

**The Animals in Moral Tales:  
The Influence of Character Realism and Narrative Theme on Young Children's  
Prosocial Behaviour and Story Recall.**

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### **Declaration**

I declare that this thesis is my own work completed solely by myself under the supervision of Professor Kate Cain and Dr J Jessica Wang, and that it has not been submitted in support of an application for another degree or qualification at this or any other institute of learning.

My submission for a PhD is via publication (Alternative Format). Therefore, I would like to further acknowledge the contribution of my co-authors: Professor Kate Cain is a co-author for Chapters 3, 4, 5 and 6. Dr J Jessica Wang is a co-author for Chapters 5 and 6.

Samantha J. Russell 1<sup>st</sup> December 2022

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Finally, to my family and friends outside of the university 'bubble': Please receive many apologies for my absence at times and my grateful thanks for your patience and encouragement!

### **Dedication**

This thesis is dedicated to my children – James, Esme, Adam, Benedict and Naomi – with each of whom I spent many precious hours enjoying picture book stories (anthropomorphised, prosocial and otherwise).

## Abstract

The aim of this thesis was to examine the role of story character realism (anthropomorphised animal versus human) and narrative theme (prosocial versus non-prosocial) on 3- to 7-year-old children's prosocial behaviour, and indices of memory and understanding of stories using a retell paradigm. A small body of previous research suggests that anthropomorphised content negatively influences children's responses to otherwise identical narratives. Anthropomorphic characters, relative to human protagonists, have been associated with poorer plot recall and reduced understanding of character reasoning (Kotaman & Balci, 2017), lower rates of solution transfer from stories to real-world tasks (Richert et al., 2009), and lack of facilitation of prosocial behaviour (Larsen et al., 2017). Prosocial theme may cue children's perspective taking (Cingel & Krcmar, 2019) and moral stories may offer particularly salient context for human interaction, as ethical choices are a predominantly human, rather than animal, trait. Chapter 1 provides an introduction and thesis rationale. Chapter 2 presents an overview of literature relevant to the experimental work, which is reported in chapters 3 to 6, as a series of journal articles.

Chapter 3 outlines the development of an Anthropomorphic Picture Scale to capture children's ratings of thought, feeling, self-knowledge, and intention for humans, real animals, and anthropomorphised animal characters. Ratings were similar for real and anthropomorphised animals, which were significantly lower than those for humans. Children's individual differences in internal state attribution for humans and anthropomorphised animals was explored in relation to prosocial responses to stories in Chapter 4, and to the use of internal state terms in retells of stories in Chapter 6.

Chapter 4 examined the relationship between story character realism, prosocial theme, age, and prosocial behaviour (sticker sharing task). In contrast to previous research, a prosocial themed narrative depicting human characters was no more influential on children's

subsequent prosocial behaviour than the other stories. However, children who had made higher human internal state attributions donated more stickers post-story.

Chapters 5 and 6 investigated the influences of character realism and moral theme on retells of stories. Chapter 5 examined retell length, syntactic complexity, and centrality as indices of memory and understanding of the original story. No significant influence of story character was found. However, retells of narratives with a prosocial theme had higher syntactic complexity and greater centrality than retells of the non-prosocial themed story. Chapter 6 examined retells for character internal states and dialogue. Children who retold a prosocial story with human protagonists included significantly more socio-relational language than those retelling the same story featuring animals.

A critical reflection on the implications of the experimental findings is provided in Chapter 7, along with suggestions for future work in the field.

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## CHAPTER 1: Introduction

### 1.1 General Introduction and Thesis Rationale

Young children hear stories as a regular activity in school and preschool (Duursma et al., 2008; Jacobs et al., 2000; Lane & Wright, 2007) because exposure to shared reading is associated with the emergence of language and literacy skills (Aram & Aviram, 2009; Kotaman, 2013; Lynch et al., 2008; Sénéchal et al., 2008). Stories are also used in school-based character education (USA and Canada) or personal, social and emotional learning (UK), with the aim of conveying social, moral and emotional lessons to young children (Lee et al., 2014; Leming, 2000; Talwar et al., 2016; Walker & Lombrozo, 2017). Furthermore, stories are used as a therapeutic tool in bibliotherapy, with the aim of helping children to engage with difficulties such as illness, disability, death or trauma (Lucas & Soares, 2013; Montgomery & Maunders, 2015; Pardeck & Pardeck, 1993). These findings present a clear rationale for determining the influences of key discrete elements of stories on children's responses. The aim of the research presented in this thesis is to provide empirical evidence to support an informed choice of resource, to facilitate specific learning or behavioural outcomes. I examine two key properties of children's stories - character realism and prosocial theme.

A particularly prevalent character type in literature aimed at young children is an anthropomorphised animal. Anthropomorphised animals are afforded human-like thoughts, feelings, goals and behaviours, whilst retaining many realistic physical characteristics of their species (they look like bears or foxes, for example). However, such characters clearly violate reality (Epley et al., 2007; Severson & Lemm, 2016; Waytz et al., 2010). Moreover, previous work has suggested that they may be associated with poorer plot recall and reduced understanding of character reasoning (Kotaman & Balci, 2017b), lower rates of solution transfer from stories to real-world tasks (Richert et al., 2009), and lack of facilitation of

prosocial behaviour (Larsen et al., 2017). These findings suggest that, in at least some contexts, anthropomorphised stories may not provide an optimal resource to support children's learning. The work presented in this thesis aims to explore the influences of character realism further.

Whilst stories are frequently used to convey specific moral or social messages to children, general theme extraction from stories is challenging for those under 10 years of age, and young children's story representations are inclined to focus on concrete action (Goldman et al., 1984; Mares & Acosta, 2008; Narvaez, 2002; Narvaez et al., 1999; Walker & Lombrozo, 2017). The work in this thesis examines the influence of story theme (prosocial or non-prosocial) in relation to children's prosocial responses, and indices of memory and understanding in their retells of these stories that varied by these key features. Interactions between story theme and character realism are additionally explored.

## **1.2 Alternative Format and Student Contribution**

My aim during my PhD work was to undergo thorough academic training, which included developing methodology, considering and applying the most appropriate statistical analyses, preparing manuscripts to journal specifications and standards, and undertaking the peer review process. As such, thesis by alternative format was apposite. The data collection was designed to address several research questions simultaneously, to be presented as a series of journal articles. These are reported in Chapters 3, 4, 5 and 6. I am the primary author of each article, and the primary researcher with respect to the conceptualization, methodology, investigation, data curation, visualisation, formal analyses, original draft preparation, literature searches, editing and preparing articles for submission and responses in the review process. Professor Kate Cain and Dr Jessica Wang provided supervision in all areas of my work and contributed to the articles as my co-authors: Professor Kate Cain is a co-author for Chapters 3, 4, 5 and 6. Dr Jessica Wang is a co-author for Chapters 5 and 6.

## **CHAPTER 2: Literature Overview**

### **2.1 Chapter Outline**

This chapter provides an overview of the literature relevant to the journal articles in chapters 3, 4, 5 and 6. To avoid unnecessary repetition, where relevant research has been cited and discussed in depth later in the thesis, the relevant chapter is signposted.

First, an overview of our current understanding of young children's representations of stories is presented. This section discusses the role of narrative topic on attention, children's grasp of narrative themes, moral stories as a particular genre, and the inherent difficulty of generalizing ideas from fantasy fiction to the real world. Second, anthropomorphism in children's narrative fiction and its influences on learning is reviewed; an overview of individual differences in anthropomorphic thinking, and indicators of children's preferences between fantasy and reality-based fiction is included. Third, the literature concerning prosocial development, experimental measurement of altruistic sharing and influences of stories are discussed. Finally, child and environmental characteristics are briefly discussed with reference to the experimental design.

The main objectives of the thesis are outlined at the end of the chapter.

### **2.2 Children's Representations of Stories**

Illustrated storybooks are considered an important means by which children gain language and literacy skills (Aram & Aviram, 2009; Kotaman, 2013; Lynch et al., 2008; Sénéchal et al., 2008), and learn new concepts and moral lessons (Strouse et al., 2018; Strouse & Ganea, 2021; Yao & Enright, 2020). When children (or adults) read or listen to a story, they construct a meaning-based representation, or situation model, of the events described (Johnson-Laird, 1983; Kintsch, 1988). These representations include key dimensions related to time, space, causality, protagonists, and intentionality (see event-indexing model described in Zwaan, Langston, et al., 1995; Zwaan, Magliano, et al., 1995;

Zwaan & Radvansky, 1998). Stories are generally presented as a temporal sequence of causally linked events, which can be true or imaginary (e.g., Graesser et al., 1980).

The extent to which any particular idea in the series is connected to other ideas relates to how central the idea is to the overall gist of the narrative. Older children and adults typically exhibit a centrality effect, where more central than peripheral ideas are recalled from texts, and this is related to the quality of the situation model (Miller et al., 2013; Miller & Keenan, 2009, 2011). Currently, the development of the centrality effect in young children (those under 9 years), whose cognitive capacities are rapidly developing is an unexplored avenue of research. Chapter 5 of this thesis presents a journal article reporting the influences of story character realism and narrative theme on the length, syntactic complexity, and central focus in 3- to 7-year-old children's retells of stories. These indices serve as proxy measures of children's memory and understanding of narrative (Bishop, 2004; Miller & Keenan, 2009; van den Broek et al., 2012). Further review of the relevant literature can be found in Chapter 5.

Children's comprehension of stories also requires the integration of both the action provided by the plotline and the characters' behaviours, with the internal world, or consciousness, of characters (Bruner, 1986; Pelletier & Astington, 2004). To fully comprehend a typical plot, the child must understand the internal states of characters which provide coherent intentionality underpinning story actions. In children's own storytelling, there is a shift from action-based storylines typical of 3-year-olds, to increasingly psychologically rich accounts with age (Aldrich et al., 2011; Longobardi et al., 2014; Nicolopoulou & Richner, 2007; Pinto et al., 2016; Tarchi et al., 2019). For example, Aldrich et al. (2011) found significant development in children between the ages of 5 and 8 years, with respect to their use of intellectual (e.g., thoughts, knowing) and perceptual (e.g., hearing, looking) terms for protagonists in their oral stories. This development of mental state talk in

storytelling by children in the early primary school period has been found to relate to abilities in the co-ordination of coherent and increasingly complex narrative structures, such as the inclusion story openings, focus on a central problem, and drawing the story to a resolution or conclusion (Tarchi et al., 2019). However, an appreciation for the thoughts, feelings, goals and motivations of story characters requires reference to internal state concepts, which are emerging in young children (Wellman & Liu, 2004). Key literature related to internal states and story comprehension is further reviewed in the journal article presented in Chapter 6. Here, children's representations of characters' internal states and dialogue in their retells of stories were related to story character realism and narrative theme.

Comprehension monitoring is a critical aspect in constructing situation models in response to an oral narrative (Language and Reading Research Consortium (LARRC) & Yeomans-Maldonado, 2017; Kim & Phillips, 2014; Strasser & Del Río, 2014). Content that is consistent with prior knowledge is more easily integrated into a coherent representation. This might suggest that fantasy content in children's story books is more difficult to incorporate and comprehend than content that is closer to children's lived experiences. Animal characters that speak and behave in line with human goals, sentiments or morality, represent a specific violation of reality, which conceivably influences the coherence of situation models of these stories.

### ***2.2.1 The Role of Topic on Attention***

There is a known influence of narrative topic (broad focus of the story) on children's interest in the passage, their attentional motivation, and subsequent narrative comprehension (Lee & Pulido, 2017; Lepper & McElvany, 2020; Oakhill & Petrides, 2007; Stothard & Hulme, 1991). In general, research suggests that primary (elementary) school-age girls express a preference for fiction and boys for factual texts (Oakhill & Petrides, 2007; Topping et al., 2008). In the UK, the National Literacy Trust (2005) reported children and young

people's reading habits and preferences (Clark & Foster, 2005). The three fiction topics that were top preferences for primary age children (those under 12 years old in the UK) were adventure, horror or ghost, and comedy stories; this was true for both boys and girls. The reported choices were not further disaggregated by age, so understanding which topics capture the interest of boys and girls between the ages of 3- and 7-years is not possible from this survey.

