

**A Children's Narrative Retells: The Influence of Character Realism and  
Storybook Theme on Central and Peripheral Detail**

## **Abstract**

### **Research Findings**

Anthropomorphized animal characters have been associated with negative influences on educational outcomes for young children, for example story comprehension and prosocial learning from moral tales. In this study we investigate how character realism and moral theme influence young children's recall of the story content. Retells were examined for length, syntactic complexity, and centrality as indices of memory and understanding. Participants were 171 children (age 3-7 years) from 6 rural schools in the Northwest of England. We found no significant influence of story character on the measures under test. Retells with a prosocial sharing theme had higher syntactic complexity and greater centrality than those with a busy theme.

### **Practice or Policy**

The results suggest that animal characters are not necessarily an impediment to coherent representations of stories. The central message from a prosocial themed story appeared to be more strongly retained than that of a closely matched story with no prosocial lesson. This suggests story theme to be a potential influence that should be considered when testing children's narrative comprehension.

### **Children's Narrative Retells: The Influence of Character Realism and Storybook Theme on Central and Peripheral Detail**

Illustrated storybooks are considered an important means of acquiring new language, concepts and learning moral lessons (Strouse et al., 2018; Yao & Enright, 2020). However, both the reality of the characters and the valence of moral theme are found to influence children's comprehension and prosocial learning (Kotaman & Balci, 2017, 2019; Yao & Enright, 2020). Anthropomorphised characters, that is, non-human characters such as animals that are afforded human-like behaviours, preoccupations, and goals, are prevalent in illustrated storybooks aimed at young children. Well-known examples of these anthropomorphised tales include those written over a century ago by Beatrix Potter about 'Peter Rabbit', as well as an extensive range of more recent stories, such as many of books produced by Julia Donaldson, for example, 'Superworm' (Donaldson, 2016). However, whilst clearly popular, these stories may be a less effective tool for learning in comparison with versions portraying more realistic human characters. For example, animal characters have been associated with a negative influence on young children's narrative comprehension (Kotaman & Balci, 2017, 2019) and a failure to enhance prosocial learning from moral tales (Larsen et al., 2017). Although narratives are frequently used in educational settings to convey moral messages (Leming, 2000), children's extraction of the core message differs developmentally (Narvaez et al., 1998), and their post-story prosocial behaviour is influenced by the valence of the moral message (Yao & Enright, 2020). This paper examines how these two factors – character realism and moral theme – influence young children's recall of the central story content.

Comprehension of narratives requires children to construct a situation model of the events described (Johnson-Laird, 1983; Kintsch, 1988). These representations

include aspects related to time, space, and causality, along with the characters and their intentions (see event-indexing model described in Zwaan, Langston, et al., 1995; Zwaan, Magliano, et al., 1995; Zwaan & Radvansky, 1998). Ideas that have a greater number of connections to other ideas in the text are considered more central to the overall meaning or gist of the narrative, than those with fewer connections. Older children and adults typically recall a greater number of central than peripheral ideas, a phenomenon known as the *centrality effect*, (Miller et al., 2013; Miller & Keenan, 2009). Under certain conditions, such as a high cognitive processing load, a centrality deficit is observed in which there is a reduction in the relative proportion of central ideas expressed in retells, which is related to the quality of the situation model (e.g. Miller et al., 2013; Miller & Keenan, 2011).

A critical aspect in constructing situation models in response to an oral narrative is coherence (or comprehension) monitoring (Language and Reading Research Consortium (LARRC) & Yeomans-Maldonado, 2017; Kim & Phillips, 2014; Strasser & Del Río, 2014). Content that is inconsistent with prior knowledge is more difficult to integrate into a coherent representation. This suggests that anthropomorphised animals in human settings inherently provide a violation of a child's expectations, notably in relation to a child's representation of characters and their intentions. Thus, the use of anthropomorphised characters in a narrative may potentially increase the cognitive load for a young child. Previous work indicates that young children often expect animal, rather than human, behaviours and mental state capacities from anthropomorphised characters (Larsen, et al., 2017; Russell & Cain, 2020). Furthermore, whilst fiction can be considered as an abstraction of the social world (Mar & Oatley, 2008), an anthropomorphised story represents a further level of abstraction. For these reasons, it is conceivable that the cognitive workload of retrieving relevant information and

connecting salient ideas to form coherent representations is a greater challenge when the character is less realistic. This may be particularly true for very young children.

Reduced connection between salient ideas could explain the findings that anthropomorphised animal stories are sometimes less effective as a learning tool, as discussed above (Kotaman & Balci, 2017, 2019; Larsen et al., 2017).

If anthropomorphised characters represent a greater cognitive challenge for children, we may find a negative influence on retells, relative to stories about human characters. Disruption to connections and coherency may result in reduced retell length, syntactic complexity and focus on the central points (van den Broek et al., 2012). To our knowledge, no previous work has considered centrality biases in children's retells of oral stories that vary by character realism. Indeed, most studies concerning centrality have been conducted using expository texts, or narratives describing an event, with older children (Miller et al., 2013; Miller & Keenan, 2009), or adult participants (Miller & Keenan, 2011; Rizzella & O'Brien, 2002; Yeari et al., 2019). Little is known about the development of the centrality effect in younger children, whose cognitive capacities are rapidly developing. Given the use of children's stories to convey moral lessons (Lee et al., 2014; Leming, 2000; Talwar et al., 2016; Walker & Lombrozo, 2017) it is important to establish if character influences children's recall retention of core information. For these reasons, we explored patterns of central and peripheral ideas included in young children's retells of stories that differed by character realism (human vs anthropomorphised animals) to understand any influence of character realism on the patterns observed.

There are developmental differences in the ability to extract the moral message from stories (Narvaez et al., 1999). Research indicates that general theme extraction from narratives is a difficult task for children under 10 years of age, and that young

children's story representations tend towards a concrete focus on action (Goldman et al., 1984; Mares & Acosta, 2008; Narvaez, 2002; Narvaez et al., 1999; Walker & Lombrozo, 2017). However, in a separate line of research, Narvaez et al. (2010), observed earlier comprehension of moral themed stories (where characters set aside self-interest) than of prudential themed stories (where characters use practical wisdom to achieve personal gain) in 10-year-olds. As children from the age of 6 have been found to differentiate between moral and prudential rules (Tisak & Turiel, 1984), it is possible that memory and understanding of prosocial stories will exceed that of non-prosocial stories in younger children.

Additionally, in their review of children's learning from picture books, Strouse et al. (2018) report that interactions between young children's developing abilities and key characteristics in books facilitate, or hinder, the generalisation of knowledge from fiction: Young children gradually develop symbolic and analogical reasoning which their children's understanding of material in books as a source of generalizable information about the world. In addition, capacities to separate realistic elements from fantastical ones must develop to ensure children to isolate those features of stories which are applicable to reality. Such a distinction is known as 'the readers' dilemma' (Gerrig & Prentice, 1991) and is understood to be particularly problematic for children (Hopkins & Weisberg, 2017). Books that incorporate fantasy elements, such as anthropomorphised characters, not only require symbolic and analogical reasoning from children with immature reasoning capacities, but any difficulty in separating fantasy from realistic elements in such stories, may result in still poorer extraction of the central messages of the narrative.

The influence of either theme or character may not act in isolation. A recent study, (Russell, Wang, & Cain, under review), found an interaction between prosocial

theme and character realism. Children either retold a story about a character who learned to share (prosocial theme) or a closely matched story about a busy character (no prosocial theme). Children used significantly more socio-relational language when retelling prosocial (sharing) stories with human protagonists compared with the same story featuring anthropomorphised animals. The analyses reported in this paper expand our current knowledge by examining the influence of both character realism and narrative theme on the central and peripheral detail in 3- to 7-year-olds' retells.

The formation of a situation model of a storybook narrative is supported by various additional factors. Story book features, such as illustrations, can aid understanding (Pike et al., 2010). Child-related characteristics such as vocabulary, prior world knowledge (Fecica & O'Neill, 2010; Kendeou et al., 2009), and frequency of exposure to story books (Sénéchal, 2006; Sénéchal & LeFevre, 2002) are predictive of narrative comprehension. To account for individual differences unrelated to the research question, we examined the relationships among children's receptive vocabulary (adjusted for age) and story book exposure, on children's retells.

### **The current study**

We examined the influences of story and child characteristics on 3- to 7-year-olds' retells. Retell tasks have been used successfully to explore the central and peripheral story ideas recalled by older children (e.g., Keenan & Brown, 1984; Miller & Keenan, 2009). In this study, children were first told one of four versions of a story, from an illustrated storybook. The books varied by character realism (human/animal) and by story theme (prosocial sharing/busy). The stories were segmented into idea units based upon clause structure, following the procedure outlined in Miller and Keenan (2011). The coding of the central and peripheral idea units in children's retells was based on norms provided by adults' ratings.

Our main purpose was to address research questions related to the influence of story character realism (animal/human), narrative theme (busy/sharing) and chronological age on both quantitative and qualitative indices of narrative recall. These serve as a proxy measures of memory and understanding of narrative (Bishop, 2004; Miller & Keenan, 2009; van den Broek et al., 2012). There were 4 age groups: 3- to 4-year-olds (UK Nursery), 4- to 5-year-olds (UK Reception), 5- to 6-year-olds (UK Year 1), and 6- to 7-year-olds (UK Year 2); for brevity we refer to them as 3-, 4-, 5- and 6-year-olds). In the UK, age group serves as a proxy measure of prior schooling as typically developing children progress through school year groups linearly and without reference to attainment. Nursery provision is typically part-time, but school attendance from Reception onwards is full-time.

