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Drawing attention to print or meaning: How parents read with their preschool-aged children on paper and on screens

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Background: Shared reading is an important opportunity for parents and children to connect and learn, which can support later independent reading skills. Much of the research to date has examined shared reading as parents read physical print books with their children. This research has demonstrated that parents tend to engage in more activities that emphasise the meaning of the stories over the code (i.e., print). Here, we examine the focus of shared reading when parents are reading with their children on paper versus on a digital device and whether this differs across the preschool years.

Methods: A total of 253 parents of children aged 0–5 years completed an online self-report questionnaire. Parents reported on the frequency of engaging in meaning- versus code-related activities during shared book reading on paper and on screen with their youngest child. We conducted a linear regression analysis contrasting code- versus meaning-related activities on paper versus screen modality with age as a continuous variable.

Results: Key to our objectives, parents reported engaging in meaning-related activities more frequently during shared reading on paper versus on screens and in code-related activities more frequently during shared reading on screens than on paper. These effects did not differ across age, although overall, parents reported engaging slightly more frequently in shared reading activities in general when their child was older.

Conclusions: The findings show that parents are engaging with their children differently as they read together on paper versus screens. Consistent with prior research, we found that activities emphasising the meaning of stories dominate shared paper book reading experiences in the preschool years. Critically shared reading on screens tips this balance, with parents reporting more code-related activities. These patterns identify the learning opportunities enabled by the affordances of shared reading on screens.

Keywords: code-related activities, meaning-related activities, preschool years, shared reading

Highlights

What is already known about this topic

- Research to date on shared reading has shown that parents tend to focus on the meaning of the story (meaning-related activities) over the features of the print (code-related activities).
- This research has largely described how parents read on paper.
- Parents and children are increasingly reading on screens.

What this paper adds

- We found that parents report engaging in more meaning-related activities when reading with their children on paper than on screens.
- Parents engage in more code-related activities when reading with their children on screens than on paper.
- While we found that the frequency of shared reading activities in general increased slightly with the age of the children, the frequency of parental engagement in both types of shared reading activities is similar across the preschool years.

Implications for theory, policy or practice

- The findings show that parents report engaging with their children differently as they read together on paper versus screens.
- Consistent with prior research, we found that when reading on paper, parents emphasise the meaning of stories during shared book reading experiences in the preschool years.
- In contrast, parents report more code-related activities when doing shared reading on a screen than on paper. These findings suggest that the affordances offered by reading on screens shift the learning opportunities offered by shared reading.

Reading stories with children is an important forum for parent–child connection, and it is also a source of learning about language and books. In the research literature, shared reading is defined as the frequency and variety of parent–child book reading (Sénéchal et al., 2017). Within the shared reading activity, parents are often described as emphasising

either the print or the meaning of the text (e.g., Hindman et al., 2008; Sénéchal et al., 2017). Specifically, the term 'code-related activities' refers to activities that focus on the features of print, such as directing children's attention to letters and encouraging them to read words (Sénéchal et al., 2017). In contrast, in meaning-related activities, parents might discuss the story or expand upon it with their child (Sénéchal et al., 1998). A large body of research has shown that parents use more meaning-related activities than code-related activities when engaging in reading with their children (e.g., Korat & Or, 2010; Sénéchal et al., 2017), at least when they are reading physical books on paper.

In recent years, parents' and children's reading habits have been transformed by the digital era, with reading on screens now occurring widely, including on computers, tablets and phones (Singer & Alexander, 2017). E-books and other forms of screen reading often have different characteristics than paper books, such as sound effects, dictionary features and games, resulting in a different reading experience, including during shared reading (Takacs et al., 2015). We know that elementary school-aged children are reading more on screens than traditional paper books (Aparicio et al., 2022), with evidence suggesting that reading comprehension is lower on screens than on paper (Kong et al., 2018, but see also Takacs et al., 2014, and Furenes et al., 2021). Here, we turn to a younger age cohort, with the goal of understanding how parents engage in shared reading with their preschool children on screens and with paper books. Specifically, we examine the extent to which parents report engaging in code- versus meaning-related activities with their preschool-aged children when reading paper books versus on screens.