However, other sources suggest that interest in texts within the fiction genre can vary by gender, depending upon the topic (e.g., Lepper et al., 2022; Oakhill & Petrides, 2007). This influence appears to be more significant for boys. For example, Lepper et al. (2022) found lower text-based interest by 10-year-old boys in response to stereotypical 'female' topics relative to 'male' topics (e.g., ballet dancing, compared with soccer). However, the girls did not discriminate between interest in topics to the same extent. Moreover, Oakhill and Petrides (2007) found that boys' comprehension scores following expository tests were more negatively influenced by disinterest in the topic, than were girls'. Therefore, there is a potential for gender to influence children's understanding and memory for stories that vary by topic. This possibility requires an exploration of gender effects on outcome variables before collapsing the data to address the main research questions examined in this thesis (see Chapters, 4, 5 and 6).

### ***2.2.2 Grasping the Story Theme***

In addition to children's memory for the gist, or central points, from narrative fiction, the extent to which children extract and comprehend the underlying message is subject to debate. Research demonstrates that general theme extraction from stories is a difficult task for children under 10 years of age and that, as noted above, 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). Clear

developmental differences in the ability to extract underlying messages from stories is evident. For example, Narvaez et al., (1999) asked adults and children to match moral lessons from stories with correct themes from a list, and also with picture vignettes. They found that 8-year-olds consistently chose distractors which portrayed the surface action of the plotlines; 10-year-olds were more successful at selecting themes, and young adults did not struggle to extract the theme from the narrative. In separate research, children aged 5 and 6 years have been observed to attend to the surface features of stories, but performance in theme matching was improved by prompts that explained critical aspects of the story (Walker & Lombrozo, 2017).

Interestingly, thematic extraction for elementary school children also appears to be more difficult from folktales (e.g., *The Three Little Pigs*) than from realistic stories (Lehr, 1988). The ages of the children were not stated, but developmental trends were noted; kindergarten aged participants (US sample, so around 5 to 6 years of age) were less able to identify themes, especially for folktales, compared with second-grade and fourth-grade children (approximately 8 and 10 years). The extent to which either fantasy content or character realism contributed to these findings is not clear, but it is evident that all stories are not equally understood by young children.

### ***2.2.3 Moral Tales and Prudential Self Interest***

Stories can be a source of important and relevant cultural information that shapes children's (and adults) beliefs and behaviour (K. Lee et al., 2014; Tappan & Brown, 1989; Yao & Enright, 2020). It would be informative to understand whether stories that include a moral theme preferentially capture children's interests, and whether extraction of the underlying theme from stories is easier when stories are prosocial in nature.

A comparison of children's comprehension of stories that vary by the inclusion, or otherwise, of a moral theme appears to have attracted little consideration, to date. However,

in relation to this point, Narvaez et al. (2010) conducted two experiments that examined children's and adults narrative theme comprehension in stories that had an underlying moral theme, and compared those with stories motivated by a character's prudential self-interest. The difference between these two story types is that moral themed stories involve the character setting aside self-interest, whereas prudential concern requires only practical wisdom to achieve personal happiness or gain. In this study, the differences in the stories were ones of relative emphasis of social concern, not the presence or absence of social behaviour. Narvaez et al. found evidence of earlier comprehension of moral theme than prudential theme in 10-year-olds. These findings may relate to previous research which found that 6 to 10-year-old children can differentiate between moral and prudential rules (Tisak & Turiel, 1984).

Narvaez et al.,'s (2010) line of research suggests earlier cognition by children for moral stories, compared with those without a moral theme. This implies a stronger story schema for moral narratives. This evidence motivates the need to establish whether moral theme is a key factor that influences children's memory and understanding of a story and was a focus of this thesis. Story theme may be a particularly important factor when selecting materials used for academic testing or therapeutic use. In this thesis, Chapters 4, 5 and 6, explore the influence of moral theme on children's responses to stories, in comparison with carefully matched social stories which include only the prudential self-interest aspects that motivate character action.

#### ***2.2.4 Generalization from Fiction – 'The Reader's Dilemma'***

Authors of fictional worlds merge knowledge from the real-world with imagined story content to create rich narratives (Weisberg, 2016). To interpret stories, readers (or listeners) have to make judgements about the applicability of information within fiction and relate this, to the real-world; this conundrum is known as 'the reader's dilemma' (Gerrig & Prentice,

1991). The lines between fact and fiction are not always unambiguous. The reader's dilemma can lead to the compartmentalization of story information, particularly when the reader (or listener) is unsure of the real-world truth.

Given that stories are often intended to teach children specific lessons, successful differentiation between real and fantasy elements is critical. Take the example of the story 'Little Raccoon Learns to Share' (Packard, 2013), which was used in the experimental work in this thesis. The story is designed to teach children the virtue of sharing resources, so that a party with friends can be enjoyed. However, this story is not intended to teach children that raccoons collect berries, bake cookies, wear clothing, or discuss difficult decisions with their mothers (all included in this story). Faced with moral lessons within fantasy fiction, children must decide which story elements are only true in the fictional-world, and which are generalizable and can be applied in their own everyday life. This is the reader's dilemma, and it has been suggested to be particularly challenging for young children (Hopkins & Weisberg, 2017).

Children from the age of 3 years begin to make distinctions between fantasy and reality, for example being able to differentiate between human and imaginary characters (e.g., Walker et al., 2015b) and realistic and fantasy stories (e.g., Weisberg et al., 2013). This capacity continues to develop with age; for example, accurate judgement about the reality status of real characters improves between the ages of 3- and 5-years (Sharon & Woolley, 2004; Woolley & Cox, 2007). Relatedly, Skolnick and Bloom (2006) found that 3- to 6-year-old children are able to divide between story worlds, understanding that Batman and Sponge Bob do not inhabit the same make-believe domain. In this respect, these young children had similar capacities to a comparison group of adults in terms of their ability to distinguish between fictional worlds. However, unlike the adults, the children appeared to over-apply the

principle to within-world characters, and sometimes mistakenly claimed that Batman did not believe that Robin (a protagonist within the same story-world) was real.

Fantasy elements in stories appear to signal to young children that the information in the text is unreliable for the real-world and experimental work suggests that children ‘over-quarantine’ information from fantasy stories. For example, Walker et al. (2015) found that 3- to 5-year-olds generalized causal knowledge from realistic (‘close world’) versions of illustrated storybooks significantly more often than from matched fantasy (‘far world’) versions of the story. The authors suggest a quarantining explanation; realistic content within fantastical stories can be mistakenly confined by young children within the story world. Interestingly, in this study children’s willingness to generalize causal information from fantasy stories decreased with age, suggesting that as children’s awareness of fantasy grows between the ages of 3 and 5 years, their quarantining of the information increases. In similar experiments, solution transfer from fiction to real-world problems by 3- to 6-year olds has been observed to be poorer in response to fantasy, compared with more realistic story contexts (Richert et al., 2009; Richert & Smith, 2011). Solutions offered within fantasy contexts appear to be considered as unreliable sources of information, which are often quarantined.

Together, these findings raise the question of whether books that contain fantasy elements, such as anthropomorphised animal characters, may negatively influence 3- to 7-year-old children’s understanding and application of real-world messages contained in the stories.

### **2.3 Anthropomorphism in Children’s Literature and Influences on Learning**

The online Oxford English Dictionary (Stevenson, 2010) defines anthropomorphism as ‘The attribution of human personality or characteristics to something non-human, as an animal, object, etc.’ (“Anthropomorphism”, 2022). These characteristics include humanlike

motivations, intentions and emotions, in relation to real or imagined behaviour. These go beyond description of actions and involve attributions of internal state psychology in non-human entities (Epley et al., 2007; Heider & Simmel, 1944; Severson & Lemm, 2016; Waytz et al., 2010).

Anthropomorphised characters are ubiquitous in fiction aimed at young children. For example, a content analysis of best-selling books in the United States aimed at 3- to 6-year-old children, found that almost 79% were anthropomorphised (Goldstein & Alperson, 2020). Additionally, in two studies regarding character realism, anthropomorphised books were noted as the most common genre of fiction available to children in the classrooms from which their participants were drawn (Kotaman & Balci, 2017b; Larsen et al., 2017).

Anthropomorphised stories are employed across a variety of book types. Animal characters are a particularly common human substitute. Some ostensibly aim to entertain; for example, in the story ‘Ridiculous!’ (Coleman, 1997), which describes the adventures of a tortoise who wants to stay awake to experience winter snow. Anthropomorphised animals are also used as a way of imparting moral lessons; in the classic tale of ‘The Elephant and the Bad Baby’ (Vipont, 1971), an elephant admonishes a baby for his poor manners. Stories such as ‘The Very Hungry Caterpillar’ (Carle, 2002) present biological life-cycle information to very young children, alongside inaccurate information about caterpillar consumption of human foods. Additionally, anthropomorphised characters are used as a therapeutic device to introduce themes around difficult life experiences; in ‘Badger’s Parting Gifts’ (Varley, 2013), various anthropomorphised animals come to terms with the death of badger, and in ‘The Teazles’ Baby Bunny’ (Bagnall, 2008), two rabbits adopt a much-wanted baby rabbit. Many of these books deliberately contain desirable social attitudes that the adult authors intend the young listeners to internalize and apply in their own lives.

Despite the prevalence of anthropomorphism in literature aimed at young children, the use of animal characters to inform human situations and illuminate cultural and social issues has not been underpinned by empirical research to indicate its effectiveness, relative to books using realistic characters. Markowsky (1975) noted the prevalence of anthropomorphism in children's literature in the 1970s and suggests this resulted from a cultural shift in how animals were viewed in the post-Darwinian period. Although Aesop's fables predate that era, they were originally created as allegorical, political and cautionary tales for adults (Cooper, 1955; Reinstein, 1983) rather than for the entertainment or education of children.

There has been a small body of research exploring children's responses to fantasy content in books, TV shows and films (Ganea et al., 2014; Richert et al., 2009; Waxman et al., 2014). Findings include a negative influence on information transfer from stories by 3- to 6-year-olds when presented with various monster characters, relative to human characters (Richert et al., 2009). Similarly, anthropomorphised language and pictures in books about animals reduced 3- to 5-year-olds factual learning, relative to realistic versions of the books (Ganea et al., 2014). However, this negative influence upon the acquisition of biological knowledge was not found in a further study with a similar aged sample of children, when using anthropomorphised materials that were less strongly humanized (Geerds et al., 2016).

At the time of planning the experimental work reported in the thesis, a small body of research had examined the influence of character realism on the ease with which children understand stories and apply the themes in fiction to themselves. A negative influence of fantasy character was suggested. First, a single study reported an examination of the influence of animal and human protagonists on young children's prosocial behaviour (Larsen et al., 2017). It demonstrated that 4 to 6-year-old children were more likely to share (stickers) if they had heard a story about human generosity compared with an anthropomorphised animal version of the same book. This finding suggests that human characters may be more

effective than fantasy characters in facilitating prosocial behaviour, such as sharing, in young children. Chapter 4 of this thesis presents a conceptual replication and extension of Larsen et al.'s (2017) study and, accordingly, provides a comprehensive review of the original study and related subsequent literature (e.g., Kruse et al., 2020; Yao & Enright, 2020).

Second, 4 to 6-year-old children's story comprehension of an otherwise identical narrative appears poorer if the book presents anthropomorphised illustrations rather than more realistic pictures (Kotaman & Balci, 2017). Children's comprehension scores, both immediately after the story and when tested around a week later, for narrative events, plotline, reasoning, and problem solving were significantly higher when the book presented realistic characters relative to animal protagonists. In a second study, the same researchers found better comprehension of stories with a realistic character at the second testing point around a week after presentation but, with this sample, not immediately following the story presentation (Kotaman & Balci, 2019). Superiority of realistic characters at the second (follow-up) test point was found for story reasoning, and there was evidence for durability of children's performance in testing between the initial comprehension scores and the follow-up test. Together, these studies suggested that further work to consider the influences of character on children's responses to stories would be of value.

### ***2.3.1 Individual Differences in Anthropomorphic Thinking***

The propensity to anthropomorphise appears to be somewhat innate in human beings. Original work by Heider and Simmel (1944) demonstrated that adults describe intention and emotion to animated shapes. Later research, involving gaze experiments with infants, suggests a social evaluation of animated objects by around 12 months of age (e.g., Hamlin et al., 2007; Kuhlmeier et al., 2003; Meltzoff et al., 2010). However, there are individual differences in the tendency to anthropomorphise. This has been measured in adults using the Individual Differences in Anthropomorphism Questionnaire (IDAQ: Waytz et al., 2010), and

in children using a Child Form adaptation of this original rating scale (IDAQ-CF: Severson & Lemm, 2016). The IDAQ-CF measured 5- to 9-year-olds' attributions of thoughts, feelings, self-knowledge and intention of animals, natural objects and technology.