Our analyses addressed the following research questions (when controlling for children's receptive vocabulary (standardized BPVS-3):

- (1) Do character, theme, and/or age group influence narrative length (number of words) and/or the syntactic complexity (as measured by mean length of utterances in words: MLU) at retell?
- (2) Do character, theme, and/or age group influence the total proportion of story units included in retells, and does this differ by centrality of story unit?
- (3) Do character, theme, and/or age group influence the proportion of central ideas in retells?

If anthropomorphised content influences retell, differences on these outcome measures relative to the human content narratives will be seen. The relationship between the presence of a moral theme and young children's retells of stories has not be previously explored. If there is an effect of theme, differences may be observed in the outcome variables. We would expect age-related changes in retells (Khan et al., 2016; Lynch et



al., 2008; Westerveld & Vidler, 2015). We predict that older children will produce longer retells, that are more linguistically complex, with greater focus on story central ideas. We will explore interactions between story character realism, narrative theme, and age on the outcome measures. Additionally, associations between child and environmental characteristics (vocabulary, print exposure) and our outcome measures will be examined.

## **Method**

### **Participants**

Participants ( $N = 171$ ) were typically developing, native English speakers, aged between 3 and 7 years ( $M = 67.20$  months,  $SD = 13.87$ , range: 38 to 91 months, 71 girls, 100 boys). The children were recruited from six state primary schools in the Northwest of England, serving similar catchment areas and were tested as part of a larger study (with the same children) investigating responses to anthropomorphized content in stories. Children in each of the school year groups (Nursery, Reception, Year 1, Year 2) were randomly assigned to one of the four storybooks. Story data from 13 additional children from the wider study were not available for these analyses due to audio equipment failure ( $N=7$ ), participant unwillingness to retell the story ( $N=1$ ), or receptive vocabulary scores that were more than one standard deviation below the mean ( $N=5$ ).

### **Materials**

#### ***Story books***

Book stimuli were developed to enable simultaneous data collection to examine several separate research questions related to character realism (Russell & Cain, 2020, 2022; Russell, Wang, & Cain, under review). Four books were constructed. Two books had a prosocial (moral) theme about sharing. In the *Animal Sharing* book, the original book's anthropomorphized illustrations were used; in the *Human Sharing* book, the

pictures were those created by Larsen et al. (2017), which had been adapted so that human protagonists replaced animal characters. The prosocial stories were identical, other than for specific references to characters, for example, ‘Little Rachel’ in the human version was ‘Little Raccoon’ in the animal story, as is typical in these narratives. The same animal and human illustrations were used to create two further versions of the books. Key words in the sharing story were changed to create a prudential narrative about the theme of ‘being busy’, that fitted the pictures without providing a sharing theme (see Table 1). Again, the busy narratives were identical to one another, other than for specific references to characters. This provided the *Animal Busy* and *Human Busy* books. The four books were printed in an identical format. Wordless copies of anthropomorphic and human books were produced for use in the retell task. These were printed and bound to match the experimental books.

Equivalence across the four stories was confirmed by scores for key linguistic variables obtained using the online automated computational tool, Coh-Metrix 3.0: [Index - Coh-Metrix 3.0 \(memphis.edu\)](#), see Graesser et al., 2004, 2011). These scores indicated no substantial differences between conditions (see Appendix A). The small variation in story length between themes was a result of using slightly more words to create a busy story from the sharing text whilst maintaining a narrative that both made sense and fitted the illustrations (see Table 1).

### ***Defining Centrality***

To define centrality, each story was segmented into idea units based upon clause structure in line with Miller and Keenan (2011), to enable a comparison of findings with the extant literature. Stories that shared a common theme (e.g., *Animal Sharing*, *Human Sharing*) were identical, excluding specific references to character names. The sharing and busy stories were created intentionally to be very closely matched in syntax and

length, differing only by a small number of key words. Therefore, the clause structure of all story variants was the same, and 61 idea units were established for each of the four narratives.

To organise the story into central and peripheral ideas a norming study was conducted. Undergraduates ( $N = 68$ ) were randomly assigned to one of the four story conditions. The 61 idea units were presented without pictures and participants rated the importance of each segment to the overall meaning of the story on a scale from 1 (not at all important) to 9 (extremely important). Results indicated high reliability estimates for story ratings (busy stories average measure ICC was .960 with a 95% confidence interval from .938 to .977, ( $F(33,1980) = 24.89, p < .001$ ); Sharing stories average measure ICC was .926 with a 95% confidence interval from .886 to .957, ( $F(33,1980) = 13.53, p < .001$ ).

For each of the two stories (collapsed across character), mean ratings of importance were calculated for each unit. Following previous research (Miller et al., 2013, Miller & Keenan, 2011) we defined central ideas as those for which the mean ratings were greater than the median, and peripheral ideas as those with ratings equal to or below the median. Assessment of the highest and lowest quintiles yielded the same overall pattern, which supported the use of a median split, as similarly verified in the work of Miller and colleagues.

### ***Receptive Vocabulary Assessment***

The British Picture Vocabulary Scale: Third Edition (BPVS-3; Dunn et al., 2009) is a UK standardized assessment tool for measuring children's receptive vocabulary (comparable to the PPVT for American English). This was administered and scored according to the manual guidelines. Standardized scores indicate ability taking into account chronological age. These were used to exclude participants with weak

language skills (more than 1 SD below the mean; included range 85-125). The standardized scores were included in subsequent analyses.

### ***Home Literacy Environment***

Information about the home literacy environment was obtained by parental questionnaire (see Appendix B). The questionnaire included a Child Title Checklist (CTC) and Child Author Checklist (CAC) as proxy measures of children's exposure to print (Stanovich & West, 1989) using validated checklists (Hamilton, 2014). Each comprised a series of real items (30 true children's book titles; 40 published children's authors) and an equal number of foils (30 plausible made-up titles; 40 non-author names). Parents were asked to identify only those titles and authors they recognised. Total scores were calculated by subtracting the number of foils incorrectly identified from the total number of target items correctly identified for each to adjust for guessing (Stanovich & West, 1989). Internal consistency was very high (CTC: Cronbach's  $\alpha = .88$ ; CAC: Cronbach's  $\alpha = .92$ ). The CTC and CAC scores, along with those items relating to children's frequency of shared book reading, frequency of reading to themselves, and a parental estimate of the number of children's books in the home were used to compute standardised factor scores in a principal components analysis.

Parental responses to invitations to name their child's favorite book title(s) and TV show(s) were carefully examined and binary coded for the presence of anthropomorphic content by the first researcher. This enabled a characterization of the sample with respect to children's orientation towards anthropomorphized media.

### **Procedure**

Parents returned the home literacy environment questionnaire with the consent form. Children were then assessed in their schools in two 20-minute sessions. The BPVS-3 was administered in the first session. In the second session, children listened to

one of four versions of a story. They were asked to listen carefully and told that they would be invited to retell the story afterwards. The researcher read the scripted story verbatim. Any interruptions were responded to neutrally, and attention redirected to the book. Next, the child was provided with a wordless version of the same book. Using similar directions to those used in the Test of Narrative Language (TNL; Gillam & Pearson, 2004), the child was invited to retell the story aloud and to include everything they could remember. Hesitancy of more than 10 seconds was responded to with scripted neutral prompts such as, ‘What happened at the beginning of the story?’ or ‘What happened next?’ Children were rewarded with stickers for their work and tasks related to the wider study (see Russell & Cain, 2022).

### **Retell Transcription, Coding Systems and Reliability**

The story retells were audio recorded and transcribed following the procedures outlined in the Expression, Reception and Recall of Narrative Instrument manual (ERRNI; Bishop, 2004) to provide ‘T units’. A research assistant, blind to the experimental hypotheses, independently checked and parsed 20 randomly selected transcripts. Reliability was excellent for both transcription accuracy (98.8%) and division into utterances (96.5%). Any disagreement was resolved by discussion.

The transcribed narratives were scored for inclusion of the 61 idea units by a different research assistant, blind to the centrality hypothesis. Credit was given for recall if an idea was reported either verbatim or in gist (evident in synonymous language). This provided a binary value, indicating the presence or absence of each idea unit. The first researcher independently scored 39 of the transcripts (23%); inter-rater reliability of the subset was good ( $k > .94$ ). A summary of the scoring for inclusion criteria is available on OSF [[link here on acceptance of manuscript](#)].

### ***Transcript Scoring***

From the transcribed stories, the mean narrative length (in words) and the MLU were computed. Proportional scores for the story idea units were computed in line with previous studies (Miller et al., 2013; Miller & Keenan, 2009). The original stories varied by theme (sharing/busy). Both themes had 61 story ideas and the numbers of ‘central’ and ‘peripheral’ ideas, as defined by the norming study, are reported in Table 1. The number of story idea units expressed in each retell was counted and used to compute a total proportional score of the original 61 unit narrative. Similarly, the numbers of central and peripheral ideas in each retell were counted and proportional scores computed (see Table 1). For example, a retell following a *sharing story* with 16 central and 10 peripheral idea units resulted in a total proportion score of 26/61 (0.43), a central score of 16/34 (0.47), and a peripheral score of 10/27 (0.37).

#### **Data Reduction (Parental Questionnaire)**

To prepare the data for further analysis, the number of variables related to children’s home literacy experiences was reduced using a principal component analysis with an oblique rotation (used when two or more factors may be correlated). The analysis included both the title and author checklist (CTC, CAC) scores, and scores related to the frequency of book reading (shared and alone) and number of children’s books in the home. Two separate factors emerged. The first related to objective measures of print exposure (CTC, CAC, number of books) and explained 47% of the variance. The second factor related to frequency of shared reading and reading alone and explained 22% of the variance. Standardized factor scores were obtained using the regression method for each component. A summary of factor loadings is provided in Appendix C.

