either the text-and-picture book (23%) and toy play (23%) conditions. The finding aligns with prior studies comparing wordless and text-and-picture books (Chaparro-Moreno *et al.*, 2017; Nielsen, 2012; Petrie *et al.*, 2023) and may arise because wordless books allow parents to elaborate and interact more freely with their children around the narrative.

Examining the specific nature of parent responsiveness revealed that conceptual expansions/extensions – as expected – were more frequent in wordless book sharing (19% of child utterances expanded/extended) than in both toy play (10%) and text-and picture book reading (13%). Linguistic expansions happened significantly more often in wordless book sharing (9%) than toy play (4%), confirming our prediction and the findings of Rezzonico *et al.* (2014). However, contrary to predictions, there was no significant difference in linguistic expansions between the wordless (9%) and text-and-picture (7%) conditions. All types of books, with or without text, may support parents in linguistic responsiveness.

As predicted, there were no differences in interactive extensions between the wordless book and toy play conditions. However, contrary to predictions, these two open-ended contexts did not encourage parents to use interactive extensions more often than text-and-picture book reading. In fact, parents were equally likely to use interactive extensions in all conditions. It may be that this feature of adult input (*i.e.*, building on the child's words with another prompt to encourage further communication) is less sensitive to the effects of activity context.

The predicted advantage of wordless books over text-and-picture books in encouraging use of open-ended prompts was identified by the robust model. However, wordless books also displayed an unexpected advantage over the toy play activity. Estimated marginal means suggest that 30% of parent prompts in the wordless book condition

were open-ended, as compared with 23% in both other conditions. This is a novel finding which extends prior research.

Together, these findings expand what is known about the specific features of adult interactive language input which are promoted by wordless books; and shed light on the potential mechanisms through which such effects might occur. Our study suggests that wordless books may combine the benefits of open-endedness and a structured (and illustrated) narrative offering a scaffold for parent-child interactions. They appear to offer unique advantages for use of open prompts and conceptual expansions/extensions (on which they outperformed both other conditions) and at the same time support parents to provide enriching linguistic feedback to children (similarly to text-and-picture books). Indeed, open questions are understood to support language development in part BECAUSE they create opportunities for children to receive linguistic feedback from adults; providing them with a contingent model of language they have yet to master within the socially meaningful context of a conversation (Cleave et al., 2015; de Rivera et al., 2005; Kuchirko et al., 2016; Lee & Kinzie, 2012; Tompkins et al., 2017). The similar pattern seen for open prompts and conceptual expansions/extensions makes theoretical sense, since open prompts are understood to develop children's thinking as well as their language (Lee & Kinzie, 2012). Our findings suggest that wordless books encourage parents to use open prompts to stimulate children's language and thinking and, once the child replies, to further extend conceptual understanding by adding new information and ideas.

It is worth noting that findings may have differed had the full audio-recordings been used. The current analysis compared RATES of strategy use across the first 10 minutes of each recording. Its aim was to examine the extent to which the features of different activity contexts directly shape parents' use of dialogic strategies. That is, within a given period of time, do some contexts elicit greater use of certain strategies than others. However, the toy play activity prompted longer recordings than the other two contexts (150% longer than either the text-and-picture or wordless book reading, on average), potentially because children were more engaged in this highly child-led context. Had absolute parent input across the full recordings been analysed, toy play may have displayed an advantage over both book-sharing contexts. Future studies should ideally include measures of absolute input as well as calculating dependent variables as proportions of total adult or child utterances.

### *Use of abstract language*

We hypothesised that wordless books would elicit greater input at Level 2 and Level 3 than text-and-picture books, but that the profile of wordless books and toy play would look similar. We expected no differences between wordless and text-and-picture books at Level 1 and Level 4, and that both would elicit greater input at Level 1 and Level 4 than the toy play activity.

As predicted, the wordless book condition elicited a greater proportion of parent utterances at Level 2 (44%) and Level 3 (41%) than the text-and-picture book condition (33% L2, 32% L3), confirming the findings of Petrie et al. (2023). This plausibly derives from the fact that relationships between story components – objects, characters, actions – are implicit in a wordless book, requiring them to be described (L2) or inferred (L3) (de la Rie et al., 2020). For example, dyads reading a wordless book might need to describe events or scenes for themselves (e.g., '*She's walking outside in the snow*' – L2) or infer a character's feelings, motivations or desires, prompting them to use mental state language (e.g., '*Oh see now, she's so upset*' – L3; '*I think the cat also wants some milk*' – L3). It should be noted that we did not assess children's OVERALL exposure to abstract language, since

we focused on dialogic talk. Once reading (in the text-and-picture condition) is included, the differences in Level 2 and Level 3 language may fall away. In support of this, one study with teachers which included reading in the text-and-picture book condition found very few differences overall, or for a range of types of abstract talk, although text-and-picture books did elicit more analyses and predictions (Schick *et al.*, 2021).