Subsequent experimental work demonstrated that dispositional anthropomorphism in adults, as measured by the IDAQ, is related to hoarding behaviours (Timpano & Shaw, 2013), and predictive of a perception of intentionality in stock market trends (Caruso et al., 2010). Similarly, children's ratings for robotic and natural objects on the IDAQ-CF are predictive of their moral concern for similar objects (Sommer et al., 2019). To explore children's disposition towards anthropomorphised animal characters, a similar method of assessment was created by (Severson & Lemm, 2016). The IDAQ-CF was adapted for this thesis to capture 3- to 7-year-olds' ratings of thought, feeling, self-knowledge and intention for humans, real animals, and anthropomorphised animal characters (and inanimate natural objects as a benchmark). Chapter 3 of this thesis outlines the adaptation of the IDAQ-CF, which incorporated pictures to support its use with younger children. Children's individual differences in internal state attribution for humans and anthropomorphised animals was then explored in relation to prosocial responses to stories, as reported in Chapter 4, and to the use of internal state terms in retells of stories, as reported in Chapter 6.

### ***2.3.2 Preferences for Anthropomorphic Content***

The prevalence of anthropomorphised literature as noted above, for example in the classroom (Kotaman & Balci, 2017b; Larsen et al., 2017), might suggest that young children have a preference for the genre. However, direct evidence for a general inclination towards fantasy characters of this type appears to be a gap in current literature.

Consideration of wider research related to responses to general fantasy content in stories provides some evidence of a reality bias, rather than a fantasy bias, for young children. For example, when invited to continue oral stories that were either realistic or fantastic (i.e.,

contained material that violated real-world laws), 4-year-olds were significantly reality-prone in responses, even in the fantastical condition (Weisberg et al., 2013). The main protagonists in the study material were human, however. Further, Barnes et al., (2015) conducted two experiments to explore young children's and adult's preferences for fantasy content in fiction relative to more realistic content. They found that in a choice task, 4 and 5-year-old children selected stories described as 'real' over those labelled 'make-believe' significantly more frequently than adult participants; in this sample, 85% of the children preferred the stories they were told were realistic. The second experiment manipulated the realism of both the plot and character. Combined results for fantasy content showed that adults had a preference for fantasy stories, but 4 to 5-year-olds did not. When considering the fantasy content as a separate factor to fantasy character, intriguingly, both adults and children indicated a preference for realistic characters (humans) described in fantastical scenarios, rather than fantasy characters (aliens, monsters etc.) engaged in realistic plotlines. Given that anthropomorphised books often present children with fantasy animal characters in real settings, the findings from this study suggest that such books might be amongst the least favoured story type.

Of relevance to this point is a study exploring information transfer from stories to real-world problems in 3- to 6-year-old children. Children who expressed a preference for a story with a fantasy character (a boy fairy) were less likely to respond accurately to fantasy stories in relation to realistic versions (Richert et al., 2009). This suggests that enjoyment of fantasy content does not facilitate knowledge transfer. Conversely, a separate line of research has found that unrealistic characters have a negative influence on 3- to 6-year-olds' prosocial responses to moral stories, but this effect was moderated in children who demonstrated an orientation towards anthropomorphic thinking (Larsen et al., 2017).

In summary, anthropomorphic content in children's literature is ubiquitous. Previous research has established individual differences in children's orientation towards anthropomorphism, which may under certain conditions moderate responses to stories that use this character type. Very young children may prefer realistic over fantasy content, but enjoyment of fantasy characters may not benefit story comprehension. However, to date, the development of children's orientation to or preferences for various character types in fiction, including the anthropomorphised animal, has not been a focus of research attention. As a first line of enquiry, a home literacy environment questionnaire was included in the experimental work in this thesis. Parental responses to an invitation to name the favourite book title(s) and TV show/films(s) were sought for the child in their care. Responses were binary coded for the presence of anthropomorphic content to enable a characterization of the sample with respect to children's reported orientation towards anthropomorphism in books and media. Results are reported in the articles in Chapters 4 and 5.

#### **2.4 Prosocial Behaviour in Children and the Influences of Story**

Prosocial behaviour can be broadly defined as any act designed to benefit others, such as helping, comforting and sharing (e.g., Eisenberg et al., 2016; Eisenberg & Fabes, 1998). Altruism is a subset of prosocial behaviour that includes elements of self-sacrifice in the service of promoting the well-being of other people (Hastings et al., 2007). Prosocial behaviour appears to be innate in human beings and the predisposition arises in infancy (Warneken & Tomasello, 2006, 2009; Zahn-Waxler et al., 1992). It occurs across cultures, but the expression of prosocial action is moderated by culture and learning (e.g., Cowell et al., 2017; Hastings et al., 2007; Huppert et al., 2019; Samek et al., 2020). Prosociality is a broad construct and it cannot be assumed that one manifestation of this behaviour, for example helping, generalizes across to other types of prosocial acts, such as sharing (Pfattheicher et al., 2022). As the focus of this thesis concerns altruistic sharing in children,

the literature reviewed in this section specifically concerns children's altruistic (costly) sharing behaviour.

#### ***2.4.1. Measuring Sharing in Experimental Work***

Whilst experimental procedures (often 'economic games') are not perfect predictors of real behaviour, they have the potential to provide standardized tasks to test predictions and explore factors that influence prosociality. Experimental measures of children's altruistic (costly) sharing generally use variations of a resource allocation task. The resource and task can both vary considerably. Resources used in previous research include, for example, stickers (e.g., Cowell et al., 2015; Gummerum et al., 2010), foods or sweets (e.g., List & Samak, 2013; Rao & Stewart, 1999), or small toys such as marbles (e.g., Stewart & McBride-Chang, 2000). The resource may be provided (e.g., Chen et al., 2013; Cowell et al., 2015), or be earned by the participant (e.g., Du & Hao, 2018). These resources can be chosen as favourites from a larger set (Ben-Ner et al., 2017; Benenson et al., 2007; Posid et al., 2015), or simply allocated without participant choice (Du & Hao, 2018; Gummerum et al., 2010). Additionally, the resources can be alike or dissimilar, for example, a set of unique stickers (e.g., Benenson et al., 2007), or a set of identical stickers (e.g., Posid et al., 2015). The resources can be few in number, for example just 4 stickers to allocate (Y. Chen et al., 2013), or many, for example 12 or 30 stickers (Posid et al., 2015). In altruistic tasks, children are requested to share these items between themselves and other children, where the recipients can variously be friends or classmates (e.g., Benenson et al., 2007; Chen et al., 2013), strangers (e.g., Ben-Ner et al., 2017; Gummerum et al., 2010), or described as in need in some way (e.g., Du & Hao, 2018). The recipient may be present (e.g., Rao & Stewart, 1999) or absent (e.g., Larsen et al., 2017). Children's resource allocation can be made under the observation of an adult experimenter (e.g., Ben-Ner et al., 2017) or ostensibly unobserved (e.g., Benenson et al., 2007; Gummerum et al., 2010). Clearly, resource allocation tasks are

not standardized and represent a wide diversity of contexts within which children's altruistic sharing is quantified in experiments.

Benenson et al. (2007) developed a simple, uniform 'Dictator Game' task, where a participant anonymously allocates a valued resource between themselves and an anonymous recipient, without being observed. The protocol enables systematic comparisons of altruistic sharing across experiments that manipulate variables of interest. A Dictator Game task closely modelled on the method developed and described by Benenson et al. was used in the experiment reported in Chapter 4 and is discussed more fully in that chapter.

#### ***2.4.2 The Development of Altruistic Sharing with Age***

Experiments that assess resource allocation by pre-adolescent children demonstrate clear developmental trajectories, with altruistic generosity increasing with age from a low baseline in 3-year-olds, and significantly greater sharing by 8 or 9 years of age (Benenson et al., 2007; Blake, 2018; Fehr et al., 2008; Ongley et al., 2014; Posid et al., 2015; Yu et al., 2016). Whilst 3-year-olds understand social norms and expectations concerning fairness, shifts from self-serving to more egalitarian behaviour in their resource allocations during experiments is gradual (e.g., Smith et al., 2013). Additionally, there are indicators in some studies to suggest that, although the proportion of children who share at least one sticker increases from 3 years of age, examination of only those children who share (excluding those who hoard the entire allocation) indicates that the average donation made by those under 7 years does not change significantly (Blake & Rand, 2010; Posid et al., 2015).

There are also age-related differences in children's sharing behaviour related to who is described as the recipient of generosity. Younger children (3- or 4-year-olds) show little discrimination between classes of recipient in resource distribution tasks. Older children (8- or 9-year-olds) use more complex reasoning concerning the characteristics of, or their relationship with, the beneficiary when they allocate resources (Flook et al., 2019;

Gummerum et al., 2008; Malti et al., 2016; Yu et al., 2016). For example, Flook et al., (2019) found that 3- to 4-year olds do not treat strangers or friends significantly differently in terms of dividing a small number of stickers between themselves and either class of recipient. However, 5- to 6-year-olds donate more when the recipient is a friend, compared with their allocations to a stranger.

Other factors, such as socioeconomic status (SES), can influence the observed developmental trend in sharing. For example, children with indicators of relatively high SES have been shown to become increasingly generous between 4 and 7 years significantly more quickly than those from more impoverished backgrounds (Benenson et al., 2007). The authors suggest that this is not simply a wealth effect, but the influence of local parental socialization practices. Children's prosocial behaviour development is moderated through mechanisms such as reward and punishment (Fehr & Fischbacher, 2003), or implicit imitation (Rizzolatti & Craighero, 2004), which varies across subcultures. Additionally, an urban context also appear to be influential, with urban children observed to be less generous than rural children in dictator game tasks (Rochat et al., 2009).

More broadly, prosociality is moderated by learning and culture (Henrich, 2015; House, 2018). Whilst an increase in altruistic sharing of resources with age is observed across cultures, the patterns observed vary (Cowell et al., 2017; Rochat et al., 2009; Samek et al., 2020). Cowell et al., (2017) for example, found incremental age-related increases in generosity in Dictator Game tasks between the ages of 5 and 12 years in all populations included in the study: Canada, China, South Africa, Turkey and USA. However, by 12 years, children varied significantly in the extent to which they shared resources, and those differences were less clear early in development. It has been suggested that children from Western cultures are less generous in peer-to-peer sharing than those from Eastern cultures (Stewart & McBride-Chang, 2000). However, this pattern seems to vary considerably; Samek

et al. (2020) for example found differences across 12 cultures in 3- to 12-year-olds sharing in dictator game tasks, but no clear relationship between Eastern or Western cultures and generosity.

Therefore, when considering which specific resource allocation paradigm to use to measure change in generosity in response to experimental stimuli, factors such as the participant age, SES, and/or the recipient described to the children during experiments must be carefully considered. Relevant literature concerning prosocial development and the use of a dictator game task is further reviewed in the journal article reported in Chapter 4.

## **2.5 Child and Environmental Characteristics**

In addition to experimental manipulations in this area of research, a range of child and environmental characteristics are anticipated to influence outcomes. These include age, gender, vocabulary knowledge, and narrative print exposure.

First, age is a key influence on children's representations of themes in stories (see section 2.2) and their prosocial development (see section 2.4). A post-story retell paradigm is used in the experimental work (see Chapters 5 and 6) and age-related increases in children's capacity to produce longer and more linguistically complex retells of stories are expected (Khan et al., 2016; Lynch et al., 2008; Westerveld & Vidler, 2015). Khan et al. (2016), for example, found that between 3 and 6 years, children showed progression in story structures and an increased likelihood of including the story setting, goals, subgoals and resolutions in their storytelling. Similarly, Westerveld and Gillon (2010) found that between 5 and 7.5 years of age, children's retells score more highly in measures of semantic diversity, narrative quality and in length of story. Older children are also more likely to include more internal state language and more character dialogue than younger children in story retelling tasks (Aldrich et al., 2011; Tarchi et al., 2019; Ukrainetz et al., 2005). In their examination of fictional stories from children between 5 and 12 years, Ukrainetz et al. (2005) found that the

acquisition and frequency of use of various story elaborations (those features that make stories interesting) increased over the age-range. Of particular relevance to the experimental work reported in Chapter 6 was their finding of a significant increase in mental state words between the 5- to 6-year-old age group and the 7 to 9-year-old age group. The literature around mental state language in stories is reviewed more fully in Chapter 6.

Second, gender may represent a key characteristic in experimental outcomes. The influence of gendered responses to story topic has been previously discussed in section 2.2. However, in storytelling the use of expressive elaborations is not influenced by gender (Ukrainetz et al., 2005) and, in other similar work, girls and boys have been found not to differ in their use of emotional labels in their stories (Aldrich et al., 2011). Gender does not appear to be related differences in story structure (Marjanovič-Umek et al., 2012), although girls used more words to create stories in that particular study.