### **Results**

#### **Descriptive statistics**

Several key descriptive and preliminary relationships were examined prior to the analyses addressing the three main research questions.

### ***Children's preference for anthropomorphic content***

Parents of 169 (of 171) participants completed the home literacy questionnaire. Responses indicated that 58.0% of children's children had a favourite book that included anthropomorphic content and 63.3% of children's favourite film/TV viewing included anthropomorphic content. Only 21.1% of parents reported no anthropomorphic content across book and screen favourites.

Chi-square analysis confirmed an age effect on the likelihood that parents reported anthropomorphic content in their children's favourite books,  $\chi^2(3, N = 169) = 15.35, p = .002$ ; film/TV viewing,  $\chi^2(3, N = 169) = 28.49, p < .001$ . Preferences for anthropomorphic content decreased with increasing age in both media. There was no significant effect of gender on the likelihood that favorite media contained anthropomorphic content: books  $\chi^2(1, N = 169) = .04, p = .85$ ; TV programs/films:  $\chi^2(1, N = 169) = .01, p = .92$ .

### ***Child Related Characteristics and Outcome Variable Descriptive Statistics***

Summaries of descriptive statistics for each storybook condition are provided in Table 2. Correlations between child related characteristics and outcome variables are reported in Table 3. Receptive vocabulary (BPVS-3 standardized score) was associated with several retell measures: higher syntactic complexity (MLU) and all measures of unit recall (total, central, peripheral). There was a small positive correlation between print exposure score (home literacy environment) and syntactic complexity, and weak relations with unit recall. Print exposure correlated moderately with receptive vocabulary, and the latter was used as a covariate in subsequent analyses.

Preliminary analyses by a set of ANOVAs indicated no significant relationships between any of the outcome variables (*narrative length, MLU, proportion of original story, proportion of central story ideas, and proportion of peripheral ideas*) and either gender of participant (all  $ps > .05$ ), or school location (all  $ps > .05$ ). Thus, we collapsed the data across gender and school location. Similarly, preliminary ANOVAs indicated no significant differences between experimental groups (four storybook conditions) on the measures of vocabulary (BPVS-3) and print exposure (CTC, CAC).

### ***Lexical Diversity in Stories***

In the analyses reported below, we found an influence of story theme. We therefore ran an exploratory post-hoc analysis of the language in the central story units of each theme using Coh-Metrix 3.0. There was no evidence of differences in lexical diversity across themes: scores for each book were identical (0.494). Thus, we report our original analyses and do not include lexical diversity as a covariate.

### **(1) Do character, theme, and/or age group influence narrative length and/or the syntactic complexity of retells?**

To examine the influence of storybook factors and age on narrative length and syntactic complexity (MLU), we conducted two 3-way ANCOVAs. For both analyses, we entered Character (animal/human) x Theme (busy/sharing) x Age Group (4 levels; 3-, 4-, 5- and 6-year-olds) as between-subjects variables. Receptive vocabulary entered as a covariate, because it significantly adjusted the association between the predictor variables and outcome variables. The results are reported in Table 4a.

On average, older children produced longer retells overall, and longer MLUs than younger children (see Table 4a). There was a significant effect of narrative theme on MLU. Retells with a sharing theme had a higher MLU than those with a busy theme (sharing: adjusted mean = 6.69,  $SE = 0.15$ ; Busy: adjusted mean = 6.23,  $SE = 0.15$ ).



Post hoc tests (with Bonferroni correction for multiple comparisons) are reported in Table 5. The main effect of theme was not significant in the analysis with overall length as an outcome, but it was involved in a significant interaction between theme and age group on narrative length. Simple main effects analysis showed that the retells from the 5-year-olds (Year 1) children's sharing stories were significantly longer than their busy stories,  $F(1,154) = 7.23, p = .008, \text{partial } \eta^2 = .05$  (see Table 6).

**(2) Do character, theme, and/or age group influence the total proportion of story units included in retells, and does this differ by centrality of story unit?**

To address the main research question concerning centrality, we conducted a mixed design ANCOVA<sup>1</sup> with the same between-subject factors as before: character, theme, and age group. Centrality of story unit recalled (central, peripheral) was a repeated-measures factor. Receptive vocabulary was entered as the covariate, as before. The full results of the ANCOVA are reported in Table 4b. As predicted, there was a main effect of age group:  $F(3,154) = 41.81, p < .001, \eta_p^2 = .45$ , with older children including a higher proportion of story units, in general, than younger children. Post hoc comparisons are reported in Table 5. No other main effects reached statistical significance, although we note that the main effect of character approached significance,  $F(1,154) = 3.33, p = .07, \eta_p^2 = .02$ .

---

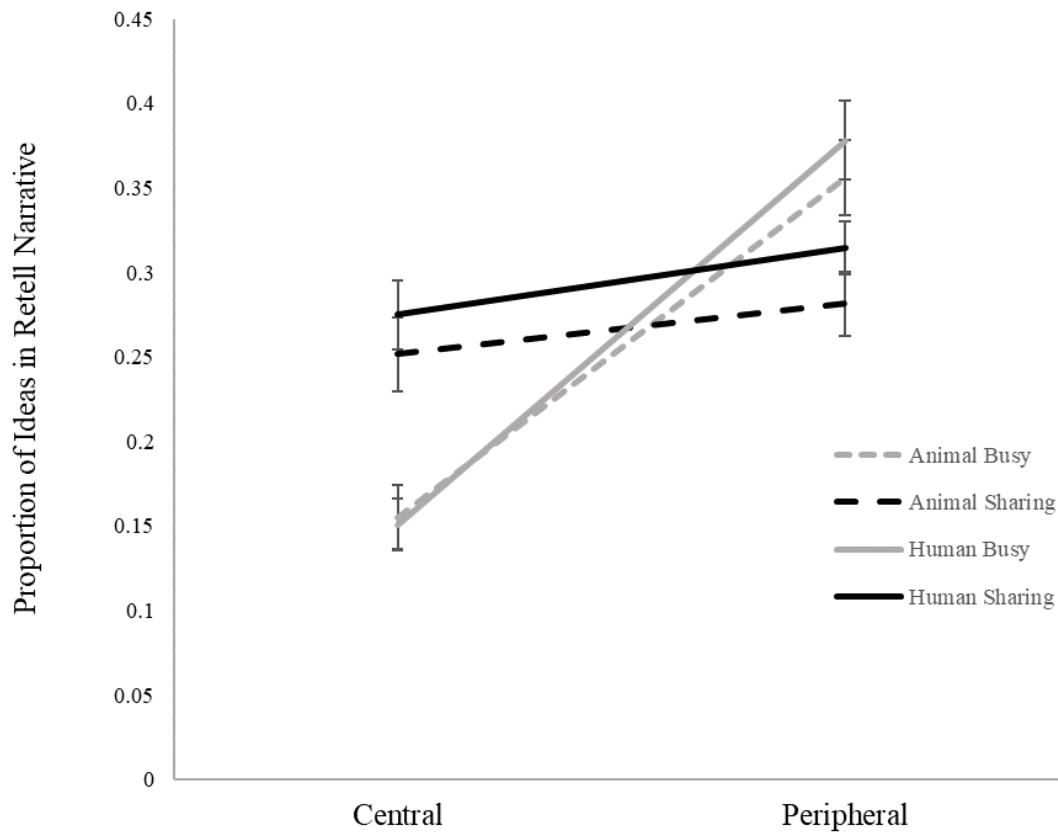
<sup>1</sup> Arcsine transformations for proportional data were considered (Lin & Xu, 2020). However, log transformations are problematic for data that contains zero counts (Chen et al., 2017; Lin & Xu, 2020). This informed a decision to use ANOVA, supported by consideration of our sample size in relation to central limit theorem.

There were two significant interactions. The first was between age group and theme,  $F(3,154) = 4.24, p = .007, \eta_p^2 = .08$ . This mirrored the interaction reported for overall narrative length, above. Simple main effects analysis showed that the retells from the 5-year-olds (Year 1) who had been presented with sharing stories had significantly greater centrality than those produced by children who had been presented with busy stories,  $F(1,154) = 12.43, p = .001, \text{partial } \eta^2 = .08$  (see Table 6). The second interaction was between centrality and theme,  $F(1,154) = 93.47, p < .001, \eta_p^2 = .38$ . This is depicted in Figure 5.1 and arose because central ideas made up a greater proportion of the story ideas in retells following a sharing story, in comparison with retells following a busy story.

**Figure 1**

*Proportions of Central and Peripheral Ideas in Animal and Human Stories by Story*

*Theme*



**(3) Do character, theme, and/or age group influence the proportion of central ideas in retells.**

To examine the factors that influenced the proportion of central story units included in retells, we ran a 3-way ANCOVA with the same between-subjects factors as above (character, theme, age group) and receptive vocabulary as a covariate (see Table 4b). As before, there was a main effect of age group,  $F(3,155) = 30.94, p < .001$ , partial  $\eta^2 = .38$ . On average, older children produced a higher proportion of central story idea units than younger children. (Post hoc comparisons are reported in Table 5). There was also a significant main effect of story theme,  $F(1,154) = 43.56, p < .001$ , partial  $\eta^2 = .22$ . Retells following sharing stories contained a significantly higher proportion of the

central story idea units than those following busy stories (sharing: adjusted mean = 0.25,  $SE = 0.01$ ; busy: adjusted mean = .15,  $SE = 0.01$ ).