Shared Reading Activities

Shared reading is an important forum for early learning about both language and reading (e.g., Sénéchal et al., 2017). As we noted above, a good deal of research has described two types of shared reading activities (e.g., Sénéchal, 2010). Meaning-related activities emphasise the meaning of the story and its connection to the child's life. In code-related activities, parents point to print and teach about letters and the reading of words. A large body of research exploring shared reading with paper books has shown that parents use more meaning-related activities than code-related activities when reading with their children (e.g., Hindman et al., 2014; Korat & Or, 2010). For example, Korat and Or (2010) found that during shared reading of paper books, mothers of kindergarten children engaged in more meaning-related activities, including expanding more on the text, paraphrasing for meaning and relating to personal experience, than code-related activities. Similarly, studies of eye-tracking suggest that during shared reading, preschool children seldom focus on the print, looking instead at the pictures (Evans & Saint-Aubin, 2005).

There is value in both kinds of activities (Sénéchal et al., 2017). The extent to which parents report meaning-related activities, such as directing children to pictures or relating the story to the child's life, is linked to children's oral language and reading comprehension (Hindman et al., 2014; Inoue et al., 2018; Sénéchal et al., 1998, 2017). For instance, Sénéchal and LeFevre (2014) found that the frequency of parent–child shared reading in kindergarten predicted growth in children's receptive vocabulary in Grade 1. The authors did not ask parents to report specifically about meaning-related activities during shared reading in this study, using the frequency and diversity of shared reading instead as a proxy for this construct. This research practice is founded on the evidence that parents tend to use more sophisticated language during shared reading than in other areas of interaction

(i.e., play; McGinty et al., 2012). The prevalence of sophisticated language is also likely one reason that shared reading has been connected with oral language development. Turning to the other aspect of shared reading activities, it is argued that code-related activities, which focus on the features of the print, help children learn alphabet knowledge and early reading and spelling skills (Inoue et al., 2018; Sénéchal et al., 1998). Parents' reported levels of code-related activities, including the frequency of teaching about letters and reading and spelling of words, have been linked to children's knowledge of letter names and sounds and early success in reading words (Inoue et al., 2018; Sénéchal et al., 2017). For instance, Sénéchal and LeFevre (2014) found that parents' reports of teaching early literacy to their kindergarten-aged children predicted children's word-alphabet knowledge 1 year later, after controlling for variables such as kindergarten reading and vocabulary levels and parental education and literacy. Sénéchal and LeFevre (2014) asked about parents teaching of any aspect of early literacy, not exclusively shared reading. That said, the data are interpreted with respect to shared reading with the idea that many occurrences of parents teaching early literacy (e.g., teaching the alphabet and reading words) happen during shared reading. Meaning- and code-related activities appear to play different and important roles in reading development.

Shared Reading on Screens

With the recent rise in technology use, children are increasingly reading on screens. For example, a survey by Rideout and Robb (2020) found that children aged 0–8 spent an average of 32 minutes a day either reading books or being read to, with 4 of these minutes spent on e-reading. The authors defined e-reading as any reading done by a child, or by a parent to a child from a tablet, phone or e-reader. Additionally, in a survey of 1511 parents of UK children aged 0–8, Kucirkova and Littleton (2016) found that 6% of parents read e-books with their children every day or almost every day, compared with 56% who said the same for print books. The results from these studies suggest that children are spending a small but increasing amount of time reading or being read to on screens, and it is important that we are able to determine the types of shared reading activities children are being engaged in when reading on these digital devices.

E-books and other types of screen reading have different characteristics than paper books. For example, they have interactive elements that can draw attention either to or away from the story. As such, research by Takacs et al. (2015) suggests that shared reading on screens may involve a different shared reading experience than when reading paper books.

These ideas were explored in two recent meta-analyses. In their research a year previously, Takacs et al. (2014) contrasted reading on paper versus on devices, combining a wide range of technological features for children either preschool, kindergarten, or elementary school age. Takacs et al. found that, when digital features reinforced the story (e.g., sound effects and video illustrations), story comprehension was higher for digital than paper format, and when these features were distracting (e.g., questions and games), no differences in comprehension emerged. In interpreting these findings, Takacs et al. (2014) suggested that story-reinforcing digital features provide support similar to that of parents, specifically in emphasising the meaning of stories. In contrast, interactive features of screens, such as memory tasks, dictionary functions or word labels, may interfere with children's story comprehension by distracting them from the story

(Takacs et al., 2015). Interpretation of these findings would benefit from understanding what parents are doing during these reading experiences on paper and screen.