Gender differences in altruistic sharing tasks have been observed in some studies, but the findings are inconsistent; higher generosity has been observed in girls (Gummerum et al., 2008, 2010; Ongley et al., 2014) and also in boys (Posid et al., 2015). Other work exploring potential gender effects on altruism either does not find significant difference between girls and boys (e.g., Chen et al., 2013), or does not report an examination of gender effects (e.g., Larsen et al., 2017). Given the inconsistent findings in previous research, and also the inconsistency of examination of this effect, this child-related characteristic is explored in the experimental work reported in Chapters 4, 5 and 6 for clarity.

Third, children's receptive vocabulary development supports their narrative comprehension (Kendeou, Savage, et al., 2009; Silva & Cain, 2015). Additionally, young children's general language abilities can be a significant influence on theory of mind development (see Milligan et al., 2007) and in turn, theory of mind development can benefit children's use of internal state terms in storytelling (Aldrich & Brooks, 2017). As children's

language abilities were anticipated to be related to their understanding of stories and their subsequent retell capacities a standardized measure of receptive vocabulary was included in the experimental work.

Exposure to narrative fiction is strongly related to measures of young children's vocabulary (see Bus et al., 1995; Sénéchal et al., 1996, 1998) and is also predictive of children's story comprehension (Sénéchal, 2006; Sénéchal & LeFevre, 2002). As a potential key environmental characteristic relevant to children's comprehension of fiction it is included as a variable in Chapter 5, which examines children's retells for indices of memory and understanding of stories.

## **2.6 Objectives of the Thesis**

The first aim of the current research was to develop a method to measure 3- to 7-year-olds' internal state ratings for humans, real animals and anthropomorphised animal characters, based on previous work that measured anthropomorphic thinking about technology (Severson & Lemm, 2016). This is reported in Chapter 3.

The second aim was to conduct a conceptual replication and extension of previous work that found an influence of story character realism on young children's responses to a sharing theme in a story (Larsen et al., 2017). The objective was to explore 3- to 7-year-olds' sharing responses following picture books that varied by story character and the presence of moral theme. Additionally, the relationships among ratings for human and anthropomorphised internal states and abilities to identify story theme on children's generosity was examined. This is reported in Chapter 4.

A third aim was to explore children's story retell narratives. There were two main objectives; to examine the influence of character realism and the presence of moral theme on the central focus of their retells, which is reported in Chapter 5 and children's inclusion of character internal states and dialogue, which is reported in Chapter 6.

**CHAPTER 3: Children see rabbit, not Peter: Young children's responses to an Anthropomorphic Picture Scale**

Text as it appears in:

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.

*Note.* References formatted to APA 7<sup>th</sup> for thesis

### **Abstract**

Previous research suggests that character realism influences children's responses to stories. This study explored 3- to 7-year-old children's ratings of thought, feeling, self-knowledge and intention for humans, real animals and anthropomorphised animal characters. Ratings were similar for real and anthropomorphised animals and significantly lower than those for humans. These findings may relate to the observed poorer outcomes following stories depicting anthropomorphic animals, relative to human characters. Individual differences in internal state attribution and corresponding responses to anthropomorphised narratives might be usefully explored with this scale.

### 3.1 Introduction

Anthropomorphic characters are prevalent in children's fiction (Kotaman & Balci, 2017; Marriott, 2002). In these stories, animals are anthropomorphised by the endowment of patently human thoughts, feelings, goals and behaviours (Epley et al., 2007; Severson & Lemm, 2016; Waytz et al., 2010). Recent work suggests that character realism influences children's responses to otherwise identical narratives. Relative to books with human characters, stories with anthropomorphised characters are associated with poorer plot recall and reduced understanding of character reasoning (Kotaman & Balci, 2017), lower rates of solution transfer from stories to real-world tasks (e.g., Ganea et al., 2014; Richert et al., 2009) and they do not benefit altruistic behaviour (Larsen et al., 2017).

The propensity for anthropomorphic thinking varies amongst adults (Waytz et al., 2010) and might underlie the findings outlined above. Indeed, differences in the extent to which 5- to 9-year-olds attribute thoughts, feelings, self-knowledge and intention to animals, natural objects and technology is evident (Severson & Lemm, 2016). To date, children's attributions for real and anthropomorphised animals relative to humans has not been examined. To fill this gap, we developed an Anthropomorphic Picture Scale to measure 3- to 7-year-old children's internal state attributions for humans, real animals, and anthropomorphised animals. Notably we used pictures alongside verbal statements, to support assessment of children under 5 years, for whom picture books with anthropomorphised animals are prevalent.

### 3.2 Method

A 16-item scale was developed to explore children's ratings of the capacity for thought, feeling, self-knowledge and intention for items in four categories: animals, humans, anthropomorphised animals, and inanimate natural objects (4 items for each). The latter category was included as a benchmark for which we predicted very low ratings (see Severson

& Lemm, 2016). Two versions of the scale were produced; animal exemplars in one version (e.g., mouse) were presented in anthropomorphised form in the other (i.e., mouse wearing clothes). The human and natural object items were identical in both versions. For each item, there was a picture paired with a question. For example, a photograph of a mouse with the question, ‘Does a mouse think?’ was an item in the animal subscale.

Typically developing children ( $n=184$ ) aged between 3 and 7 years ( $Mage = 66.55$  months,  $SD = 14.15$ ) completed the scale individually, with items presented in random order. If children responded, ‘yes’ to the question, they were invited to indicate ‘How much?’ on a 3-point visual scale. Responses were scored 0 (‘no’ responses) to 3 points. Training items were used first to familiarise children with the visual scale. Full details of items and instructions are provided in Appendix A.

### 3.3 Results

**Table 3.1**

*Mean APS Score and Standard Deviations for each Category and Question*

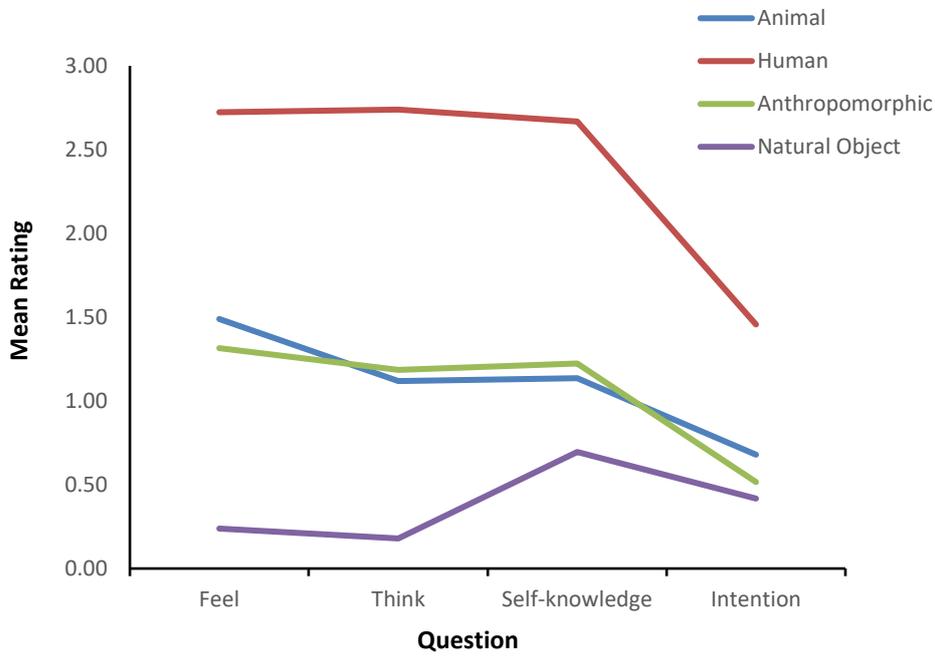
Variable	<i>M</i>	<i>SD</i>
Category		
Animal	1.11	0.76
Human	2.40	0.49
Anthropomorphic	1.06	0.75
Natural Object	0.38	0.59
Question		
Feelings	1.44	0.60
Think	1.31	0.60
Self-Knowledge	1.43	0.77
Intention	0.77	0.64

See Table 3.1 for the mean and standard deviation of ratings for each category and question. A mixed ANOVA on the ratings examined the effect of category (animal, human, anthropomorphic, natural object) and question (feel, think, self-knowledge, intention), with age (4 age groups) as a between participants factor (degrees of freedom corrected using Greenhouse-Geisser estimates).

Significant main effects of category,  $F(2.53, 455.06) = 398.66, p < .001, \eta^2 = .69$ , question,  $F(2.73, 455.06) = 54.49, p < .001, \eta^2 = .23$  and age group,  $F(3, 180) = 6.06, p = .001, \eta^2 = .09$  were qualified by two significant interactions. The category x question interaction is shown in Figure 3.1:  $F(7.92, 1425.46) = 22.79, p < .001, \eta^2 = .11$ . The interaction (tested with one-way ANOVAs by question and t-tests) arose because ratings for the intention question were different for human relative to the other categories. The category x age group interaction is shown in Figure 3.2:  $F(7.58, 455.06) = 8.77, p < .001, \eta^2 = .13$ . The interaction (tested with one-way ANOVAs by age and t-tests) and arose because the youngest age group provided higher ratings than the other age groups for natural objects.

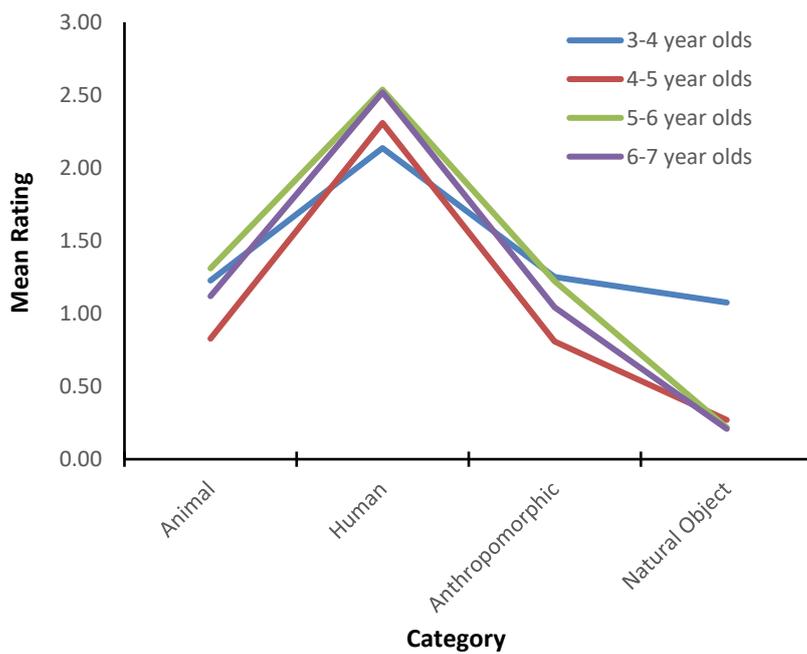
**Figure 3.1**

*Mean ratings as a function of question and category*



**Figure 3.2**

*Mean ratings as a function of category and age*



Exploratory Principal Component Analysis of the 3 animate categories revealed a four-factor orthogonal structure (see Table 3.2). There were two separable factors for real and anthropomorphic animals; one for thought and feeling, the other for self-knowledge. In addition, responses to the intention question for all 3 categories loaded together. All human items loaded together and with one cross-loading on the intention factor.

**Table 3.2***Varimax-Rotated PCA loadings*

	Component			
	1	2	3	4
Animal Thought	.73			
Animal Feeling	.68			
Anthropomorphic Thought	.68			
Anthropomorphic Feeling	.56			
Anthropomorphic Self-knowledge		.86		
Animal Self-knowledge		.84		
Animal Intention			.79	
Anthropomorphic Intention			.77	
Human Intention			.46	.45
Human Self-knowledge				.73
Human Thought				.70
Human Feeling				.47
Eigenvalues	2.73	1.56	1.35	1.17
Percentage Variance explained	22.71	13.03	11.27	9.77

*Note.* Coefficients > .3 reported

### 3.4 Discussion

Children in each age group provided significantly higher internal state ratings for human items than they did for either real or anthropomorphised animal items and ratings for the two animal categories were comparable. This pattern suggests that: (1) 3- to 7-year-olds consider that people have higher capacity for thought, feeling, self-knowledge and intention than animals, and (2), that young children view anthropomorphised animals as animals, rather

than imagining that they have similar capacities for mental and emotional states as humans. These differences in attributions may contribute to the poorer outcomes for stories depicting anthropomorphic animals relative to humans, outlined in the Introduction (e.g. Kotaman & Balci, 2017a; Larsen et al., 2017). The three older age groups gave low internal state ratings to natural objects, but the youngest group did not. This suggests that 3-year-olds are less able to differentiate between non-human categories.