### **Discussion**

Retell is widely used as an indicator of narrative comprehension and provides a window into the organisation of story ideas retained by children (Cao & Kim, 2021; Reed & Petscher, 2012; Shapiro et al., 2014). Using this framework, we used a retell task to explore the influences of character realism and narrative theme on 3- to 7-year-olds' memory and understanding of narrative (Bishop, 2004; Miller & Keenan, 2009; van den Broek et al., 2012). We found clear developmental progression with respect to narrative length, syntactic complexity, and the inclusion of central story information. These findings are consistent with the wider literature examining story telling development in young children (Khan et al., 2016; Lynch et al., 2008; Westerveld & Vidler, 2015) and suggests that our paradigm is sufficiently sensitive to detect both quantitative and qualitative differences in retells.

There was no evidence of a significant influence of story character on inclusion of any of the linguistic features we examined. However, story theme had a significant influence on syntactic complexity (assessed with MLU) and on recall of central story units; sharing stories were associated with retells that had greater syntactic complexity and greater proportions of central story units than busy stories. Whilst, on average, a sharing theme did not result in longer retells, there was an interaction of theme with age group: 5-year-olds produced longer retells that included higher proportions of story units following sharing stories, compared with busy stories. These findings are discussed in relation to the wider literature concerning children's responses to stories, anthropomorphism, and the influence of story topic on engagement.

### **Age and Influences on Retells**

We established that our methodology was sufficiently sensitive to detect age related differences in children's retells: retell length and syntactic complexity increased with age. Older children also included greater proportions of the original story and of the central story units than younger children. This suggests better organisation and comprehension of key ideas from stories with increasing age. The pattern of findings align with expected developmental trends of an increase in the quantity and complexity of language included in children's narrative retells over this age range (e.g., Lynch et al., 2008a; Westerveld & Gillon, 2010; Westerveld & Vidler, 2015). Thus, in general, our task was sensitive to developmental change and captured expected trends.

The developmental improvements were not linear. Post hoc analyses indicated no significant difference in retell length, syntactic complexity, or proportionate total or central idea recall between the 3-year-old (nursery) and 4-year-old (reception) class children. However, significant progression in these indices of story memory and understanding were observed between each of the two older age groups. This development may be closely related to the cognitive shift observed in 5- to 7-year-olds, which includes changes in how children represent context and ideas (Chandler, et al., 1996; Davidson, 1998) which has clear pedagogical implications concerning the limitations of younger children's capacity to learn from stories. That cognitive shift coincides with the inclusion of explicit reading and comprehension instruction in our sample, which may have had an additional influence on the progression observed between the older three age groups.

### **Character Realism and Retells**

A primary aim was to explore the influence of story character on children's retells. Despite a prevalence of anthropomorphised content in fictional and informational content produced for this age range, previous research suggests that

anthropomorphised content has a negative influence on children's comprehension (Kotaman & Balci, 2017) and prosocial behaviour (Larsen et al., 2017), at least under some test conditions. We found no evidence to support an influence of story character realism on children's retells, measured by linguistic indicators and content. This suggests that animal characters are not necessarily an impediment to children constructing coherent representations of stories.

Children's ability to enter the anthropomorphised story world may be facilitated by regular exposure to the genre. Almost 80% of returned parental questionnaire responses listed anthropomorphised content in children's favourite books or films or TV shows. How books are shared with children, and also the child's ability to imbue animals with human characteristics, may also play a role. More widely, anthropomorphised books have been noted as highly prevalent in classrooms (Kotaman & Balci, 2019; Larsen et al., 2017). One proposed mechanism for poorer transfer of information following these stories is a "quarantining" effect (Hopkins & Weisberg, 2017; Walker et al., 2015), as children realise that the content of less realistic stories may not be a reliable source of information for the real world. We found no indication that children's memory and understanding was significantly influenced by anthropomorphic content. This suggests that any influence of character realism may be on children's application of a message from a story.

Future work focused on how children decide the validity of storybook information as guide for behaviour may clarify how children separate (or quarantine) realistic from fantastical elements of stories. However, influences of character realism may be subtle. When tested immediately, Kotaman and Balci (2017a) found no significant differences in comprehension of stories depicting realistic versus non-realistic characters, but differences were apparent one week later; children's retention of

learning from the human stories was significantly better than from the anthropomorphised stories. Future work exploring the development of children's multidimensional situation models across a wider variety of character types may clarify how children construct mental representations of stories and retain central information to use as a guide in real-world situations.

### **The Influence of Theme and Retells**

We explored the influence of story theme by using a prosocial sharing story and a busy story. Retells following each did not differ significantly in story length - a measure which incorporates any embellishments included by the child, in addition to the original story units. Similarly, theme did not significantly influence the proportion of the original story units included in retells, indicating that children remembered and reported similar amounts of story action. However, the syntactic complexity (measured by MLU) was greater in response to a sharing theme than a busy theme and, of note, there was a greater centrality effect. This finding led us to consider whether the illustrations may have better supported the sharing theme, over the busy theme. To assess this, 15 adults, naïve to the research questions, were asked to propose a plausible story theme to fit the illustrations in the wordless picture books. The most common responses were themes of friendship and forest adventures. As noted in our methods, the central story units were of equivalent lexical complexity in each book. Therefore, neither the illustrations, nor lexicality of the central story units, were likely to have caused the observed differences in retells. Our post-hoc exploration instead support our conclusion that the difference in theme underpins this key finding; the central message of our prosocial themed story was more strongly retained than the very similarly presented central message about a character who was busy.

A related strand of research shows an influence of narrative topic on children's interest in the passage, attentional motivation, and subsequent narrative comprehension (Lee & Pulido, 2017; Lepper & McElvany, 2020; Oakhill & Petrides, 2007). Theme and topic are clearly connected: Theme can be described as the overall (and sometimes hidden) message in a narrative, for example, expected social behaviour; topic relates more to the specific focus in a story, for example in our prosocial story, a character sharing resources with friends to access a party. Our prosocial sharing story may have provided a topic that provoked more interest than our busy story. A measure of narrative interest and engagement could be usefully incorporated into future work to assess the relationship with comprehension.

Prosocial stories in general may elicit particular attention to salient story elements. This could be related to familiarity of theme, as attempts to instil behaviour such as sharing are common cultural preoccupations of those caring for and educating young children (e.g., Berkowitz, 2011; Callaghan & Corbit, 2018). Alternatively, there may be an effect of valence; taking on a behaviour (sharing) may have been easier to conceptualise by children than the inhibition of a behaviour (busyness) in our stories. Valence effects have been observed previously, for example, honesty in children is promoted by stories that highlighted the benefits of honesty, but not those outlining punishment for lying (Lee et al., 2014). Additionally, our findings may relate to the finding of earlier comprehension of moral than prudential theme in stories by 10-year-olds (Narvaez et al., 2010). Future work might usefully explore children's retention of story units from a wider variety of prosocial narratives, using control stories with matched valence. Second, research comparing comprehension of closely matched stories that vary by the inclusion of a moral or prudential theme could aid our understanding of the development of children's understanding of prosocial stories as a



particular genre. Clearly, a better understanding of story theme and valence effects may inform the choice of the most beneficial reading materials to be used by educators.

We found an interesting interaction between age group and story theme: the 5-year-olds' (Year 1) retells with the sharing theme were significantly longer and contained greater proportions of the original story units than those with the busy theme. This effect was not driven by this age group's responses being at ceiling. Previous research suggests that around this age, children develop in their thinking about their own and other's capacities to act against stated desires and to begin to apply counterfactual reasoning (Chernyak & Kushnir, 2018; Kushnir et al., 2015; Rafetseder et al., 2010). Prosocial stories may provide a particularly salient context for these developing capacities, and the longer retells from this age group may reflect a step change in attention to such reasoning. An examination of the semantic content of retells in relation to this point was outside the scope of this study, but might shed light on the reasoning of participants. This is something for consideration in future research.

### **Centrality in Retells**

Our findings highlight new avenues of research to extend our understanding of the development of centrality. In contrast to previous work with older children and adults (Miller et al., 2013; Miller & Keenan, 2009; Rizzella & O'Brien, 2002; Yeari et al., 2019), we did not find higher proportions of central over peripheral ideas (i.e., a *centrality effect*) in retells. This may relate directly to established patterns of young children's focus on concrete action over story meaning (Goldman et al., 1984; Mares & Acosta, 2008; Narvaez, 2002; Narvaez et al., 1999; Walker & Lombrozo, 2017), resulting in a focus on event recall, rather than preferential organisation of ideas around overall salience to the story message. In addition, previous research has explored centrality biases using expository texts or short descriptions of events rather than

stories, which may yield different patterns of retell. However, our method was sensitive to differences in proportions of central story units in relation to both age and story theme, and therefore provided an appropriate measure to explore the potential influence of character, as discussed previously. The development of centrality in younger children's retelling of stories and expository texts is currently under-examined.

### **Limitations and future directions**

There are limitations of our study and ideas for future research, in addition to those discussed above. First, whilst retell is an established method of examining centrality, additional concurrent methods for a fuller assessment of children's situation models in response to stories would be advantageous. For example, the use of visual world and other eye tracking paradigms (e.g., Engelen et al., 2014; Huettig et al., 2011), or causal connection analysis and question and answer comprehension methods could be considered (e.g., Lynch et al., 2008).

Second, as with previous studies (e.g., Miller & Keenan, 2009), the centrality of the passages was defined by an adult sample. Future research with young children could additionally relate their central and peripheral ideas against those of an age-matched sample for a more sensitive assessment of centrality in retells: indeed, other research demonstrates that adults' and children's views on the meaning of the stories can differ (Mares & Acosta, 2008; Narvaez, 2002; Narvaez et al., 1999; Walker & Lombrozo, 2017). Exploration of children's salience ratings of story units in relation to the frequency of inclusion may provide added insight into children's attention towards specific aspects of story.