A newer meta-analysis examined the effects of reading in a digital modality specifically on children's (aged between 1 and 8 years) story comprehension and vocabulary. Furenes et al. (2021) first compared story comprehension for reading on paper versus on screens in studies where these differed only in the presence of a screen, meaning that there are no digital features. Consistent with research on independent reading (Clinton, 2019; Delgado et al., 2018), Furenes et al. (2021) found that with parental support, there was stronger story comprehension for print than digital books. However, similar to Takacs et al. (2014), when digital features were story congruent, comprehension was better on digital devices than on print. This suggests that the impact of parent support on children's story comprehension is likely affected by the story modality and features of the digital book; however, these findings do not tell us what parents are doing during this screen-based reading experience that might differ from paper-based reading.

Adding on to this research, we explore what activities parents report doing during shared reading on paper versus on screens, building on the two small-scale studies to date on this question. MacKay (2015) observed shared reading while reading a storybook on an iPad versus reading a paper book between six pairs of 5- to 6-year-old children and their mothers. In comparison with reading a paper book, mothers engaged in more meaning-related activities (specifically, vocabulary interactions) and less code-related activities (i.e., text and print talk) when reading on an iPad. Chiong et al. (2012) observed the extent to which parents (n = 32) engaged in meaning-related activities during shared reading with 3- to 6-year-old children. When reading e-books with no interactive features, parents engaged in meaning-related activities to the same degree as when reading paper books. However, when reading e-books with interactive features, parents engaged in fewer meaning-related activities than when reading on paper. The authors did not describe the extent to which parents engaged in code-related activities. That said, these findings point to the possibility that shared reading activities are affected by the medium in which reading occurs, although findings on the way in which it does so conflict across these two studies.

Shared Reading Activities Varied by Age

In our exploration of parent-reported meaning- versus code-related activities during shared book reading on paper versus screen, we were interested in whether this might shift across the preschool years. There is a theoretical basis for asking this question. Taking the theory of the Zone of Proximal Development (Vygotsky, 1978) to the context of reading, Zevenbergen and Whitehurst (2003) suggest that early shared reading should focus on the meaning of the story and later shift to print. This would be consistent with decoding, which often begins at or just before the start of school (age 5). To our knowledge, there are little data on parents' meaning- versus code-related activities across ages, with most studies reporting instead on a single age group. This is the case, for instance, even in a longitudinal study reported by Hindman et al. (2014) on the shared reading practices of families. This queried the shared reading practices between parents and children at 9 months, again at 2 years and again at 4 years. The authors did not examine the frequency of code- and meaning-related activities by age. Instead, the authors reported on means collated across ages without dividing by age group. In these combined analyses, the authors found, consistent with prior work, that during shared reading of a single book,

mothers were observed to use on average less than one (M = 0.12) code-related activity compared with almost three (M = 2.83) meaning-related activities (Hindman et al., 2014). Overall, these results suggest that mothers of children between the ages of 9 months and 4 years are frequently engaging in meaning-related activities and in code-related activities quite infrequently.

Other research has found that parents adjust their level of teaching during shared reading to their child's reading level, although it is not clear that this maps directly to a shift to more code- versus meaning-related activities with increasing age. Specifically, Georgiou et al. (2021) found that parents of children between Grade 1 and Grade 3 report engaging in what could be considered to be meaning-related activities (i.e., asking their child questions about the content or characters in the book and asking their child to summarise the book) when they realise their child is struggling with reading rather than when their child is not struggling with reading. Similarly, Sénéchal and LeFevre (2014) found that parents of children between Grade 1 and Grade 2 report engaging in more teaching of code-related skills (i.e., teaching the alphabet, printing words and reading words) when they realise their child is struggling with reading (i.e., their child's reading is below average) than when their child is not struggling with reading. These results both suggest that parents are engaging in *more* shared reading activities (both code and meaning related) when their children are struggling with reading compared with when they are not. The findings of both Georgiou et al. and Sénéchal and LeFevre indicate that parents do indeed scaffold children's learning during shared reading, with the question of whether they do so through code- versus meaning-related activities being less clear. Our research investigates the conceptual idea that parents might engage in more meaning-related activities with younger than older children and more code-related activities with older than younger children, including exploring whether this varies by modality of reading.