A clear limitation was the validity of the question to tap intentionality. We used the phrasing included by Severson and Lemm (2016) for their Canadian sample: ‘Does [item] do things on purpose?’. We found ratings were far lower than for the other questions. Post-test follow-ups suggested that UK children interpret ‘on purpose’ as ‘doing something bad’, rather than general agency. This indicates that the use of such scales may not generalise across different cultures.

**CHAPTER 4: The Animals in Moral Tales: Does Character Realism Influence Children's Prosocial Response to Stories?**

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*Note.* Spellings are American English, as required by journal

### Abstract

Previous research has suggested that moral stories depicting realistic characters may better facilitate children's prosocial behavior than those containing anthropomorphized animal characters. The current study is a conceptual replication with a different sample and an extended age range. We examined the relationships between story character realism (anthropomorphized animal or human), theme (sharing or busyness), age and prosocial behavior (i.e., resource allocation). Four versions of an illustrated story book were created: An *Animal Sharing* book; an *Animal Busy* book; a *Human Sharing* book; and a *Human Busy* book. A total of 179 children, between 3 and 7 years old listened to one of the four versions of the story. Children's sticker donating behavior was measured prior to hearing the story and again following a story recall task. All groups donated more stickers post-story than pre-story. Younger children were more likely to increase their donation than older children and children who had made higher human internal state attributions in a previous experimental session donated more stickers post-story. In contrast to previous research, we found that a sharing-themed narrative depicting human characters was no more influential on sticker donation than the other stories.

### 4.1 Introduction

The reading aloud of stories from picture books to young children is a regular activity in schools and preschools (Duursma et al., 2008; Jacobs et al., 2000; Lane & Wright, 2007). Read-aloud is practiced because there are established links between a child's exposure to shared reading and the emergence of language and literacy skills (Aram & Aviram, 2009; Kotaman, 2013; Lynch et al., 2008; Sénéchal et al., 2008). Moreover, stories are used in school-based personal, social and emotional learning (UK) or character education (USA and Canada), with the aim of conveying social, moral and emotional lessons to young children (K. Lee et al., 2014; Leming, 2000; Talwar et al., 2016; Walker & Lombrozo, 2017). Optimal educational resources must be underpinned by robust empirical evidence. In this context, it is important to determine the influence of key discrete properties of stories on children. With this in mind, the current study builds on existing research examining how fantasy and realism influence children's understanding and learning from picture books (e.g., Ganea, et al., 2014; Kotaman & Balci, 2017a; Richert & Smith, 2011).

#### **Moral Tales and Prosocial Behavior**

Whilst infants may be innately predisposed towards prosocial behavior (e.g., Warneken & Tomasello, 2009), the expression of prosocial actions is cultivated and moderated by learning. With a focus on sharing, it is evident that rewards for altruism and punishments for selfishness occur across a wide variety of societies (Fehr & Fischbacher, 2004; Henrich et al., 2006), which indicates that the promotion of altruism is a widespread preoccupation. Furthermore, the ubiquitous presence of moral, folk and religious tales, suggests that these narratives provide important sources of relevant cultural information that shape children's behavior (Collette & Miller, 2018; K. Lee et al., 2014; Yao & Enright, 2020).

Key discrete features in moral tales appear to act as an immediate nudge for various forms of prosocial behavior. For example, narratives that portray a positive outcome for a character who is honest significantly increase truth telling by children, when they are tested directly after hearing the story (K. Lee et al., 2014; Talwar et al., 2016). Intriguingly, in this research, children who were presented with moral stories that depicted negative outcomes for dishonest protagonists, subsequently told the truth no more frequently than those who heard a morally neutral story. Larsen et al. (2017) built on this finding and successfully used a story presenting positive outcomes for a generous protagonist to elicit sharing in Canadian children. For this reason, the current study used a narrative with a positive outcome for the prosocial protagonist. It should be noted however, that Chinese children have been found to respond to generosity stories by sharing more stickers than in a control condition, no matter the valence of outcome for the protagonist (Yao & Enright, 2020).

### **Altruistic Sharing in Children**

Sharing is frequently used in research as a measure of prosocial behavior. An established measure of altruistic sharing, known in the literature as the ‘dictator game’, provides children with the opportunity to anonymously ‘dictate’ how a set of allocated resources (usually toys or stickers) are distributed between themselves and an absent third-party (Benenson et al., 2007; Cowell et al., 2017; Du & Hao, 2018). This procedure has been used successfully in children from 3 years old (Gummerum et al., 2010; Liu et al., 2016; Rochat et al., 2009). Children typically allocate only a small proportion of their resources to others, particularly if the sharing is anonymous and to an unspecified peer rather than a close friend (Flook et al., 2019; Moore, 2009; Stewart & McBride-Chang, 2000). Thus, this measure potentially provides sensitivity to increased sharing in response to experimental stimuli. However, individual differences in children’s propensities to share are indicated by the large standard deviations reported in the literature (e.g. Benenson et al., 2007; Stewart &

McBride-Chang, 2000). Therefore, it may be more appropriate to take a baseline measurement before any experimental manipulation and compare this with resource allocation at a second point in time. We employed this technique and invited children to divide ten stickers between themselves and an unspecified same-age child both pre- and post-story, with the aim of examining the influences of specific aspects of stories on children's altruistic giving.

Predictable developmental trajectories are observed, with altruistic sharing more evident as children age (Benenson et al., 2007; Flook et al., 2019; Ongley et al., 2014; Posid et al., 2015). Whilst 3-year-olds appear to understand social expectations regarding fairness, the mean proportion of resources (stickers) shared in an anonymous task increases steadily between 3 and 8 years; 8-year-olds behave more in line with their egalitarian beliefs than 3-year-olds (Smith et al., 2013). Interestingly, whilst children's (baseline) propensity to share at least one sticker from a set increases incrementally from 3 years, when considering only those children who share, no age-related increases in donation are observed in under 7-year-olds (e.g., Blake & Rand, 2010; Posid et al., 2015).

Developmental pathways and the expression of prosocial actions are moderated by learning and culture (Henrich, 2015; House, 2018) and variations between cultures are observed (e.g. Cowell et al., 2017; Rochat et al., 2009; Samek et al., 2020). For example, it has been suggested that children in Eastern cultures exhibit greater peer-to-peer sharing than those in Western cultures (Stewart & McBride-Chang, 2000). Notably though, local socio-demographic characteristics can be at least as influential. For example, children living in urban contexts appear to be more self-interested than rural children (Rochat et al., 2009), but those from higher socioeconomic demographics altruistically share more resources than those from more impoverished environments (Benenson et al., 2007). We sought to further explore children's altruistic responses to stories in a 3-7-year-old sample of UK rural children.

### **Children's Responses to Anthropomorphism**

A prevalent type of fantasy genre in children's literature uses anthropomorphism. Anthropomorphized characters are animals or objects portrayed as exhibiting human thoughts, feelings, goals and behaviors, which is a violation of reality (Epley et al., 2007; Severson & Lemm, 2016; Waytz et al., 2010). A small body of work has examined whether character realism affects the ease with which children understand these stories and apply the themes in fiction to themselves. For example, story comprehension is poorer if the book presents anthropomorphized illustrations rather than more realistic pictures, despite an otherwise identical narrative (Kotaman & Balci, 2017b). The relationship between the transfer of solutions from stories to analogous real-world problems has also been observed to be less robust when fantasy protagonists, relative to human characters, are presented to young children (Ganea et al., 2008; Ganea et al., 2014; Richert et al., 2009; Richert & Smith, 2011).

Of direct relevance to the current study is research that has examined the influence of book character realism on 4 to 6-year-old children's prosocial behavior (Larsen et al., 2017). Larsen et al. found that children were more likely to share (stickers) if they had heard a story about human generosity compared with an anthropomorphized version of the same book. This finding supports the hypothesis that human characters are more effective than fantasy characters in facilitating prosocial behavior, such as sharing, in young children. However, Larsen et al. did not examine the influence of story character and narrative theme on prosocial response as separate factors. The current study sought to explore these potential influences on behavior and to examine the generalizability of the original finding with a different sample.

Further impetus to explore the concepts with a different sample is provided by similar research conducted by Yao & Enright (2020). Their stories were anthropomorphized, but nevertheless prompted sharing in Chinese children; this is a challenge to the idea that only

human characters be an effective nudge. Socioeconomic characteristics influence not only altruism, but also responses to anthropomorphism. For example, rural children appear to employ less anthropocentric reasoning than urban children (Geerdt, 2016; Herrmann et al., 2010; S. Waxman & Medin, 2007), which may shape responses to animal characters. Given that the original recruited sample were children associated with a city university or science center (Larsen et al., 2017) and high SES, there is great value in examining the generalizability of responses to anthropomorphism in other geographic locations, with children from diverse backgrounds.

Anthropomorphized stories have been noted as providing the majority of fiction books available to children in educational settings (Kotaman & Balçı, 2017b; Larsen et al., 2017). However, children do not universally show a strong preference for this story type (Barnes et al., 2015; Mar et al., 2010; Mar & Oatley, 2008) and individual differences have been observed in terms of personal orientation to fantasy content (Plante et al., 2017; Richert & Smith, 2011; Sharon & Woolley, 2004). These individual differences may influence the effects of character realism on subsequent behavior and children with greater fantasy orientation might exhibit stronger responses to animal stories.

Indeed, Larsen et al. (2017) assessed orientation to fantasy content by measuring the strength of association between human behavior and anthropomorphic pictures in young children. They found that children who judged anthropomorphic characters to have human behaviors (such as eating with utensils) were more likely to show prosocial behaviors (measured by the number of stickers shared) following an anthropomorphized story with a prosocial theme. This measure was concerned with children's expectation of general behavior, (e.g., using utensils), but did not assess children's beliefs about an agent's relative consciousness, emotions, thoughts, or intentions. It is possible that a child's abilities to personally identify with a character's moral behavior might be more strongly related to those

beliefs about mental states, rather than overt behaviors. In a separate line of research, these beliefs have been assessed with a child oriented scale, the Individual Difference in Anthropomorphism Questionnaire-Child Form (IDAQ-CF; Severson & Lemm, 2016). This questionnaire has been adapted to assess children's mental and emotional state attributions to people and to various animal characters that might typically be found in storybooks (Russell & Cain, 2020). This was used in the current study to further our understanding of the development of anthropomorphic thinking in early childhood and its relationship with children's responses following a story with a prosocial theme, that either had human or anthropomorphized characters.

### **The current study**

This study provides a conceptual replication and extension of Larsen et al.'s (2017) Canadian study, building on previous findings using a different set of methods to test the same idea. We extend the work in terms of the cultural context, by examining the responses of UK children. Additionally, we broaden the age range, to ensure a comprehensive sample of young children, to whom anthropomorphized literature is targeted. This enables an evaluation of the generalizability of previous findings, particularly since evidence suggests that cultural contexts can influence resource allocation (Callaghan & Corbit, 2018a; Stewart & McBride-Chang, 2000), and is consistent with the current broad debate concerning reproducibility in psychology (Asendorpf et al., 2013; Munafò et al., 2017).

Our study extends the scope of the original Larsen et al. (2017) work in several respects. The previous study did not examine the influence of story character and narrative theme on prosocial responses as separate factors. To assess for potential separate influences of these two variables, we examined the relationships between character, theme and sharing behavior, using a factorial design. Children in each age group were randomly assigned to one of four story conditions: *An Animal Sharing* condition; an *Animal Busy* condition (both these

stories were illustrated with identical anthropomorphic cartoon pictures); a *Human Sharing* condition; *Human Busy* condition (both stories were illustrated with identical human cartoon pictures, adapted from the illustrations used in the anthropomorphic books). We predict that a sharing themed story will have a positive influence on post-story sticker donations and that human sharing stories will be associated with more donations than animal sharing stories. Gender was included in the first analysis, as differences in resource allocation have occasionally been noted previous studies; examples of higher generosity in girls (Gummerum et al., 2010; Ongley et al., 2014) and in boys (Posid et al., 2015) have been observed. We do not have a prior prediction concerning gender and sharing.