The toy play and wordless book profiles for Level 2 and Level 3 language were not as similar as anticipated. Although no significant differences were found at Level 2, toy play elicited significantly more parent utterances at Level 3 (48%) than both the wordless book (41%) and the text-and-picture book (32%) conditions. This may derive in part from the fact that toy play offers opportunities for role-based talk – for example, making inferences about character roles (*‘Is that the Mummy?’*) or talking in role as a character (e.g., *‘Oh no, I’ve fallen off the see-saw!’*), both included under Level 3 in our coding frame.

In line with our predictions, toy play elicited significantly less adult dialogic talk at Level 1 (11%) and Level 4 (5%) than the text-and-picture book (18%, 17%). Unexpectedly, however, the wordless book condition displayed a similar profile to the toy play condition, with significantly less talk at Level 1 (8%) and Level 4 (7%) than the book with text. This differs from the findings of Petrie *et al.* (2023), who found no differences between wordless and text-and-picture books at Levels 1 and 4. The contrast may derive from the fact that our study included ALL extra-textual talk, whereas the Petrie study assessed only parent prompts. The additional Level 1 and Level 4 utterances in our text-and-picture condition may reflect parents’ modelling of language, rather than their prompts for children. It is plausible, for example, that the presence of text elicits greater attention to story-related vocabulary, leading parents to label objects or characters (L1) or provide definitions and factual knowledge (L4). For example, the text in *Chapatti Moon* contained a number of words related to Indian food and cooking which may have been novel to children, prompting comments such as *“Look, there’s the chapatti”* (L1) and *“Ghee is a special fat that you cook Indian food with”* (L4). In support of this hypothesis, studies comparing text-and-picture book reading with play have found the frequency of labelling (e.g., *‘This is a tiger’*) to be greater during book reading than play (Choi, 2000; Hoff, 2003).

Alternatively, it may be that the wordless and text-and-picture books in the Petrie study were more carefully matched than those in our study. Petrie *et al.* used two different versions of the same traditional story. Our books were carefully matched on a range of dimensions in an attempt to minimise differences (other than the presence or absence of text) which may influence adult input. Nonetheless, differences may have existed; and we know from prior research that variations in narrative complexity and content can have an impact on talk (Holme *et al.*, 2022).

In sum, our study suggests that wordless books elicit more descriptive language (L2) and inferential talk about character’s actions, feelings or motivations (L3) than text-and-picture books, potentially because these elements are not explicit and need to be ‘told’ by the readers. However, text-and-picture books elicit more adult talk at Levels 1 and 4, plausibly including labels, definitions and explanations relating to vocabulary introduced by the text.

## Implications

Our findings suggest that wordless books may hold potential for use in intervention programmes, alongside existing approaches. Both text-and-picture books and play are common activities within parent-mediated programmes designed to promote children’s oral language skills (e.g., Dowdall *et al.*, 2019; van der Pluijijm *et al.*, 2019). Wordless books

may offer an additional open-ended-yet-structured activity context, which encourages parents to use open questions and responsive linguistic and conceptual feedback – creating serve-and-return feedback loops which support language learning – as well as eliciting rich descriptive and inferential talk.

When compared to text-and-picture books, they may allow parents to elaborate more freely and children to take a more active role as ‘co-teller’ of the story. However, a note of caution – and a key limitation of our study – is that our parents were of relatively high socio-economic status (SES). SES is a strong predictor of the ways in which parents interact and read with their children (Rowe, 2012). For example, low SES parents on average prompt children less often to elicit conversation and use less explanatory talk (Hoff et al., 2002; Rowe, 2012). Research with text-and-picture books suggests that the effects of book reading on parent speech is sufficiently strong that it mitigates variations due to SES (Hoff, 2003; Hoff-Ginsberg, 1991). However, the same may not be true of wordless books, since they provide less scaffolding for parent input. Indeed, de la Rie et al. (2020) found that low SES parents used less abstract language than high SES parents when reading wordless books with children. Thus, our findings on the advantages of wordless books may not generalise to low-SES samples, limiting their potential for parent-mediated intervention. Benefits may be restricted to parents whose confidence, prior experience in shared reading and language skills enable them to make the most of their open-ended nature.