Present Study

Here, we report on a study designed to examine two objectives: the extent to which parents engage in meaning- versus code-related activities during shared reading on paper versus on a digital device, and whether this differs across the preschool years. To address these questions, we asked parents to complete a self-report questionnaire. The questionnaire assessed shared reading with items developed from Sénéchal et al. (2017) and Hutton et al. (2018). We modified questions from classic research by Sénéchal et al. (2017) by expanding the number of questions about specifically meaning- and code-related activities. This enabled us to describe the extent of activities that occur during shared reading in each of these categories. We report here on data from parents of children from 0 to 5 years old. We do so to describe the extent of meaning- and code-related activities during shared reading across the preschool years, when they are most common and also most impactful on language and reading development (e.g., Bus et al., 1995; Sénéchal et al., 2017).

As a broad prediction, we expect the extent of meaning- versus code-related activities to differ between shared reading on paper versus screen. Consistent with prior research on shared reading on paper, we expect greater meaning- than code-related activities. Making clear predictions as to expected results for shared reading on screens is challenging given conflicting results in the prior observational studies with small samples of parent–child pairs (Chiong et al., 2012; MacKay, 2015). Further still, meta-analytic results of the impacts of story reading in these two contexts point to differences based on the types of

digital features (Furenes et al., 2021; Takacs et al., 2015). Interpretation of these meta-analytic findings depended in part on assumptions about the kinds of activities that parents engage in during shared reading on paper versus screen. This broader survey capturing parent reports of shared reading across digital devices and contexts provides a much-needed description of the activities parents engage in during shared reading on paper and on digital devices.

Methods

The protocol was approved by the Research Ethics Board of Dalhousie University (REB #2021-5570). We report here on items and participants from a larger study (Language and Literacy Environment Questionnaire) investigating how parents support their children's language and literacy skills when reading on paper and on screens at home.

Participants

We originally recruited 253 participants through the Qualtrics recruitment service. All participants needed to be 18 years of age or older, currently living in Canada and have a child aged 5 years or younger. From the original 253 participants, 17 were excluded as they had children older than 5 years and another 24 whose data suggested careless responses.[1] This left us with data for 212 participants, roughly half of whom reported on children who were male (53.16%).

The demographic characteristics of our participants are reported in Table 1. Inspection of this table suggests that the average income of participants in our sample was relatively comparable with, though perhaps slightly higher than, that of the Canadian population. The median Canadian family income is approximately $67,000 (Statistics Canada, 2022) – the family income of our participants was fairly evenly distributed, with 56% of our participants having a family income of $76,000 or more per year. In terms of the language most often spoken, our sample might overrepresent anglophones in comparison with the Canadian population. In the national population as of 2021, 64% spoke English most often, followed by 19% speaking French most often (Statistics Canada, 2023). In contrast, 85% of our participants spoke English most often, followed by 6% reporting French.

Procedure

Participants completed the online consent form and questionnaire using the Qualtrics survey software (Qualtrics, 2023). The questionnaire, written in English, underwent a clear language and design revision by a professional to ensure that the language was clear and that the questionnaire was accessible across literacy levels.

Demographic Information

Participants answered demographic questions about themselves (e.g., education), their family (e.g., family income) and their youngest child, who was 5 years of age or younger (e.g., age and gender). Parents were also asked about the number and kinds of digital devices used (i.e., smartphones, e-readers, tablets, computers, gaming consoles and

Table 1. Demographic characteristics of participants.

Participant variable	(n = 212)
Annual family income	
$25,000 or less	18
>$26,000 and <$50,000	20
>$51,000 and $75,000	47
>$76,000 and $100,000	46
>$101,000 and $125,000	30
>$126,000 and $150,000	12
>$151,000	32
Not reported	7
Language spoken most often	
English	180
French	13
Other	19
Highest level of education completed	
Junior high or high school	69
College/university	115
Post-graduate degree	28
Device child uses most often	
Computer/laptop	10
E-reader (e.g., Kobo and Kindle)	3
Gaming console (e.g., Wii and Xbox)	7
Smartphone (with a touchscreen)	42
Tablet (e.g., iPad)	66
Television	84

Note: Languages reported in the 'Other' category are Cantonese, Arabic, German, Mandarin, Spanish and Tagalog.

televisions). Participants' answers for the number of each type of digital device they had in their home were dichotomised into two categories: zero devices or one or more devices.