To extend our understanding of the development of these behaviors, we included 3- to 7-year-olds to explore the influence of age on sharing behavior. This age range includes that studied by Larsen et al. (2017) and is one of rapid development in social cognitive understanding (Wellman & Liu, 2004). From 3 years, children are sensitive to underlying causal structures in stories and become increasingly able to differentiate between human and fantasy characters (Walker et al., 2015). Additionally, a demonstrable grasp of the concept of fairness (Smith et al., 2013), capacities for moral decisions (Ball et al., 2017) and successful participation in dictator games (Benenson et al., 2007) emerges in 3-year-olds. This informed our decision to test a wider relevant age-range. In line with the previous literature, we predict that older children will donate more stickers than younger children when measured pre-test. Influence of age on donation responses to stories is exploratory.

We additionally examined the relationship between children's sharing and their responses to the adapted anthropomorphic scale (Russell & Cain, 2020), which sought to capture children's beliefs concerning potential protagonists' capacities for consciousness, emotions, and thoughts, in place of the behavioral categorization task employed in the

original study. We predict that this measure would be more strongly related to change in sticker donation following the prosocial story.

Larsen et al. (2017) included only those children who could explicitly answer post-narrative comprehension questions in the reported analyses. This precluded the examination of how ability to remember the story was related to subsequent sharing. To address this, we assessed how children's engagement with the narrative theme (assessed by explicit mention in a retell) was related to their sharing behavior. We predict a positive relationship between prosocial theme recall and sticker donations.

Our purpose was to address the following research questions:

- (1) Does story character (Human, Animal) or story theme (Sharing, Busy) influence sharing behavior.
- (2) Are children's ratings for human or for anthropomorphized animal thoughts, feelings and self-awareness related to their sharing behavior?
- (3) Is the ability to identify the story theme associated with the prosocial response following a prosocial story?
- (4) Are there age-related influences on children's prosocial responses to stories?

## 4.2 Method

### Participants

The participants were 179 typically developing children, attending 6 rural state primary schools in the North-West of England, mostly serving areas of lower socioeconomic status (SES), recruited as part of a larger study. The children were aged between 3 and 7 years ( $M = 66.34$  months,  $SD = 14.18$ , range: 38 to 91 months, 104 boys) and all were native English speakers. Equal numbers of children from each year group were randomly assigned to one of the four picture book conditions. The data from seven additional children were excluded due to unwillingness to participate ( $N=4$ ), being unavailable to complete the second

session ( $N=1$ ) or due to developmental concerns raised by school staff ( $N=2$ ). We also excluded participants with receptive vocabulary scores that were more than one standard deviation below the mean ( $N = 5$ )<sup>1</sup>.

## Materials

### *Book Stimuli*

Book stimuli were created to explore the influences of character type and prosocial narrative content on children's subsequent altruistic behaviors. The illustrations were based on those in a published book called *Little Raccoon Learns to Share*, written by Mary Packard (2013). This story has a strong sharing theme and was used with this age range in previous work by Larsen et al. (2017).

Four versions of the book were constructed, one for each experimental condition. Two books had a prosocial 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 altered to replace the animal characters with human protagonists. The prosocial stories were identical, other than for specific references to the character, 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 control versions of the books. Key words in the sharing story were changed to create a narrative about the theme of 'being busy', that fitted the pictures without providing a sharing theme. Again, the busy narratives were identical, other than for specific references to the character. This provided the *Animal Busy* and *Human Busy* books for the two control conditions. Table 4.1 provides examples of key matched sentences across the 4 conditions. The four books were printed to look identical. Additional wordless

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<sup>1</sup> No significant differences in findings resulted from this exclusion.

copies of the animal and human book were produced, for use in the recall task. These were printed and bound to match the experimental books.

**Table 4.1**

*Examples of Matched Sentences from each Story Condition*

Illustration type	Prosocial story (Sharing theme)	Control story (Busy theme)
Anthropomorphized: color drawings of a raccoon and animal friends	Little Raccoon was very selfish: her favorite word was ‘mine’!  ...Then she went to pick some flowers. She didn’t share!	Little Raccoon was very active: her favorite word was ‘busy’!  ...Then she went to pick some flowers. She didn’t stop!
Human: color drawings of a girl and human friends	Little Rachel was very selfish: her favorite word was ‘mine’!  ...Then she went to pick some flowers. She didn’t share!	Little Rachel was very active: her favorite word was ‘busy’!  ...Then she went to pick some flowers. She didn’t stop!

### ***Sticker Task***

To examine the influence of book type on children’s sharing behavior, a sticker task was administered both before and after the story session. We used an established effective marker for altruism in children of this age, modelled on the dictator game task described by Benenson et al. (2007). Good quality color stickers were provided, which children could allocate to themselves and to others.

### ***Anthropomorphic Picture Scale***

An adaptation of the Individual Differences in Anthropomorphism Questionnaire-Children Form (IDAQ-CF; Severson & Lemm, 2016) was used (see Russell & Cain, 2020, for full details). The 16-item Anthropomorphic Picture Scale was administered on small, laminated picture cards and was randomized. The extent to which participants attributed feelings, thoughts, self-knowledge or agency to items within each category was assessed. For

example, within the human subscale, a photograph of a person with a neutral expression was paired with the question, ‘Does a person have feelings - like happy and sad?’ For those items which precipitated a positive response, children were asked to indicate ‘How much?’ on a 3-point visual scale, identical to one used by Severson and Lemm (2016).

Two scores, an anthropomorphic score and a human score, were computed by averaging child responses across the anthropomorphic items and human items respectively (see Severson & Woodard, 2018). Scores for both subscales ranged from 0 (no endorsement of internal state) to 3 (full endorsement of internal states). The intentionality items were excluded from the computed means as responses to these items loaded onto a separate factor and were clearly treated differently in the UK sample relative to that of the Canadian children in the original scale (see Russell & Cain, 2020, for a discussion of this finding).

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

Receptive vocabulary was measured with the British Picture Vocabulary Scale: Third Edition (BPVS3; Dunn et al., 2009), which was administered and scored according to the manual guidelines. Four pictures on each plate were presented with a single word spoken aloud by the assessor and the child indicated which picture they considered matched with the word. The standardized scores were used to exclude participants with weak language skills (more than 1 SD below the mean; included range 85-125).

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

Parents completed a questionnaire about the home literacy environment (as part of a larger investigation concerning the influence of anthropomorphic characters on children’s understanding of stories). Only those questions designed to elicit information about children’s favorite book(s) and TV show(s) are relevant and reported here (see Appendix B for full questionnaire). Parents were invited to name their child’s favorite book title(s) and TV show(s). Each listed item was carefully examined online and binary coded for the presence of

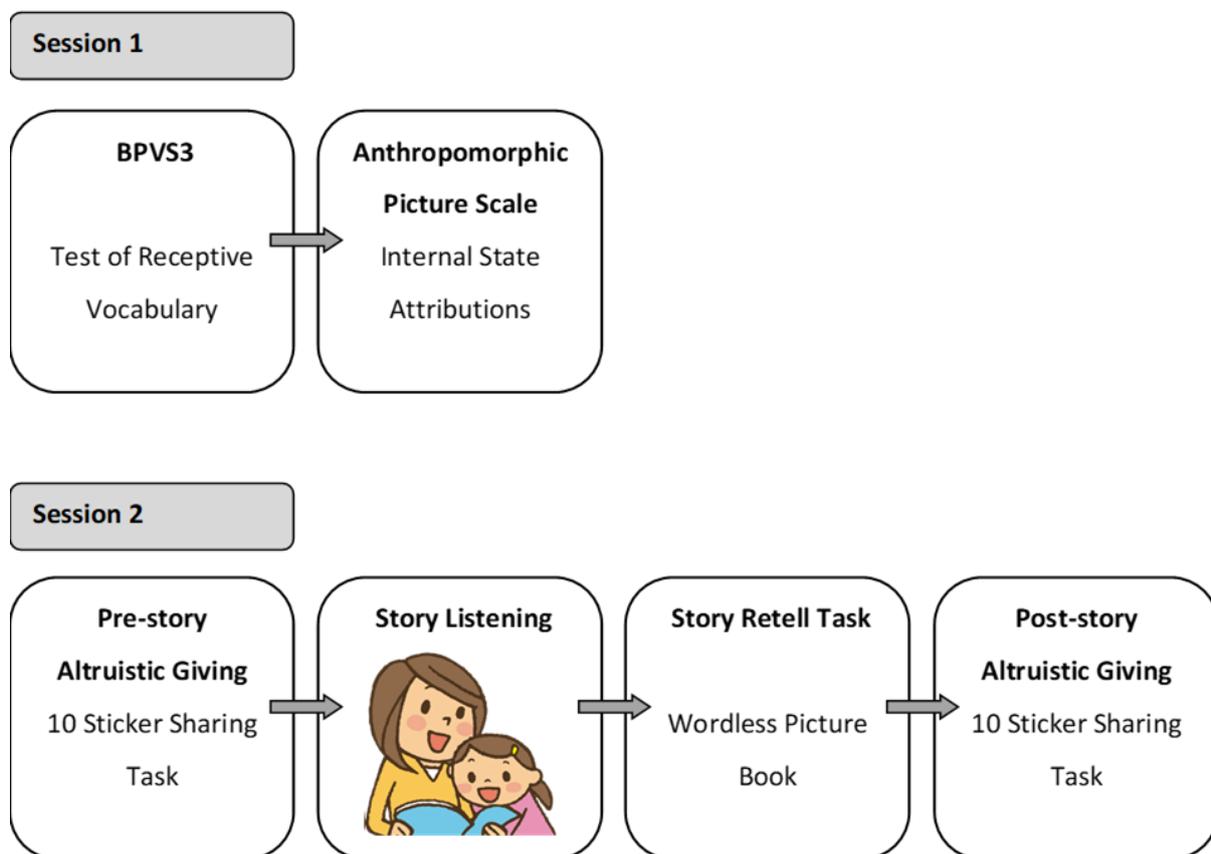
anthropomorphic content by the researcher. This provided descriptive information concerning children's orientation towards anthropomorphized media.

### Procedure

Children were assessed individually in two separate sessions, each lasting no more than 20 minutes (see Figure 4.1).

**Figure 4.1**

*Overview of the Procedure*



#### *Session 1*

The BPVS3 was administered, followed by the Anthropomorphic Picture Scale. At the end of the first session, the researcher explained that the participant could choose a reward for their work at the start of session two.

#### *Session 2*

Thirty assorted highly attractive stickers were presented at the start of the session. The child selected their ten favorites as their reward. Then, the child was invited to anonymously share their stickers with children in school who were not participating in the study; it was made clear that they could keep all ten stickers if they wished to. Two envelopes were provided; one clearly marked with the child's name for stickers they wanted to take home, and an unmarked envelope for donated stickers. Participants were told that staff and other children would not know who had shared and that the researcher would not watch. After verifying that the child understood the task, the researcher turned away whilst the participant allocated stickers to envelopes. The child then posted the sharing envelope into a mailbox, which contained two discretely marked foil envelopes. The named envelope was put aside during the story, to reduce distraction.

Next, the child was presented with their allocated storybook. They were told to listen carefully, as they would have the opportunity to retell the story afterwards. The story was read straight through by the researcher. Any interruptions were answered neutrally, and attention redirected to the book. The child was then 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), participants were invited to retell the story to the researcher and to include everything they could remember. If the child did not start within ten seconds, a probe of 'What happened at the beginning of the story?' was used; 'What happened next?' was used to as a neutral prompt during the task. After the task, the child was offered a further ten stickers from a new distinct assorted set of 30, ostensibly given in reward for story participation. The invitation to anonymously share, as outlined above, was repeated. The child's named envelope was returned to them to put away their additional stickers and a second plain sharing envelope, unobtrusively marked on the reverse to differentiate it from the first, was provided. The second sharing envelope was posted into the mailbox and the

child's envelope was sealed. The participant was instructed to open them at home, to minimize sticker distribution in school during testing periods. Following the session, the numbers of stickers in each of the two envelopes were recorded. At the end of testing, the children were debriefed in class by the researcher and donated stickers were given to class teachers for distribution.

### **Recall Coding and Reliability**

The audio recordings were transcribed following the procedures outlined in the Expression, Reception and Recall of Narrative Instrument manual (ERRNI; Bishop, 2004) for use in a separate analysis. For the purpose of this current study, the transcripts were scored for explicit inclusion of the story theme (Westerveld & Gillon, 2010). Children were given credit for each mention of the key terms related to the story theme, in the prosocial story (selfish, sharing, taking turns etc.) and control story (busy, relaxing, stopping etc.). For reliability, twenty transcripts (just over 10%) were checked by a research assistant, blind to the experimental hypotheses. Reliability was excellent: transcription accuracy (98.83%); division into utterances (96.52%). Inter-coder reliability for theme estimated using Krippendorff's alpha test (Hayes & Krippendorff, 2007) was high ( $\alpha = .97$ ). Any disagreement was resolved by discussion.