This was a single between-groups study and our sample comprised mainly monolingual children, from low to middle SES backgrounds. We note that our groups did not differ by vocabulary ability or exposure to print, suggesting that differences

relating to theme were the result of our experimental manipulations. We also note that there was a significant variability in vocabulary and home literacy experiences.

However, future empirical work with diverse populations is needed to establish the reproducibility of our findings, because socio-cultural and economic factors are important influences on early language and literacy development (Rowe et al., 2016; Sénéchal et al., 1998; Van Steensel, 2006) and the influence of story valence on children's responses differs amongst cultures (Yao & Enright, 2020).

### **Conclusions and Implications for Practice or Policy:**

This study extends the literature on the centrality effect to a younger age group. The centrality effect seen in adults and older children, where more central than peripheral information is provided in retells, was not evident in these young children. However, a positive shift towards centrality was observed over the 3 to 7 years age range. This implies that the development of centrality from early childhood could be examined using retell methods.

Character realism was not significantly influential on measures of retell length, syntactic complexity, or centrality, thus we did not find evidence that animal characters are an impediment to coherent representations of stories. Previous studies of comprehension and prosocial learning (Kotaman & Balci, 2017, 2019; Larsen et al., 2017) imply that greater support may be required to aid young children's application of messages from anthropomorphized stories. Therefore, future studies designed to substantiate and extend the assessment of young children's situation models using a range of methodology would provide robust empirical evidence for policy decisions concerning the use of the anthropomorphised genre as an educational resource.

The central message from a prosocial themed story appeared to be more strongly retained than that of a closely matched story with no prosocial lesson but a prudential

theme. This implies that narrative theme can influence children's attention to the central meaning of a story. This could be explored with a greater selection of commercially available picture books, to aid generalization and inform education policy. If further work confirms our findings, careful consideration of the influence of narrative theme when testing children's comprehension, or designing optimal experimental materials for studies, would be indicated.

### **Acknowledgements**

This work was supported by a Leverhulme Trust Doctoral Scholarship in Interdisciplinary Research on Infant Development [grant number: DS-2014-014].

The authors thank Nicole Larsen and colleagues for providing us with the story pictures. We are grateful to all the children who took part, and their schools for warm welcome.

### **Disclosure statement**

The authors report there are no competing interests to declare.

**Author credits:** Sam Russell: Investigation, Data curation, Visualisation, Formal Analysis; Original draft preparation; Sam Russell, Kate Cain: Conceptualization, Methodology; Sam Russell, Kate Cain, Jess Wang: Writing- Reviewing and Editing; Kate Cain, Jess Wang: Supervision.

## References

- Benenson, J. F., Pascoe, J., & Radmore, N. (2007). Children's altruistic behavior in the dictator game. *Evolution and Human Behavior, 28*(3), 168–175.  
<https://doi.org/10.1016/j.evolhumbehav.2006.10.003>
- Berkowitz, M. W. (2011). What works in values education. *International Journal of Educational Research, 50*(3), 153–158. <https://doi.org/10.1016/j.ijer.2011.07.003>
- Bishop, D. V. (2004). *Expression, Reception and Recall of Narrative Instrument: ERRNI*. Harcourt assessment.
- Callaghan, T., & Corbit, J. (2018). Early prosocial development across cultures. *Current Opinion in Psychology, 20*, 102–106. <https://doi.org/10.1016/j.copsyc.2017.07.039>
- Cao, Y., & Kim, Y. S. G. (2021). Is retell a valid measure of reading comprehension? *Educational Research Review, 32*, 100375.  
<https://doi.org/10.1016/j.edurev.2020.100375>
- Chandler, M., & Lalonde, C. (1996). Shifting to an interpretive theory of mind: 5-to 7-year-olds' changing conceptions of mental life. *The five to seven year shift: The age of reason and responsibility*, 111-139.  
[https://www.researchgate.net/profile/Christopher-Lalonde/publication/232551521\\_Shifting\\_to\\_an\\_interpretive\\_theory\\_of\\_mind\\_5-to\\_7-year-olds'\\_changing\\_conceptions\\_of\\_mental\\_life/links/5d770bfc4585151ee4ab12d2/Shifting-to-an-interpretive-theory-of-mind-5-to-7-year-olds-changing-conceptions-of-mental-life.pdf](https://www.researchgate.net/profile/Christopher-Lalonde/publication/232551521_Shifting_to_an_interpretive_theory_of_mind_5-to_7-year-olds'_changing_conceptions_of_mental_life/links/5d770bfc4585151ee4ab12d2/Shifting-to-an-interpretive-theory-of-mind-5-to-7-year-olds-changing-conceptions-of-mental-life.pdf)
- Chen, K., Cheng, Y., Berkout, O., & Lindhiem, O. (2017). Analyzing proportion scores as outcomes for prevention trials: a statistical primer. *Prevention Science, 18*(3), 312–321. <https://doi.org/10.1007/s11121-016-0643-6>

- Chernyak, N., & Kushnir, T. (2018). The influence of understanding and having choice on children's prosocial behavior. In *Current Opinion in Psychology* (Vol. 20, pp. 107–110). Elsevier Ltd. <https://doi.org/10.1016/j.copsyc.2017.07.043>
- Davidson. (1998). Arnold J. Sameroff and Marshall M. Haith, "The Five to Seven Year Shift: The Age of Reason and Responsibility" (Book Review) [Review of *Arnold J. Sameroff and Marshall M. Haith, "The Five to Seven Year Shift: The Age of Reason and Responsibility" (Book Review)*]. *American Journal of Psychology*, 111(2), 305. University of Illinois Press, etc. <https://doi.org/10.2307/1423493>
- Donaldson, J. (2016). *Superworm*. Scholastic.
- Dunn, L. M., Dunn, D. M., & Styles, B. (2009). *The British Picture Vocabulary Scale* (3rd ed). London: GL Assessment.
- Engelen, J. A. A., Bouwmeester, S., De Bruin, A. B. H., & Zwaan, R. A. (2014). Eye movements reveal differences in children's referential processing during narrative comprehension. *Journal of Experimental Child Psychology*, 118(1), 57–77. <https://doi.org/10.1016/j.jecp.2013.09.005>
- Fecica, A. M., & O'Neill, D. K. (2010). A step at a time: Preliterate children's simulation of narrative movement during story comprehension. *Cognition*, 116(3), 368–381. <https://doi.org/10.1016/j.cognition.2010.05.014>
- Gerrig, R. J., & Prentice, D. A. (1991). The representation of fictional information. *Psychological Science*, 2(5), 336–340. <https://doi.org/10.1111/j.1467-9280.1991.tb00162.x>
- Gillam, R. B., & Pearson, N. (2004). *Test of Narrative Language*. Austin, Tex: Pro-Ed.
- Goldman, S. R., Reyes, M., & Varnhagen, C. K. (1984). Understanding fables in first and second languages. *NABE Journal*, 8(2), 35–66.

- Graesser, A. C., McNamara, D. S., & Kulikowich, J. M. (2011). Coh-metrix: Providing multilevel analyses of text characteristics. *Educational Researcher*, *40*(5), 223–234. <https://doi.org/10.3102/0013189X11413260>
- Graesser, A. C., McNamara, D. S., Louwerse, M. M., & Cai, Z. (2004). Coh-Metrix: Analysis of text on cohesion and language. *Behavior Research Methods, Instruments, and Computers*, *36*(2), 193–202. <https://doi.org/10.3758/BF03195564>
- Hamilton, L. (2014). Early exposure to storybooks in the home: Validation of title/author checklist measures in a sample of children at elevated risk of reading difficulty. *Assessment & Development Matters*, *6*(1), 31–34. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4558947/>
- Hopkins, E. J., & Weisberg, D. S. (2017). The youngest readers' dilemma: A review of children's learning from fictional sources. *Developmental Review*, *43*, 48–70. <https://doi.org/10.1016/j.dr.2016.11.001>
- Huettig, F., Rommers, J., & Meyer, A. S. (2011). Using the visual world paradigm to study language processing: A review and critical evaluation. *Acta Psychologica*, *137*(2), 151–171. <https://doi.org/10.1016/j.actpsy.2010.11.003>
- Johnson-Laird, P. N. (1983). *Mental models: Towards a cognitive science of language, inference, and consciousness* (6th ed.). Harvard University Press.
- Keenan, J. M., & Brown, P. (1984). Children's reading rate and retention as a function of the number of propositions in a text. *Child Development*, *55*(4), 1556–1569. <https://www.jstor.org/stable/pdf/1130026.pdf>
- Kendeou, P., van den Broek, P., White, M. J., & Lynch, J. S. (2009). Predicting reading comprehension in early elementary school: The independent contributions of oral language and decoding skills. *Journal of Educational Psychology*, *101*(4), 765–778. <https://doi.org/10.1037/a0015956>