Shared Reading Activities

Parents answered questions about the language and literacy habits they engage in with their children, which measured the constructs of both code-related activities and meaning-related activities. We defined shared reading on paper as reading with a child on any paper books or printed materials (e.g., children's books and comic books). Shared reading on a screen was defined as reading on any kind of digital device (e.g., iPad, tablet, smartphone, computer, laptop and e-reader). Based on Hutton et al. (2018), questions regarding the frequency of meaning-related activities during shared reading on paper were answered on a 4-point Likert scale (1 = *never*, 2 = *on a few pages*, 3 = *on about half the*

pages, 4 = *on most pages*). Similar to Sénéchal et al. (2017), questions regarding the frequency of meaning-related activities during shared reading on screens were answered using a 5-point Likert scale in regard to how often during a typical week they engage in each behaviour when sharing a book with their child (1 = *never*, 2 = *rarely – less than once a week*, 3 = *sometimes – about once a week*, 4 = *often – three to four times a week*, 5 = *very often – at least once a day*). For shared reading on screens, participants responded according to amounts per week, as it was not clear that there would be an easily identifiable 'page' for devices with enabled scrolling, a very common digital feature. Both scales offer concrete metrics to encourage accurate responses. To equate responses on these two metrics, we transformed responses to a proportion between zero and one and created scaled data. To create scaled data for the 4-point scale, we assigned a number from zero to three to each choice (with each number one below that of the scale above in text) and then divided them by three, thus transforming the participants' answers to a proportion between zero and one. For the 5-point scale, we assigned a number from zero to four to each choice (with each number one below that in the scale above in text) and divided the respondents' answers to these questions by four, again transforming the participants' answers to a proportion between zero and one. These changes resulted in scaled data for both the 4- and 5-point scales that we were able to compare.

Questions assessing meaning- and code-related activities were adapted from typical examples of questions and activities described by Hutton et al. (2018), Sénéchal and LeFevre (2002) and Sénéchal et al. (2017). Both sets began with the stem, 'When you are sharing a book with your child, how often do you do these things?' The three questions that addressed meaning-related activities were as follows: (1) ask your child questions about the story; (2) add on to what your child is saying (e.g., If your child says 'The boy is crying,' you add, 'Yes, the boy is crying because he hurt himself'); and (3) make comments to your child about the story. The four questions assessing code-related activities were as follows: (1) practise saying the names of alphabet letters; (2) talk about sounds that letters make (e.g., 'sun' starts with S. It makes an 'ssss' sound); (3) talk about rhyming words (e.g., 'cat' and 'hat'); and (4) ask your child to read the words.

Analyses

We compared the frequency at which parents did each type of shared reading activity on paper versus screen using the scaled data, which equated responses across the Likert scales. To compare the frequency at which parents of children of different ages engaged in each type of shared reading activity on paper versus screen, we conducted a linear regression analysis with two categorical variables, activity (two levels: code vs meaning) and modality (two levels: paper vs screen), and age (in months) as a continuous variable. In order to align the interpretation of the linear regression analysis statistics with our research questions, we report analysis of variance (ANOVA)-style statistics using ANOVA wrappers (type III Wald chi-square test) from the *car* package for R (Fox & Weisberg, 2019).

We report generalised eta squares (η^2_G) as effect size, which is interpreted as follows: <0.01, very small; 0.01, small; 0.06, medium; and 0.14, large (Field, 2013). Post hoc comparisons for interaction decomposition were done with pairwise comparisons using the Wilcoxon–Mann–Whitney test with false discovery rate correction for multiple comparisons. We report the *r* statistic as the effect size for these comparisons, which is

interpreted as follows: 0.1, relatively small; 0.2, typical; and 0.3, relatively large (Gignac & Szodorai, 2016).

Results

Analyses revealed a significant main effect of age, $F(1, 2632) = 23.04$, $p < .001$, $\eta^2_G = 0.009$. Having an older child slightly increased the frequency of shared reading activities; for each month older, the frequency increased by 0.002 units, $p < .001$.

There was a main effect of activity, $F(1, 2632) = 18.08$, $p < .001$, $\eta^2_G = 0.004$, with parents reporting engaging more frequently in meaning-related activities ($M = 0.625$, $SD = 0.334$) than code-related activities ($M = 0.557$, $SD = 0.350$). There was a main effect of modality, $F(1, 2632) = 9.406$, $p < .01$, $\eta^2_G = 0.004$, showing that parents engaged slightly more frequently in shared reading activities (combined across code and meaning) on screens ($M = 0.598$, $SD = 0.343$) than on paper ($M = 0.578$, $SD = 0.345$). These two main effects are qualified by a significant two-way interaction between modality and activity, $F(1, 2632) = 11.47$, $p < .001$, $\eta^2_G = 0.004$. This interaction is related to our first objective, which was to determine if there are differences in the frequency of parents' code- and meaning-related activities during shared reading with their child on paper books and on a screen. See Figure 1, which illustrates the frequency of shared reading for each activity type and modality.