### **Analysis Strategy**

Descriptive statistics were calculated using SPSS version 27 and used to characterize the sample. As the dependent variable provides count data (number of stickers) a number of suitable count distributions were fitted using the software package R (R Core Team, 2019). Initial analyses indicated a non-normal and over-dispersed distribution, with an inflated zero count (confirmed by a zero-inflation tolerance check). Therefore, we evaluated a typical linear regression against Poisson, negative binomial, zero-inflated Poisson and zero-inflated negative binomial distributions. Inspections of model fit to data informed our decision to use

zero-inflated negative binomial models in the planned analyses (see Atkins & Gallop, 2007); see Appendix C for evaluative steps and related R packages.

For each analysis, two regression analyses are estimated in parallel. A zero-inflation component estimates the probability of not engaging with the sharing behavior post-story and a count component estimates whether the model predictors explain the sharing observed.

A priori power analysis indicated that a sample size of 160 would be sufficient to detect a significant medium effect in regression analyses with up to 8 predictor variables power of .95 and an alpha of .05.

### 4.3 Results

#### Descriptive Statistics

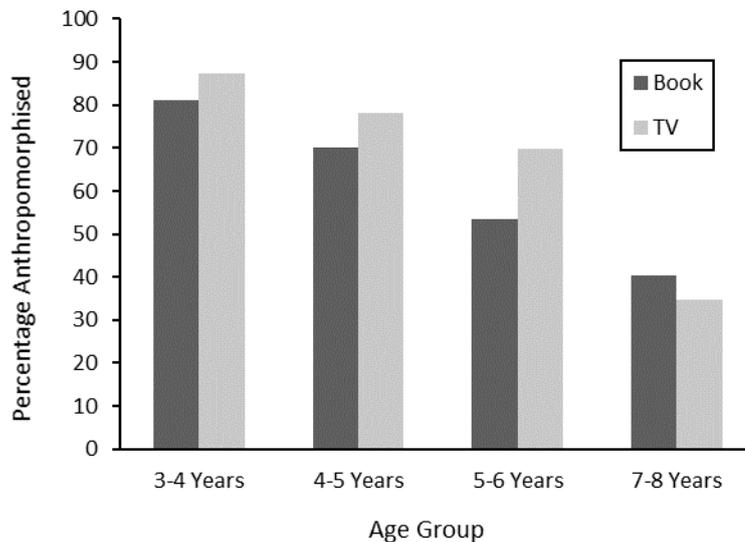
##### *Children's Preferences for Anthropomorphic Content*

Parents of 177 of the 179 participants returned a completed home literacy questionnaire. Parental responses indicated that 65.0% of children incorporated anthropomorphic content in their favorite film/TV viewing and 59.3% of children included anthropomorphic content in favorite books. Almost half the parents reported anthropomorphic content in both screen and book favorites (44.1%), whereas 19.8% of parents reported no anthropomorphized content in either medium.

Chi-squared analysis revealed a significant effect of age on the likelihood that parents reported anthropomorphic content in their child's favorite TV program/film:  $\chi^2(3, N = 177) = 32.36, p < .001$ , and similarly for books:  $\chi^2(3, N = 177) = 17.07, p = .001$ . For both media, the reported preference for anthropomorphic content decreased with increasing age, as shown in Figure 4.2. Additional analyses revealed no effect of gender on the likelihood that favorite media contained anthropomorphic content: TV programs/films:  $\chi^2(1, N = 177) = .001, p = .98$ , and books  $\chi^2(1, N = 177) = .001, p = .98$ .

#### Figure 4.2

*Percentage of Parents Reporting Anthropomorphized Content in Favorite Books and TV Programs for Each Age Group*



***Anthropomorphic Picture Scale***

Children endorsed internal state for humans ( $M = 2.71$ ,  $SD = 0.47$ ) at a significantly higher rate than for animal characters ( $M = 1.24$ ,  $SD = 0.89$ ),  $t(178) = 20.00$ ,  $p < 0.001$ ,  $CI = 1.33, 1.62$ . The mean scores were explored in relation to children's story responses below.

***Sticker Sharing Task***

Preliminary analyses showed that sticker donation was not affected by the school location from which the data was collected, pre-story ( $F(1,5) = 3.80$   $p = .57$ , or post-story ( $F(1,5) = 5.29$ ,  $p = .61$ ). Therefore, we collapsed across this variable.

The means and standard deviations of the number of stickers shared by children in each story condition, pre- and post-story, are shown in Table 4.2. Pre- and post-story sticker sharing was moderately positively correlated ( $r = .495$ ,  $p < 0.001$ ). Children significantly increased their sharing after hearing a story,  $t(178) = 2.71$ ,  $p = .007$ ,  $95\% CI = .05, .35$ .

**Table 4.2**

*Mean and Standard Deviation for Number of Stickers Shared Pre- and Post-Story for Each Story Condition*

	Pre-story	Post-story	Difference
	M (SD)	M (SD)	M (SD)
Animal Busy	1.64 (1.87)	2.11 (2.44)	0.48 (1.85)
Animal Sharing	1.84 (2.09)	2.30 (2.71)	0.45 (2.57)
Human Busy	2.11 (2.20)	2.33 (2.84)	0.22 (2.44)
Human Sharing	2.41 (2.56)	3.39 (3.51)	0.98 (3.47)
All Conditions	2.01 (2.20)	2.54 (2.93)	0.54 (2.65)

**1) Does Story Character (Human, Animal) or Story Theme (Sharing, Busy) Influence Sharing Behavior?**

A zero-inflated negative binomial (ZINB) model for sticker sharing post-story was estimated with gender, age, sticker sharing pre-story, story character and story theme as independent variables. The model was fitted with an interaction between story character and theme, to fully explore the effects of these variables on post-story sharing. Variable means, standard deviations and correlations, are provided in Table 4.3 and the analysis results are reported in Table 4.4.

Seventy-two children (40%) did not share any stickers post-story. The zero-inflated portion of the model revealed that not sharing post-story was negatively predicted by sticker sharing pre-story (odds ratio = 0.30); that is, as pre-story sticker sharing scores increased, the odds for giving zero stickers post-story decreased. No other variable was predictive of non-sharing behavior following the story. The count portion of the model revealed that, on average, older children shared fewer stickers post-story than younger children ( $B = -0.02, p < .001$ ). Children's gender and pre-story sharing was not predictive of post-story generosity. Additionally, neither story character or story theme, nor an interaction between these variables, was observed to influence sticker sharing in this sample.

**Table 4.3***Means, Standard Deviations and Correlations for Predictor Variables*

Predictor Variables	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
1. BPVS3 standardized score <sup>a</sup>	103.15	9.33						
2. Age in months	66.34	14.18	-0.08					
3. Stickers shared pre-story	2.01	2.20	0.13	0.10				
4. Stickers shared post-story	2.54	2.93	0.05	-0.17*	0.50**			
5. Thematic Utterances	3.72	3.15	0.01	0.02	-0.06	-0.21**		
6. Questionnaire score; Anthropomorphic	1.24	0.89	-0.06	0.04	0.01	-0.01	0.07	
7. Questionnaire score; Human	2.71	0.47	-0.08	0.40**	-0.03	0.03	-0.13	0.05

<sup>a</sup>BPVS3 has a mean of 100 and a standard deviation of 15.\*  $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

**Table 4.4**

*Zero-Inflated Negative Binomial Regression Model to Examine Whether Character or Theme Influence Sticker Sharing Post-Story.*

Count model	B	SE B	z score	$p >  z $	Estimate	95% CI
Predictor						
Intercept	1.27	0.13	9.83	<.001***	3.55	[2.76, 4.57]
Gender <sup>a</sup>	-0.02	0.12	-0.20	.839	0.98	[0.77, 1.23]
Age <sup>b</sup>	-0.02	0.00	-5.08	<.001***	0.98	[0.97, 0.99]
Stickers shared (pre-story)	0.04	0.02	1.49	.138	1.04	[0.99, 1.09]
Story character <sup>c</sup>	-0.07	0.06	-1.13	.257	0.94	[0.83, 1.05]
Story theme <sup>d</sup>	-0.07	0.06	-1.20	.232	0.93	[0.83, 1.05]
Story character * Story theme	0.08	0.06	1.45	.148	1.09	[0.97, 1.22]
Zero-inflation model						
Predictor						
Intercept	0.96	0.41	2.37	.018*	2.62	[1.18, 5.80]
Gender <sup>a</sup>	-0.01	0.48	-0.01	.989	0.99	[0.39, 2.53]
Age <sup>b</sup>	-0.00	0.02	-0.08	.935	1.00	[0.97, 1.03]
Stickers shared (pre-story)	-1.21	0.32	-3.72	<.001***	0.30	[0.16, 0.56]
Story character <sup>c</sup>	-0.03	0.23	-0.12	.903	0.97	[0.61, 1.54]
Story theme <sup>d</sup>	0.12	0.23	0.51	.610	1.13	[0.71, 1.79]
Story character * Story theme	0.06	0.23	0.25	.806	1.06	[0.67, 1.67]

*Note.* The model was estimated against a null model with the regressors removed. The Likelihood Ratio Test (LRT) statistic indicated that the model was a good fit to the data,  $\chi^2(12) = 115.23$ ,  $p = <.001$ .

B = unstandardized estimate.

Estimates = incident risk ratio (IRR) are presented for the negative binomial (count) model and odds ratio (OR) presented for the logistic (zero-inflation) model.

<sup>a</sup>Female = 0, male = 1.

<sup>b</sup>Variable centered on the mean.

<sup>c</sup>Contrast coded, animal = -1, human = +1.

<sup>d</sup>Contrast coded, busy = -1, sharing = +1.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

## **2) Are Children's Ratings for Human or for Anthropomorphized Animal Thoughts, Feelings and Self-awareness Related to Their Sharing Behavior?**

Children completed different storybook conditions. Two one-way ANOVAs (collapsed over age, with storybook condition as a between-subjects factor) revealed no significant differences between experimental groups' ratings on the anthropomorphic picture scale: human,  $F(3,175) = 1.54, p = .21$ ), anthropomorphic,  $F(3, 175) = 0.46, p = .71$ .

As above, a ZINB model for sticker sharing post-story was estimated with child (age, pre-story sticker sharing) and condition (story character, story theme) variables. In addition, mean scores for human and anthropomorphic characters' internal states from the anthropomorphic scale were included. Interactions between the mean scale scores and story theme were fitted to test whether post-story sticker sharing was predicted by attributed character self-awareness within prosocial (sharing themed) stories. A preliminary analysis showed no significant effect of gender on the mean scores for internal states (human,  $t(177) = 1.71, p = .09$ ; anthropomorphic,  $t(177) = -1.43, p = .15$ ), so the data were collapsed across this variable. The results of the ZINB regression are presented in Table 4.5, with post-story sticker sharing as the outcome variable.

As previously seen, the zero-inflated component of the model showed that, as sticker sharing scores pre-story increased, the odds for having a zero score post-story (rather than a non-zero score) decreased (odds ratio = 0.21). The count portion of the model showed the age-related effect, with older children, on average, sharing fewer stickers post-story than younger children ( $B = -0.03, p < .001$ ). In addition, however, a significant relationship between the human internal state score and sticker sharing post-story was observed ( $B = 0.29, p = .03$ ); on average, children who conferred higher internal states scores for humans gave more stickers post-story. Animal character internal state scores did not predict post-story

sticker sharing. There were no interactions between the human score and story theme, or between the anthropomorphic score and story theme, on donation responses.