- Khan, K. S., Gugiu, M. R., Justice, L. M., Bowles, R. P., Skibbe, L. E., & Piasta, S. B. (2016). Age-related progressions in story structure in young children's narratives. *Journal of Speech, Language, and Hearing Research, 59*(6), 1395–1408. [https://doi.org/10.1044/2016\\_JSLHR-L-15-0275](https://doi.org/10.1044/2016_JSLHR-L-15-0275)
- Kim, Y.-S., & Phillips, B. (2014). Cognitive correlates of listening comprehension. *Reading Research Quarterly, 49*(3), 269–281. <https://doi.org/10.1002/rrq.74>
- Kintsch, W. (1988). The role of knowledge in discourse comprehension: A construction integration model. *Psychological Review, 95*(2), 163–182. <https://doi.org/10.1037//0033-295x.95.2.163>
- Kotaman, H., & Balcı, A. (2017). Impact of storybook type on kindergarteners' storybook comprehension. *Early Child Development and Care, 187*(11), 1771–1781. <https://doi.org/10.1080/03004430.2016.1188297>
- Kotaman, H., & Balcı, A. (2019). Impact of realistic and non-realistic storybook characters on young children's book listening comprehension. *Early Child Development and Care, 189*(3), 450–462. <https://doi.org/10.1080/03004430.2017.1325882>
- Kushnir, T., Gopnik, A., Chernyak, N., Seiver, E., & Wellman, H. M. (2015). Developing intuitions about free will between ages four and six. *Cognition, 138*, 79–101. <https://doi.org/10.1016/j.cognition.2015.01.003>
- Larsen, N. E., Lee, K., & Ganea, P. A. (2017). Do storybooks with anthropomorphized animal characters promote prosocial behaviors in young children? *Developmental Science, 21*(3), 1–9. <https://doi.org/10.1111/desc.12590>
- Lee, K., Talwar, V., McCarthy, A., Ross, I., Evans, A., & Arruda, C. (2014). Can classic moral stories promote honesty in children? *Psychological Science, 25*(8), 1630–1636. <https://doi.org/10.1177/0956797614536401>



- Lee, S., & Pulido, D. (2017). The impact of topic interest, L2 proficiency, and gender on EFL incidental vocabulary acquisition through reading. *Language Teaching Research, 21*(1), 118–135. <https://doi.org/10.1177/1362168816637381>
- Leming, J. S. (2000). Tell me a story: An evaluation of a literature-based character education programme. *Journal of Moral Education, 29*(4), 413–427. <https://doi.org/10.1080/713679388>
- Lepper, C., Stang, J., & McElvany, N. (2022). Gender differences in text-based interest: text characteristics as underlying variables. *Reading Research Quarterly, 57*(2), 537–554. <https://doi.org/10.1002/rrq.420>
- Lin, L., & Xu, C. (2020). Arcsine-based transformations for meta-analysis of proportions: Pros, cons, and alternatives. *Health Science Reports, 3*(3), 1–6. <https://doi.org/10.1002/hsr2.178>
- Lynch, J. S., Van Den Broek, P., Kremer, K. E., Kendeou, P., White, M. J., & Lorch, E. P. (2008). The development of narrative comprehension and its relation to other early reading skills. *Reading Psychology, 29*(4), 327–365. <https://doi.org/10.1080/02702710802165416>
- Mar, R. A., & Oatley, K. (2008). The function of fiction is the abstraction and simulation of social experience. *Perspectives on Psychological Science, 3*(3), 173–192. <https://doi.org/10.1111/j.1745-6924.2008.00073.x>
- Mares, M. L., & Acosta, E. E. (2008). Be kind to three-legged dogs: Children’s literal interpretations of TV’s moral lessons. *Media Psychology, 11*(3), 377–399. <https://doi.org/10.1080/15213260802204355>
- Miller, A. C., & Keenan, J. M. (2009). How word decoding skill impacts text memory: The centrality deficit and how domain knowledge can compensate. *Annals of Dyslexia, 59*(2), 99–113. <https://doi.org/10.1007/s11881-009-0025-x>

- Miller, A. C., & Keenan, J. M. (2011). Understanding the centrality deficit: Insight from foreign language learners. *Memory and Cognition*, *39*(5), 873–883.  
<https://doi.org/10.3758/s13421-010-0062-z>
- Miller, A. C., Keenan, J. M., Betjemann, R. S., Willcutt, E. G., Pennington, B. F., & Olson, R. K. (2013). Reading comprehension in children with ADHD: Cognitive underpinnings of the centrality deficit. *Journal of Abnormal Child Psychology*, *41*(3), 473–483. <https://doi.org/10.1007/s10802-012-9686-8>
- Narvaez, D. (2002). Does reading moral stories build character? *Educational Psychology Review*, *14*(2), 155–171. <https://doi.org/10.1023/A:1014674621501>
- Narvaez, D., Bentley, J., Gleason, T., & Samuels, J. (1998). Moral theme comprehension in third graders, fifth graders, and college students. *Reading Psychology*, *19*(2), 127–241. <https://doi.org/10.1080/0270271980190203>
- Narvaez, D., Gleason, T., & Mitchell, C. (2010). Moral virtue and practical wisdom: Theme comprehension in children, youth, and adults. *Journal of Genetic Psychology*, *171*(4), 363–388. <https://doi.org/10.1080/00221325.2010.503253>
- Narvaez, D., Gleason, T., Mitchell, C., & Bentley, J. (1999). Moral theme comprehension in children. *Journal of Educational Psychology*, *91*(3), 477–487.  
<https://doi.org/10.1037/0022-0663.91.3.477>
- Oakhill, J. V., & Petrides, A. (2007). Sex differences in the effects of interest on boys' and girls' reading comprehension. *British Journal of Psychology*, *98*(2), 223–235.  
<https://doi.org/10.1348/000712606X117649>
- Pike, M. M., Barnes, M. A., & Barron, R. W. (2010). The role of illustrations in children's inferential comprehension. *Journal of Experimental Child Psychology*, *105*(3), 243–255. <https://doi.org/10.1016/j.jecp.2009.10.006>
- Rafetseder, E., Cristi-Vargas, R., & Perner, J. (2010). Counterfactual reasoning:

- Developing a sense of “nearest possible world.” *Child Development*, 81(1), 376–389. <https://doi.org/10.1111/j.1467-8624.2009.01401.x>
- Reed, D. K., & Petscher, Y. (2012). The influence of testing prompt and condition on middle school students’ retell performance. *Reading Psychology*, 33(6), 562–585. <https://doi.org/10.1080/02702711.2011.557333>
- Rizzella, M. L., & O’Brien, E. J. (2002). Retrieval of concepts in script-based texts and narratives: The influence of general world knowledge. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 28(4), 780–790. <https://doi.org/10.1037/0278-7393.28.4.780>
- Rowe, M. L., Denmark, N., Harden, B. J., & Stapleton, L. M. (2016). The role of parent education and parenting knowledge in children’s language and literacy skills among White, Black, and Latino families. *Infant and Child Development*, 25(2), 198–220. <https://doi.org/10.1002/icd.1924>
- Russell, S. J., & Cain, K. (2020). Children see rabbit, not Peter: Young children’s responses to an Anthropomorphic Picture Scale. *Assessment and Development Matters*, 12(2), 13–23.
- Russell, S. J., & Cain, K. (2022). The animals in moral tales: Does character realism influence children’s prosocial response to stories? *Journal of Experimental Child Psychology*, 219, 105392. <https://doi.org/10.1016/j.jecp.2022.105392>
- Sénéchal, M. (2006). Testing the home literacy model: Parent involvement in kindergarten is differentially related to grade 4 reading comprehension, fluency, spelling, and reading for pleasure. *Scientific Studies of Reading*, 10(1), 59–87. [https://doi.org/10.1207/s1532799xssr1001\\_4](https://doi.org/10.1207/s1532799xssr1001_4)
- Sénéchal, M., Lefevre, J.-A., Thomas, E. M., & Daley, K. E. (1998). Differential effects of home literacy experiences on the development of oral and written language.

- Reading Research Quarterly*, 33(1), 96–116. <https://doi.org/10.1598/RRQ.33.1.5>
- Sénéchal, M., & LeFevre, J. A. (2002). Parental involvement in the development of children's reading skill: A five-year longitudinal study. *Child Development*, 73(2), 445–460. <https://doi.org/10.1111/1467-8624.00417>
- Shapiro, E. S., Fritschmann, N. S., Thomas, L. B., Hughes, C. L., & McDougal, J. (2014). Concurrent and predictive validity of reading retell as a brief measure of reading comprehension for narrative text. *Reading Psychology*, 35(7), 644–665. <https://doi.org/10.1080/02702711.2013.790328>
- Stanovich, K. E., & West, R. F. (1989). Exposure to print and orthographic processing. *Reading Research Quarterly*, 24(4), 402. <https://doi.org/10.2307/747605>
- Stothard, S., & Hulme, C. (1991). A note of caution concerning the Neale Analysis of Reading Ability (Revised). *British Journal of Developmental Psychology*, 61(2), 226–229. <https://doi.org/10.1111/j.2044-8279.1991.tb00978.x>
- Strasser, K., & Del Río, F. (2014). The role of comprehension monitoring, theory of mind, and vocabulary depth in predicting story comprehension and recall of kindergarten children. *Reading Research Quarterly*, 49(2), 169–187. <https://doi.org/10.1002/rrq.68>
- Strouse, G. A., Nyhout, A., & Ganea, P. A. (2018). The role of book features in young children's transfer of information from picture books to real-world contexts. *Frontiers in Psychology*, 9, 1–14. <https://doi.org/10.3389/fpsyg.2018.00050>
- Talwar, V., Yachison, S., & Leduc, K. (2016). Promoting honesty: The influence of stories on children's lie-telling behaviours and moral understanding. *Infant and Child Development*, 25(6), 484–501. <https://doi.org/10.1002/icd.1949>
- Tisak, M. S., & Turiel, E. (1984). Children's conceptions of moral and prudential rules. *Child Development*, 55(3), 1030. <https://doi.org/10.2307/1130154>