Decomposition of this interaction revealed that when reading on paper, parents reported engaging significantly more frequently in meaning-related activities ($M = 0.649$, $SD = 0.331$) than code-related activities ($M = 0.522$, $SD = 0.334$), $p < .001$, $r = 0.18$.

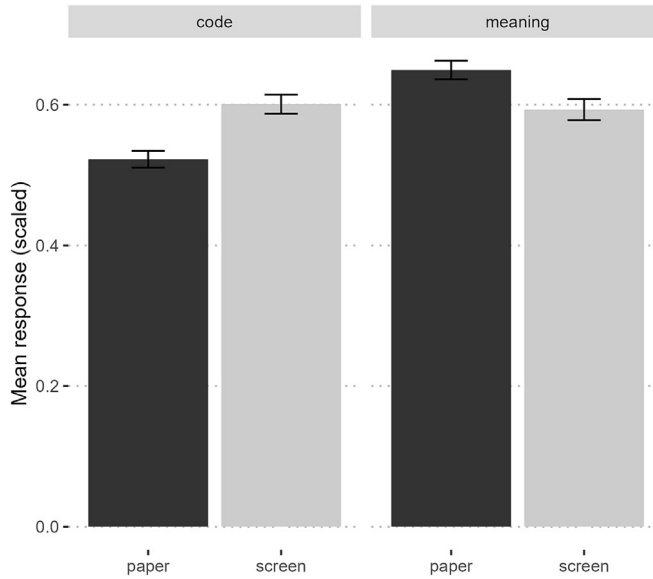

Figure 1. Frequency of shared reading activities reported by parents for each activity type and modality. The mean response of scaled data illustrates the frequency of shared reading activities reported by parents during the survey. Means are shown for code- and meaning-related activities and for paper and screen modalities. Error bars show standard errors.

During shared reading on screens, parents did not report engaging in meaning-related activities (M = 0.593, SD = 0.334) significantly differently than code-related activities (M = 0.601, SD = 0.341), p = .512, r = 0.02. We can further understand this pattern by looking at this interaction another way, contrasting the extent of meaning-related activities contrasted across the two modalities and of code-related activities across the two modalities. This revealed that parents reported engaging more frequently in meaning-related activities during shared reading on paper than on screens, $p < .05$, $r = 0.06$, and more frequently in code-related activities during shared reading on screens than on paper, $p < .001$, $r = 0.13$.

Our second objective was to determine if parents' reported use of code- and meaning-related activities differed across the age groups. Age did not interact significantly with age or modality, $F(1, 2632) = 1.132$, $p = .287$, $\eta^2_G < 0.001$. This suggests that the effects revealed in the two-way interaction between modality and activity stay constant across age groups. In other words, parents report engaging in code- and meaning-related activities on the different modalities similarly with young children as they do with older children.

Discussion

The goals of the current study were to examine whether shared reading activities – those that emphasise meaning or code – differ based on whether parents are reading with children on paper versus on a digital device across the preschool years. We examined this question by asking a large number of parents to complete a self-report questionnaire on their shared reading activities with their youngest child between 0 and 5 years of age. Specifically, parents report engaging in meaning-related activities significantly more frequently during shared reading on paper versus on screens and in significantly fewer code-related activities during shared reading on paper versus on screens. Looking at results within each modality, we found that parents reported engaging in significantly more meaning- than code-related activities during shared reading on paper, with no such difference during shared reading on screens (see Figure 1). These patterns were consistent across the preschool years.

Our findings for shared reading on paper are consistent with previous studies. Specifically, when reporting on shared reading of paper books, in our study, we found that parents reported engaging in more meaning- than code-related activities. This is consistent with previous research on shared reading on paper, with observational and parent-report data consistently showing that parents engage in significantly more meaning- than code-related activities during shared reading (e.g., Hindman et al., 2014). These findings validate the self-report methods that we used, in which we created questions based on activities described as meaning or code related in prior studies (e.g., Sénéchal et al., 2017) and adapted scales for this reporting (e.g., Hutton et al., 2018). They also confirm long-standing suggestions that shared reading is a forum for learning about meaning (Sénéchal et al., 2017); here, we show that this is certainly the case for reading on paper.