This may be particularly true in relation to linguistic input, such as lexical and grammatical sophistication and diversity. Alongside interactive and conceptual input, linguistic input is the third major facilitator of children’s language learning (Rowe & Snow, 2019). Prior studies suggest that text-and-picture books elicit parent talk which is linguistically richer than that elicited by wordless books, due to the language model provided by the text<sup>5</sup> (Curenton et al., 2008; Petrie et al., 2023); and these effects may be heightened for parents whose own language skills are weak. It is a further limitation of our study that we did not include linguistic measures alongside measures of interactive and conceptual input. Further work is needed to assess whether the benefits of wordless books identified in this study generalise to a low-SES sample, to extend the scope to measures of linguistic input, and to continue the work of de la Rie et al. (2020) in examining how SES and activity context interact in shaping parent language input.

Nonetheless, it may be that wordless books can offer a valuable supplement to text-and-picture books in parent programmes. Alternatively, rather than viewing them as a more open-ended alternative to traditional books, they may be better placed as a more structured alternative to toy play. There is evidence that parents can find playing with their children challenging – for example, due to lack of experience in doing so (Duch et al., 2019). Studies also show that attitudes towards play are predicted by parent education, with lower-educated parents less likely to view play as an enjoyable activity with potential to promote children’s learning (LaForett & Mendez, 2017). Wordless books may therefore provide a valuable alternative for intervention programmes seeking contexts for open-ended, child-led interactions, offering a scaffold for parents who find toy play too unstructured and challenging. They may also have potential in educational settings, when used by educators who have the skills to make the most of these flexible language resources. Indeed, prior work has examined their use in educational environments with promising results (e.g., Chaparro-Moreno et al., 2017).

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<sup>5</sup>When both narration and extra-textual talk are considered.

### *Limitations and directions for future research*

The primary constraints of our study relate to the high-SES nature of the sample (as discussed) and its modest size, which limited potential for sub-group analysis and may have reduced the statistical power of analyses to detect small effects.

In relation to the study design, the fact that dyads completed each activity only once may limit the representativeness of the results, particularly given prior research indicating that parent-child interactions change over repeated readings as familiarity grows (Fletcher & Reese, 2005). For example, a study across three readings found that parents made more utterances relating to events and actions in the first reading, decreasing across readings, and fewer utterances relating to abstract concepts (e.g. thoughts, feelings, desires, intentions) in the first reading, increasing across readings (Schapira *et al.*, 2021). Children spoke less than their parents but their involvement increased across readings. Future research could usefully examine whether and how differences between wordless and text-and-picture book reading change across multiple readings.

The issue of book matching has already been noted, and represents a unique methodological challenge for research comparing wordless and text-and-picture books. While within-subjects designs eliminate potential individual differences in parent interaction style, they preclude use of the same book with and without words (since dyads would read the same story twice). Going beyond our attempts to select well-matched (but different) wordless and text-and-picture books for comparison, the elegant solution of Ziv *et al.* (2013) is worth noting. This study used two matched wordless books and created text-and-picture versions of each. Dyads were randomised into four – rather than the usual two – groups to control for order effects: book 1 (wordless) then book 2 (text); book 1 (text) then book 2 (wordless); book 2 (wordless) then book 1 (text); book 2 (text) then book 2 (wordless). This provides a gold standard means of comparison but requires a large sample; larger than was feasible in the current study. Finally, we note a potential limitation in the selection of our toy play activity context. Although selected based on specific criteria (presented above), the activity reflected a playground theme in contrast to the food-related theme of the two books. Future work could potentially achieve a better match by using a kitchen-related playset, for example.

Future studies could also valuably include a comparison of ALL adult input (including reading of the text in the text-and-picture condition) alongside dialogic talk; and richer measures of child contributions alongside adult talk. A further limitation of our study is the fact that we did not have a measure of children's overall exposure to abstract language across conditions. Further work is needed with parents which examines both 'total' and 'dialogic' talk within the same study.

### **Conclusions**

To conclude, this analysis suggests that books (with or without text) hold advantages over toy play in prompting parents to offer a contingent linguistic model for their children. Text-and-picture books elicited more language at Levels 1 and 4 (e.g., labelling, defining, explaining) than wordless books, potentially due to the vocabulary scaffold provided for parents by the text. However, wordless books displayed unique benefits over both other contexts in prompting parents to use open questions and to add contingent conceptual information. Findings suggest that they may combine the benefits of open-endedness and linguistic content based around a narrative.



Taken together, these findings indicate that using wordless books alongside text-and-picture books may enrich the profile of parent-child talk, bringing benefits in both interactive and conceptual domains. However, in order to establish their potential for use in parent-mediated intervention programmes, it will be necessary to conduct further work with lower SES samples to establish whether our findings generalise; and to establish the impact of shared reading using wordless books on children's oral language skills.

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