- van den Broek, P., Helder, A., & Van Leijenhorst, L. (2012). Sensitivity to structural centrality: Developmental and individual differences in reading comprehension skills. In A. Britt, S. Goldman, & J.-F. Rouet (Eds.), *Reading-From Words to Multiple Texts* (pp. 132–146). Taylor & Francis Group.
- Van Steensel, R. (2006). Relations between socio-cultural factors, the home literacy environment and children's literacy development in the first years of primary education. *Journal of Research in Reading, 29*(4), 367–382.  
<https://doi.org/10.1111/j.1467-9817.2006.00301.x>
- Walker, C. M., Gopnik, A., & Ganea, P. A. (2015). Learning to learn from stories: Children's developing sensitivity to the causal structure of fictional worlds. *Child Development, 86*(1), 310–318. <https://doi.org/10.1111/cdev.12287>
- Walker, C. M., & Lombrozo, T. (2017). Explaining the moral of the story. *Cognition, 167*, 266–281. <https://doi.org/10.1016/j.cognition.2016.11.007>
- Westerveld, M. F., & Gillon, G. T. (2010). Profiling oral narrative ability in young school-aged children. *International Journal of Speech-Language Pathology, 12*(3), 178–189. <https://doi.org/10.3109/17549500903194125>
- Westerveld, M. F., & Vidler, K. (2015). The use of the Renfrew Bus Story with 5-8-year-old Australian children. *International Journal of Speech-Language Pathology, 17*(3), 304–313. <https://doi.org/10.3109/17549507.2015.1024168>
- Yao, Z., & Enright, R. (2020). The influence of moral stories on kindergarteners' sharing behaviour. *Early Child Development and Care, 190*(6), 891–901.  
<https://doi.org/10.1080/03004430.2018.1499098>
- Yeari, M., Vakil, E., Schifer, L., & Schiff, R. (2019). The origin of the centrality deficit in individuals with attention-deficit/hyperactivity disorder. *Journal of Clinical and Experimental Neuropsychology, 41*(1), 69–86.

<https://doi.org/10.1080/13803395.2018.1501000>

Yeomans-Maldonado, G. (2017). Development of comprehension monitoring in beginner readers. *Reading and Writing, 30*(9), 2039–2067.

<https://doi.org/10.1007/s11145-017-9765-x>

Zwaan, R. A., Langston, M. C., & Graesser, A. C. (1995). The construction of situation models in narrative comprehension: An event-indexing model. *Psychological Science, 6*(5), 292–297. <https://doi.org/10.1111/j.1467-9280.1995.tb00513.x>

Zwaan, R. A., Magliano, J. P., & Graesser, A. C. (1995). Dimensions of situation model construction in narrative comprehension. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 21*(2), 386–397. <https://doi.org/10.1037/0278-7393.21.2.386>

Zwaan, R. A., & Radvansky, G. A. (1998). Situation models in language comprehension and memory. *Psychological Bulletin, 123*(2), 162–185. <https://doi.org/10.1037/0033-2909.123.2.162>

**Table 1***Descriptive Information for the Sharing and Busy Stories Read to Children*

	Sharing	Busy
Examples of key word variations	If they see all these berries I've picked, she worried, they might want me to come and <b>share!</b> (18 words)  You could take them [muffins] to the party and offer to <b>share</b> them with your friends. (15 words)	If they see all these berries I've picked, she worried, they might want me to come and <b>sit down!</b> (19 words)  You could take them [muffins] to the party and offer to <b>sit down to eat</b> them with your friends. (18 words)
Total story ideas	61	61
Central ideas <sup>a</sup>	34	31
Peripheral ideas <sup>a</sup>	27	30

*Note.* <sup>a</sup> as rated by norming study

**Table 2***Descriptive Statistics for Children Related Characteristics and Outcome Variables by Storybook Condition*

Sharing theme	Animal				Human			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Age (months)	66.72	14.47	40	91	67.70	14.02	39	90
BPVS-3 (standardized)	103.40	9.63	85	121	102.84	8.78	86	121
Child Title Checklist score (CTC) <sup>a</sup>	10.58	5.82	0	25	11.21	6.19	0	25
Child Author Checklist score (CAC) <sup>a</sup>	7.86	7.49	0	24	7.51	6.09	0	25
Narrative length in words	137.81	75.92	4.00	286	149.67	68.09	38	265
Mean Length of Utterances (MLU)	6.75	1.94	1.00	10.28	7.13	1.76	2.11	11.32
Total proportion of story	0.27	0.12	0.00	0.52	0.29	0.11	0.05	0.48
Proportion of central idea units	0.25	0.14	0.00	0.56	0.28	0.13	0.03	0.53
Proportion of peripheral idea units	0.28	0.12	0.00	0.59	0.31	0.10	0.07	0.56
<b>Busy theme</b>								
Age (months)	67.83	14.24	39	91	66.56	13.18	38	86
BPVS-3 (standardized)	103.93	10.22	86	124	102.56	9.33	85	125
Child Title Checklist score (CTC) <sup>a</sup>	9.83	6.11	0	28	8.93	4.59	0	23
Child Author Checklist score (CAC) <sup>a</sup>	8.43	7.96	-1	26	6.35	5.35	0	20
Narrative length in words	130.26	76.25	24.00	334	140.47	89.69	22.00	457
Mean Length of Utterances (MLU)	6.46	1.78	2.23	9.92	6.29	1.89	2.08	9.73
Total Proportion of story	0.25	0.12	0.00	0.57	0.26	0.11	0.10	0.48
Proportion of central idea units	0.16	0.12	0.00	0.45	0.15	0.10	0.00	0.42
Proportion of peripheral idea units	0.36	0.14	0.00	0.70	0.38	0.15	0.10	0.77

*Note.* Sharing Condition,  $N = 86$  (animal,  $N = 43$ ; human,  $N = 43$ ); busy condition,  $N = 85$  (animal,  $N = 42$ ; human,  $N = 43$ ).

<sup>a</sup>Parental questionnaire scores



**Table 3***Pearson's Correlations Between Child and Environmental Characteristics and Outcome Variables*

Variable	1	2	3	4	5	6	7
1 BPVS-3 (standardized)							
2 Print exposure	.340**						
3 Reading frequency	.222**	.287**					
4 Retell length	.128	.095	.056				
5 Mean length utterances	.160*	.170*	.105	.796**			
6 Total proportion	.268**	.178*	.095	.857**	.760**		
7 Central proportion	.179*	.146	.122	.755**	.715**	.858**	
8 Peripheral proportion	.275**	.158*	.035	.688**	.564**	.831**	.427**

*Note.* BPVS-3 standardized score provides an ability score after adjustment for chronological age.

Strength of relationship is indicated by r value (0.10-0.29 = weak; 0.30-0.49 = moderate; 0.50-1.00 = strong)

\*  $p < .50$  \*\*  $p < .01$

**Table 4a***Three-way Analysis of Covariance<sup>a</sup> for Narrative Length and Mean Length of Utterance in Retells*

Predictor	Narrative length				Mean length of utterance			
	<i>F</i>	<i>(df)</i>	<i>p</i>	$\eta_p^2$	<i>F</i>	<i>(df)</i>	<i>p</i>	$\eta_p^2$
BPVS-3 (standardized)	17.83	(1,154)	<.001	.460	19.87	(1,154)	<.001	.114
Character	2.51	(1,154)	.115	.016	0.79	(1,154)	.376	.005
Theme	0.36	(1,154)	.547	.002	4.49	(1,154)	.036	.028
Age group	36.62	(3,154)	<.001	.416	41.90	(3,154)	<.001	.449
Character x theme	0.00	(1,154)	.979	.000	1.84	(1,154)	.177	.012
Character x age group	1.15	(3,154)	.331	.022	1.21	(3,154)	.307	.023
Theme x age group	2.88	(3,154)	.038	.053	1.85	(3,154)	.140	.035
Character x theme x age group	1.93	(3,154)	.127	.036	1.79	(3,154)	.152	.034

**Note.** <sup>a</sup>BPVS-3 (standardized) as an ability score after adjustment for chronological age was entered as a covariate.

**Table 4b***Three-way Analysis of Covariance<sup>a</sup> for Total Proportion and Central Proportion of Original Story in Retells*

Between participants	Total proportion				Central proportion			
	<i>F</i>	<i>(df)</i>	<i>p</i>	$\eta_p^2$	<i>F</i>	<i>(df)</i>	<i>p</i>	$\eta_p^2$
Predictor								
BPVS-3 (standardized)	44.3	(1,154)	.001	.223	24.77	(1,154)	<.001	.139
Character	3.33	(1,154)	.070	.021	0.87	(1,154)	.353	.006
Theme	1.44	(1,154)	.231	.009	43.56	(1,154)	<.001	.220
Age group	41.81	(3,154)	<.001	.449	30.94	(3,154)	<.001	.376
Character x theme	0.2	(1,154)	.657	.001	0.76	(1,154)	.384	.005
Character x age group	0.8	(3,154)	.496	.015	1.43	(3,154)	.238	.027
Theme x age group	4.24	(3,154)	.007	.076	1.04	(3,154)	.376	.020
Character x theme x age group	0.745	(3,154)	.527	.014	1.11	(3,154)	.347	.021
Within participants								
Predictor								
Centrality	0.02	(1,154)	.896	.000				
Centrality x BPVS-3 (standardized)	1.17	(1,154)	.281	.008				
Centrality x character	1.09	(1,154)	.298	.007				
Centrality x theme	93.47	(1,154)	<.001	.378				
Centrality x age group	0.17	(3,154)	.920	.003				
Centrality x theme x character	0.74	(1,154)	.390	.005				
Centrality x age group x character	0.73	(3,154)	.536	.014				
Centrality x age group x theme	2.62	(3,154)	.053	.048				
Centrality x age group x theme x character	0.89	(3,154)	.448	.017				

**Note.** <sup>a</sup>BPVS-3 (standardized) as an ability score after adjustment for chronological age was entered as a covariate.