Turning to reading on screens, parents reported engaging in shared reading activities focusing on meaning to a similar extent as code, and yet critically, there are differences in the extent of reported activities that emerge. Analyses of this interaction in another way help us understand the pattern of results. Specifically, parents report engaging in meaning-related activities significantly more frequently during shared reading on paper

versus on screens and in significantly fewer code-related activities during shared reading on paper versus on screens. Our findings are consistent with Korat and Or's (2010) study of mother–child dyads, in which mothers engaged in more meaningful activities with paper books than with e-books. According to Korat and Or (2010), one possible explanation could be that e-books already contain prompts that support story expansion. As a result, mothers may not be taking the lead in meaning-related activities because it is provided by e-books and, based on our study, to a greater extent by screen reading in general.

Furthermore, our findings are quite similar to those of Chiong et al.'s (2012) observational study of 32 parent–child pairs; in that study, parents engaged in fewer meaning-related activities when reading e-books with interactive features than when reading paper books (but see MacKay, 2015). Chiong et al. did not include measures of the extent of code-related activities, so we extend these findings to understand these activities here. Taking these results together, it seems that parents are more likely to engage in meaning-related activities when reading with their children on paper and in code-related activities when reading with their children on screens. These findings help to describe what is happening in homes naturalistically.

When considered in light of other research on shared book reading, the present results point to a potentially different educational value to shared reading on paper than on screens. Shared reading on paper might support meaning-related activities and therefore the learning of oral language (e.g., Sénéchal et al., 2017). Shared reading on screens might support code-related activities and, therefore, early word reading. Both skills – oral language and word reading – are essential to strong reading comprehension. In this context, we reflect further on our finding that reports of meaning-related activities increase while code-related activities decrease. Time during shared reading is finite, and parents and educators cannot focus on everything at once. This pattern is also consistent with evidence that parents' reports of the extent of shared reading are negatively correlated with the extent of their teaching on alphabet and word reading (e.g., Sénéchal et al., 2017). And given the reality that parents and educators cannot do everything, shared reading in different environments might help them to engage children in both the meaning and code aspects of text, which might in turn support both word reading and reading comprehension. These ideas need testing in a longitudinal design connecting preschool learning through to learning in the elementary school years. And beyond collecting evidence, the impacts of encouraging these different kinds of behaviours might be explored through studies of tailoring instruction.

These findings also raise a key question with strong educational implications: What is it about reading on screens that might increase parents' engagement in code-related activities compared with reading on paper? We return to an idea briefly mentioned in the Takacs et al. (2015) meta-analytic review. In interpreting their finding that there is no advantage to code-related literacy skills for reading in a technology-enhanced environment over reading on paper, the authors noted that interactive features in the reviewed studies did not tend to emphasise the code. At first glance, this observation makes our findings even more surprising. And yet, it is possible that, at least when screen-based reading includes digital features that enhance story comprehension, parents' attention and effort might be 'freed' from talking about the story line to draw children's attention to the code. We think that this exploration could help to determine how educators and digital environments might encourage certain reading behaviours.

One way to do so is to examine how features of the digital environment shift parent behaviour and, indeed, child learning. Our own findings emerge from a study in which

parents reported shared reading experiences in a very naturalistic way across the digital devices that were present in their homes. This diversity is reflected in the range of devices parents reported their children using most frequently (see Table 1). Inspection of this table shows that this was often a tablet or television, leading to the supposition that the results likely mostly reflect the experiences of reading on a tablet (as shared reading is unlikely to occur on a television). And yet, even with this information in mind, we do not know the features of that reading environment. Were there pop-ups? Were there features that were story supportive or distracting? The next step in this line of research will be to explore parents' activities during shared reading for individual devices in reading stories with specific digital features. This will help to bring the detailed knowledge of parents' activities in line with the specific exploration of the impacts of digital features on children's story comprehension (e.g., Furenes et al., 2021). Indeed, the format of reading is one reason that our results might have differed from one of the few prior studies; MacKay (2015) observed mothers to engage in more frequent meaning-related activities during shared reading on iPads than on paper. As previous research indicates that different interactive features have opposing effects on children's reading comprehension (e.g., Takacs et al., 2015), future research could explore the impact of specific interactive features of digital devices (i.e., hyperlinks, scroll bars and read-aloud functions) on parents' likelihood to engage in code- and meaning-related activities. Such research would in effect merge learning from research on shared book reading (e.g., Hindman et al., 2014) with that from screen reading (e.g., Takacs et al., 2015).

Turning to our second research objective, our results showed that the frequency of shared reading activities in general increased slightly with age, consistent with previous research (Hindman et al., 2014). However, we found that the types of activities performed within each modality remained similar regardless of the children's age. Based on previous research (Georgiou et al., 2021) and reading theories by Vygotsky (1978) and Zevenbergen and Whitehurst (2003), we expected an increase in code-related activities and a decrease in meaning-related activities with increasing age. One explanation lies in the methodology that we used: Parents were asked to report on their youngest child. We did so to increase the consistency of responses across birth order. That said, the responses of parents with older children might be influenced by the ways in which they are currently reading with those older children, somewhat 'muddying' responses. And of course, results from self-report always bear exploration and confirmation with observational methods (as per Chiong et al., 2012; Hindman et al., 2014). Similarly, inspection of Table 1 shows that the devices used by children shift across ages, with far greater use of phones with touchscreens by younger children and more use of tablets by older children. This too might have influenced the results. Age is a factor that needs to be explored, along with digital devices and interactive features.

Another factor worth exploring lies in how these results play out across a wider range of families. Our sample reported a slightly higher median family income than the Canadian population. Early research showed that children from homes with lower socioeconomic status (SES) have even greater challenges comprehending digital books than print books, possibly because of the kinds of digital activities they experience in the home; it was hypothesised that children from low SES families experience more game-like activities when interacting with digital devices (Bus & Neuman, 2009). This hypothesis is quite speculative, with several assumptions about technology use, including cultural ones. For instance, a 2017 UNICEF report described vast differences in children's use of digital devices around the world, particularly contrasting those on the African continent with other

places in the world. This further motivates observational studies across a range of metrics and across multiple cultural contexts (Do4Africa, n.d.).

One implication of our findings lies in informing current policy recommendations. Certainly, limits on screen time for children (American Academy of Pediatrics, 2023; Canadian Pediatric Society, 2022) have been made with an eye to ensuring that children are getting face-to-face interaction. And yet, others have suggested that context matters (Viner et al., 2019). Our findings reinforce suggestions from high-profile organisations such as the Canadian Pediatric Society that reading e-books with their child is a way in which parents can foster their child's reading skills; our findings also extend this, such that it seems that shared reading on screens might offer additional learning about print that is less likely to occur in the reading of paper books.

There are at least three potential limitations concerning the results of this study. A first limitation concerns the scales we used in our survey to assess the frequency of shared reading activities: based on the number of pages for paper reading and based on the number of reading sessions per week for screen reading. This latter scale may conflate time spent on screens in general with the frequency with which parents use a particular strategy. However, we could not use the scale based on pages for shared reading on screen, as the concept of pages does not apply to websites, for example. Nevertheless, this does not affect the results we found regarding the distinct frequency of code- versus meaning-related shared reading activity within each modality. A second limitation is that we examined self-reported data on parents' shared reading practices instead of an observational design. As a result, parents may have tried to provide more socially desirable answers or may not have accurately reported the frequency and types of shared reading activities they engage in with their child. Future research should consider using an observational design to obtain a more accurate measure of parents' shared reading activities. A third limitation of the current study is that we did not ask parents about what kinds of digital devices they used to read with their children. As such, we were not able to examine how the different types of digital features (e.g., scroll bars and hyperlinks; Takacs et al., 2015) affected parents' use of code- and meaning-related activities. This is another area that future research should address in order to gain a better understanding of how specific digital features may be more or less conducive to parents' engagement in shared reading activities.

In summary, we found that the modality of reading matters for parents' activities during shared reading with their preschool-aged children. During shared reading on screens, parents engage their children more frequently in code-related activities than when reading on paper. This suggests that there might be different value to reading on paper than on screens, with the former supporting meaning-related activities and therefore learning of oral language and the latter supporting code-related activities and therefore early word reading. Future research could test these connections as well as investigate how specific features of screen reading support the use of either code- or meaning-related activities.

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Conflict of Interest Statement

No conflicts of interest, financial or otherwise, are declared by the authors.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Endnote

[1]Careless responders were identified as parents of a child under 36 months who selected the same response item, *on most pages*, for three consecutive items in the language and literacy habits paper reading section of the questionnaire (Meade & Craig, 2012). Given the nature of these items, this pattern is quite unlikely; for instance, parents would need to be practising alphabet letters, talking about letter sounds and making rhyming words on most pages of a book with a child under 3 years old. This seemed unrealistic and more likely to reflect careless responses.

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