**Table 5***Post Hoc Tests Comparisons for Adjacent Age Groups (with Bonferroni Adjustment for Multiple Comparisons)*

Comparisons		Mean Difference <sup>a</sup>	SE	<i>p</i>	95% C.I.
Narrative Length (in words)					
Year 2 (6-7 years)	Year 1 (5-6 years)	71.75	12.31	< .001	[38.85, 104.66]
Year 1 (5-6 years)	Reception (4-5 years)	42.25	12.92	.008	[7.72, 76.79]
Reception (4-5 years)	Nursery (3-4 years)	4.21	14.71	>.999	[-35.11, 43.53]
Mean Length of utterance (in words)					
Year 2 (6-7 years)	Year 1 (5-6 years)	1.49	0.28	< .001	[0.74, 2.25]
Year 1 (5-6 years)	Reception (4-5 years)	0.96	0.30	.009	[0.17, 1.76]
Reception (4-5 years)	Nursery (3-4 years)	0.78	0.34	.140	[-0.13, 1.68]
Total proportion of story units					
Year 2 (6-7 years)	Year 1 (5-6 years)	0.09	0.02	< .001	[0.04, 0.14]
Year 1 (5-6 years)	Reception (4-5 years)	0.07	0.02	.001	[0.02, 0.12]
Reception (4-5 years)	Nursery (3-4 years)	0.02	0.02	>.999	[-0.03, 0.08]
Central proportion of story units					
Year 2 (6-7 years)	Year 1 (5-6 years)	0.09	0.02	< .001	[0.03, 0.14]
Year 1 (5-6 years)	Reception (4-5 years)	0.08	0.02	.002	[0.02, 0.14]
Reception (4-5 years)	Nursery (3-4 years)	0.02	0.03	>.999	[-0.04, 0.09]

*Note.* <sup>a</sup>Estimates based on adjusted marginal means

**Table 6***Simple Main Effect of Theme by Age Group on Narrative Length and Centrality*

Age Group	Narrative length			Centrality		
	$F(1,154)$	$p$	$\eta_p^2$	$F(1,154)$	$p$	$\eta_p^2$
Nursery (3-4 years)	0.05	.825	.000	0.11	.746	.001
Reception (4-5 years)	0.00	.972	.000	0.25	.618	.002
Year 1 (5-6 years)	7.23	.008	.045	12.43	.001	.075
Year 2 (6-7 years)	1.69	.196	.011	1.47	.227	.009

## Appendix A

Table A1

*Key Linguistic Characteristics of the Four Storybooks*

Linguistic features	Sharing		Busy	
	Animal	Human	Animal	Human
Story length (word count)	473	473	481	481
Number of sentences	54	54	54	54
Sentence length (mean number of words)	8.76	8.76	8.91	8.91
Word length (mean number of syllables)	1.31	1.31	1.32	1.32
Word length (mean number of letters)	4.22	4.21	4.16	4.16
Narrativity <sup>a</sup> (percentile)	90.32	90.82	90.99	91.31
Referential cohesion <sup>b</sup> (percentile)	41.29	39.74	36.32	35.94
Deep cohesion <sup>c</sup> (percentile)	96.49	96.41	94.74	94.63
Situation model causal cohesion <sup>d</sup>	0.38	0.39	0.38	0.39
Syntactic complexity <sup>e</sup> (words before main verb)	2.96	2.96	3.02	3.02

*Note* <sup>a</sup>Narrativity: score highly affiliated with word familiarity, world knowledge, and oral language

<sup>b</sup>Referential cohesion: extent to which words and ideas that overlap to form explicit threads that connect the text

<sup>c</sup>Deep cohesion: degree to which the text contains causal and intentional connectives

<sup>d</sup>Situation Model: relationship between causal verbs and language that signal how the events and actions are connected

<sup>e</sup>Syntactic Complexity: mean number of words before the main verb of the main clause in sentences (good index of working memory load).

## Appendix B

### Children's Title Checklist

*This list contains some names of children's storybooks and some unrelated titles. Put a tick in the box beside the name of any children's book that you **recognise** - you do not have to have read the book - but please do not guess!*

No Matter What		Dogger		Rodney and the Big Blue Bubble	
One Snowy Night		Polly's Pink Pyjamas		Peace at Last	
Green Greta		Pumpkin Soup		The Kiss that Missed	
Six Dinner Sid		Goodnight Moon		Kabam Kaboom!	
Owl Babies		There's Treasure in the Attic		Splish Splosh Sunday	
Marmalade Muffins for Breakfast		Letty Spaghetti		Little Grey Duckling and the Egg	
The Very Quiet Cricket		The Jolly Postman		Hairy Maclary from Donaldson's Dairy	
How do you Climb a Rainbow?		Crackers and Fluff		My Mum Knows	
Daisy's Magic Day		Handa's Surprise		The Tiger who Came to Tea	
Bedtime Balloons		Is it Bedtime, Wibbly Pig?		Chimney Pot Cha Cha	
The Snail and the Whale		Ding Dong Doodle Doo		The Great Toy Hunt	
A Flute, A Trumpet and a Big Bass Drum		The Lazy Koala		Say Hello Clemmie	
Miss Gumpy's Outing		Each Peach, Pear, Plum		Mr Wolf's Pancakes	
Giraffes Can't Dance		The Owl who was Afraid of the Dark		Reindeer's Recipe	
Dear Zoo		Fox and Mr Boot		Watch Out, Octopus!	
The Little Lifeboat		Spring in the Meadow		The Lighthouse Keeper's Lunch	
We're Going on a Bear Hunt		The Floppy Broomstick		The Lion Rider	
Round and Round the Windmill		Guess How Much I Love You		Stop that Steamroller!	
Rosie's Walk		Where's My Teddy?		Meg and Mog	
Billy's Fantastic Book		Mog the Forgetful Cat		Not Now, Bernard	

**Children's Author Checklist**

*This list contains some names of authors of children's storybooks and some unrelated names. Put a tick in the box beside the name of any author that you **recognise** - you do not have to have read his or her books - but please do not guess!*

Rod Campbell		Emma Mulligan		Rachel Smale	
Neil Greenfield		Luke Pitman		Spencer Davis	
Janet Ahlberg		John Burningham		Tracey Pratt	
Margaret Mayo		Nathalie Peacey		Lynley Dodd	
Pat Hutchins		Jez Alborough		Sandra Boynton	
Angus Cook		Raymond Briggs		Mick Inkpen	
Ashley Fruin		Judith Kerr		Hayley Clutterbuck	
Maurice Sendak		Lorna Pockett		Sarah Easdown	
Dav Pilkey		Beatrix Potter		Jan Fearnley	
Christopher Holpin		Steve Leadbetter		Eric Hill	
Lynsey Bull		Joanne Birch		Ian Falconer	
Julia Donaldson		A.A. Milne		Lee O'Connor	
Emma Williams		Jenny Gleed		Shirley Hughes	
Martin Waddell		Debi Gliori		Annette Howe	
Charlie Coulbourn		Sam Meyrick		Rosslyn Elliott	
Graham Cramp		Ian Whybrow		Cressida Cowell	
Laura Dalley		Nick Butterworth		Sean Mowatt	
Lauren Child		Michelle Tilling		Juliet Morefield	
Katharine Holabird		Dr Seuss		Georgina Tudor	
Russell Hide		Giles Andreae		Michael Bond	
Jill Tomlinson		A.J. Bodenham		Lucy Cousins	
David McKee		Eric Carle		Alison Pack	
Miranda Cullen		Denise Ireland		Roger Hargreaves	
Michael Rosen		Helen Nicoll		Sam McBratney	
Alan Hazlewood		Hilary Mitton		Martin Dalton	



Robert Wathan		Louisa Dimmock	Rev W Awdry
Fiona Milne		Helen Cooper	

Please answer the following questions about your child’s preferences.  
 There are no right or wrong answers, children vary in their enjoyment of these activities at this age.

**My Child’s favourite TV program(s) or film(s) are:**

\_\_\_\_\_

\_\_\_\_\_

(If none watched, please leave blank)

**My Child’s current favourite book(s) are:**

\_\_\_\_\_

\_\_\_\_\_

(If none enjoyed, please leave blank)

**My child watches TV programs:** (Please circle)

Never/Hardly Ever                      Some Days                      Most Days                      Every Day

**My child has books read to them:** (Please circle)

Never/Hardly Ever                      Some Days                      Most Days                      Every Day

**My child reads on their own:** (Please circle)

Never/hardly Ever                      Some Days                      Most Days                      Every day

**How many children’s book does your child have at home?** (Please circle)

None                      1-20                      21-40                      41-60                      60+

\_\_\_\_\_ ✂ \_\_\_\_\_ ✂ \_\_\_\_\_

**(Note: This section will be removed and shredded by the researcher to preserve the anonymity of your child. The form will be marked only with a participant number and kept separately from your written consent)**

**Child’s Name:** \_\_\_\_\_

**Child’s DOB:** \_\_\_\_\_

### Appendix C

**Table A2**

*Factor Loadings from a Principal Component Analysis of the Parental Home Literacy Environment Questionnaire*

	Component	
	1	2
CTC score	.94	
CAC score	.92	
Number of books	.59	
Frequency of shared reading		.74
Frequency of reading alone		.82
Eigenvalues	2.37	1.08
Percentage variance explained	47.37	21.56

*Note.* The extraction method was principal axis factoring with an oblique (Oblimin with Kaiser Normalization) rotation. Factor loadings above .40 are reported.