**Table 4.5**

*Zero-Inflated Negative Binomial Regression Model to Examine Whether Human or Anthropomorphised Questionnaire Scores Influence Sticker*

*Sharing Post-Story*

Count model	B	SE B	z score	$p >  z $	Estimate	95% CI
Predictor						
Intercept	1.19	0.11	11.05	<.001***	3.28	[2.66, 4.05]
Age <sup>a</sup>	-0.03	0.00	-5.60	<.001***	0.98	[0.97, 0.98]
Stickers shared (pre-story)	0.04	0.03	1.67	.096	1.04	[0.99, 1.10]
Story character <sup>b</sup>	-0.07	0.06	-1.12	.264	0.94	[0.84, 1.05]
Story theme <sup>c</sup>	-0.04	0.06	-0.62	.534	0.96	[0.86, 1.08]
Human score <sup>a</sup>	0.29	0.13	2.18	.029*	1.34	[1.03, 1.74]
Anthropomorphic score <sup>a</sup>	-0.02	0.06	-0.33	.743	0.98	[0.87, 1.11]
Story theme * Human score	-0.21	0.12	-1.70	.089	0.81	[0.64, 1.03]
Story theme * Anthropomorphic score	0.05	0.06	0.81	.418	1.05	[0.93, 1.19]
Zero-inflation model						
Predictor						
Intercept	1.03	0.28	3.72	<.001***	2.81	[1.63, 4.85]
Age <sup>a</sup>	0.00	0.02	0.24	.813	1.00	[0.97, 1.04]
Stickers shared (pre-story)	-1.57	0.51	-3.08	.002**	0.21	[0.08, 0.57]
Story character <sup>b</sup>	0.03	0.28	0.11	.916	1.03	[0.59, 1.79]
Story theme <sup>c</sup>	0.19	0.25	0.78	.437	1.21	[0.74, 1.98]
Human score <sup>a</sup>	-0.55	0.61	-0.90	.369	0.58	[0.18, 1.91]
Anthropomorphic score <sup>a</sup>	0.16	0.30	0.54	.590	1.17	[0.66, 2.09]
Story theme * Human score	-0.22	0.64	-0.34	.732	0.80	[0.23, 2.81]
Story theme * Anthropomorphic mean	-0.05	0.30	-0.19	.853	0.94	[0.53, 1.69]

*Note.* The model was estimated against a null model with the regressors removed. The Likelihood Ratio Test (LRT) statistic indicated that the model was a good fit to the data,  $\chi^2(1) = 122.72, p < .001$ .

B = unstandardized estimate.

Estimates = incident risk ratio (IRR) are presented for the negative binomial model and odds ratio (OR) presented for the logistic (zero inflation) model.

<sup>a</sup>Variable centered on the mean.

<sup>b</sup>Contrast coded, Animal = -1, Human = +1.

<sup>c</sup>Contrast coded, Busy = -1, Sharing = +1

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

### **3) Is the Ability to Identify the Story Theme Associated with the Prosocial Response Following a Prosocial Story?**

Of the 179 participants, eight children were excluded from this analysis as no data relating to thematic inclusion was available, due to participant unwillingness to retell the story ( $N=1$ ), poor recording quality which precluded an accurate deciphering of participant narrative ( $N=5$ ), or audio-recording equipment failure ( $N=2$ ).

A ZINB model for sticker sharing post-story was estimated for the remaining participants ( $N=171$ ). One hundred and forty-nine children (87%) made at least one explicit reference to the story theme (Sharing, Busy) during recall. The number of explicit references to the theme (range 0 to 22) was included as an independent variable in the model, and interactions between thematic references and story character, and thematic references and story theme, were fitted. The variables of age, sticker sharing pre-story, story character and story theme were retained as independent variables from the previous model. As preliminary analysis showed no significant effect of gender on the number of thematic utterances,  $t(169) = -0.56$ ,  $p = .58$ , we collapsed the data across this variable. The results from the ZINB regression are presented in Table 4.6, with post-story sticker sharing as the outcome variable.

Sixty-nine children (40%) shared no stickers post-story. The zero-inflated portion of the model showed that the only variable associated with not sharing after the story was pre-story sharing, with lower sticker sharing pre-story associated with higher odds of not sharing post-story (odds ratio = 0.29).

The count portion of the model continued to show the influence of age on sticker sharing after a story, with older children donating fewer than younger children on average ( $B = -0.02$ ,  $p < .001$ ). Children's thematic utterances were not related to their sticker sharing, and there was no interaction between story theme and theme mentions in predicting subsequent sticker sharing. However, this model suggests a significant effect of story theme

( $B = -0.18, p = .046$ ) on post-story sharing, with more stickers donated following sharing themed stories ( $M = 2.86, SD = 3.17$ ), than after busy stories ( $M = 2.22, SD = 2.64$ ). No effect of story character was observed.

**Table 4.6**

*Zero-Inflated Negative Binomial Regression Model to Examine Whether the Ability to Identify Story Theme Influences Sticker Sharing Post-Story*

Count model	B	SE B	z score	$p >  z $	Estimate	95% CI
<b>Predictor</b>						
Intercept	1.27	0.13	10.05	<.001***	3.55	[2.77, 4.54]
Age <sup>a</sup>	-0.02	0.00	-3.82	<.001***	0.98	[0.97, 0.99]
Stickers shared (pre-story)	0.05	0.03	1.74	.081	1.05	[0.99, 1.11]
Thematic utterances	-0.02	0.02	-1.03	.302	0.98	[0.94, 1.02]
Story character <sup>b</sup>	0.01	0.09	0.12	.915	1.01	[0.84, 1.21]
Story theme <sup>c</sup>	-0.18	0.09	-2.00	.046*	0.83	[0.70, 1.00]
Thematic utterances * Story character	-0.03	0.02	-1.41	.157	0.97	[0.95, 1.01]
Thematic utterances * Story theme	0.02	0.02	0.93	.352	1.02	[0.98, 1.06]
<b>Zero-inflation model</b>						
<b>Predictor</b>						
Intercept	0.31	0.42	0.74	.459	1.36	[0.60, 3.06]
Age <sup>a</sup>	-0.02	0.02	-1.18	.239	0.98	[0.94, 1.02]
Stickers Shared (pre-story)	-1.24	0.32	-3.86	<.001***	0.29	[0.15, 0.54]
Thematic utterances	0.19	0.10	1.85	.065	1.21	[0.99, 1.47]
Story character <sup>b</sup>	0.03	0.35	0.08	.934	1.03	[0.52, 2.06]
Story theme <sup>c</sup>	0.42	0.36	1.18	.240	1.53	[0.75, 3.10]
Thematic utterances * Story character	-0.01	0.08	-0.12	.903	0.99	[0.84, 1.16]
Thematic utterances * Story theme	-0.02	0.09	-0.24	.814	0.98	[0.83, 1.16]

*Note.* The model was estimated against a null model with the regressors removed. The Likelihood Ratio Test (LRT) statistic indicated that the model was a good fit to the data,  $\chi^2(14) = 103.32, p = 1.1 \times 10^{-15}$ .

B = unstandardized estimate.

Estimates = incident risk ratio (IRR) are presented for the negative binomial (count) model and odds ratio (OR) presented for the logistic (zero-inflation) model.

<sup>a</sup>Variable centered on the mean.

<sup>b</sup>Contrast coded, animal = -1, human = +1.

<sup>c</sup>Contrast coded, busy = -1, sharing = +1.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

#### 4) Are there age-related influences on children's prosocial responses to stories?

The means and standard deviations of the number of stickers shared by children, pre- and post-story, for each age group are shown in Table 4.7.

**Table 4.7**

*Means and Standard Deviations for Number of Stickers shared Pre- and Post-Story in Each Age Group*

	Pre-story	Post-story	Difference
	M (SD)	M (SD)	M (SD)
3-4 years	1.82 (2.65)	3.67 (3.81)	1.85 (3.51)
4-5 years	1.88 (2.27)	2.60 (3.26)	0.72 (3.02)
5-6 years	1.82 (1.94)	2.23 (2.29)	0.41 (1.40)
6-7 years	2.40 (2.02)	2.04 (2.22)	-0.37 (2.10)

A one-way ANOVA<sup>2</sup> explored the change in sticker donations made by children in each year group. Younger children were more likely than older children to increase the number of stickers donated post-story compared with pre-story,  $F(3,175) = 5.15, p = .002, \eta^2 = .08$ . A Tukey post hoc test revealed that the youngest children (Nursery, age 3-4 years) were significantly more likely to increase their sticker donation post-story compared with the oldest children (Year 2, age 6-7 years). There were no significant differences between the intermediate age ranges.

#### 4.4 Discussion

The present study examined the influences of story character realism and prosocial message on children's subsequent sharing behavior. We tested a concept originally developed in a novel study conducted in Canada (Larsen et al., 2017), which had recruited children from an urban and relatively high SES demographic. Our sample provided a different cultural context, testing UK children recruited from rural areas with a lower SES profile. We found

<sup>2</sup> See also non-parametric test in Appendix D

no significant influence of story character on children's sharing behavior. Furthermore, the evidence for an influence of a sharing story theme on children's post-story giving was not robust. As such, this study does not find evidence to suggest the generalizability of a significant influence of sharing-themed narratives depicting human characters benefitting generosity. Our paradigm was sensitive to detect differences in relation to pre- and post-story sharing behavior and age. We also found that children's internal state attributions for humans related to their sharing behavior, but that internal state attributions for anthropomorphic characters did not. Furthermore, internal state ratings did not interact with a sharing story theme to influence generosity. Finally, children's recall of the story theme was not related to their subsequent generosity. These findings and an examination of key patterns we observed in our data are considered in relation to the wider literature and potential contextual confounds. The challenges in generalization and the need for more robust empirical evidence in support of educational resources using anthropomorphized content are discussed.

First, we consider the influence of story character and story theme on children's post-story sharing. Our stories for each theme (Sharing, Busy) were identical, other than the carefully manipulated book illustrations and any specific references to the protagonists, either human (e.g., Little Rachel) or anthropomorphized animal (e.g., Little Raccoon). We found no evidence that children responded differently to stories about humans compared with stories that conveyed the same content but with anthropomorphized characters. Moreover, there was not a robust influence of story theme; in two of our three models, the sharing theme did not predict our measure of prosocial behavior (subsequent sticker donation). There was no interaction between story theme and story character, so our children did not behave significantly differently towards human sharing stories, compared with other story variants.

These findings prompted an evaluation of a key difference between our study and Larsen's et al. (2017). First, we might consider the differences in sample. Larsen et al.'s

participants were urban Canadian children, with a higher SES than our rural UK sample. Whilst relative wealth is associated with higher levels of altruism (Rochat et al., 2009), rural living (and associated exposure to real animals) is associated with less anthropocentric thinking (S. Waxman & Medin, 2007). Although sticker donations may be slightly fewer from children with lower socioeconomic demographics, the difference in responses to animal and human stories could plausibly be expected to be larger in rural children (who tend to view animals as less similar to humans); we did not observe this difference in our data, which prompted an evaluation of experimental methods.

We included a post-story retell task prior to sticker sharing. This may have interrupted the immediate influences of character and prosocial concepts on children's subsequent actions. Indeed, a contemporaneous experiment that involved similar resource sharing after the retelling of a human-charactered generosity story also found no effect of prosocial theme on stickers donated (Kruse et al., 2021). Research suggests that pre-adolescent children focus primarily on concrete representations of stories, rather than accurately abstracting the intended meaning of a narrative (Mares & Acosta, 2008; Narvaez, 2002; Narvaez et al., 1999; Walker & Lombrozo, 2017). Therefore, an explicit instruction for children to listen and remember the story for later recall potentially further focuses children upon memorizing concrete events, rather than reinforcing the underlying story theme.

Second, we explored the influences of children's internal state attributions for humans and for anthropomorphized animals on sticker sharing. Children rated the internal states at significantly different levels for humans compared with animal characters demonstrating validity in our task to assess internal state attributions. However, there was no interaction between either score and the story theme on sticker donation. This suggests that no matter children's propensity to take perspective (assessed with our internal state attribution task) there was no further influence of prosocial story on their donations. However, an association

between children's human internal state attributions and post-story sharing was found. Children who were more aware of the thoughts and feelings of people were more likely to share than children with lower awareness, across all conditions. This supports previous evidence that finds a relationship between children's perspective taking and various prosocial behaviors, including sharing (Cigala et al., 2015; Cowell et al., 2015; Eggum et al., 2011; Paulus & Moore, 2017; Wu & Su, 2014; Yu et al., 2016). Plausibly, those children with higher human perspective taking scores may be more able to imagine the thoughts and feelings of unseen recipients of their generosity, which may encourage their donation.

Third, we sought to understand whether children's explicit recall of the story theme might be related to their subsequent generosity. We found no relationship between thematic recall and donation; children who included more of the theme at recall did not then share differently to those who included fewer references to the theme. There was no significant interaction between story character and thematic recall on generosity. More surprisingly, there was also no significant interaction between the number of thematic references and the story theme (Sharing, Busy) on subsequent sticker sharing. That is, those children who heard a sharing story, who explicitly recounted more of this prosocial theme, were no more generous post-story than children who heard a neutral story (busy) and recalled more of the busy theme. This finding may relate to the knowledge-behavior gap previously observed in children of this age; an awareness of fairness, does not tend to correspond with actions in accordance with this knowledge, at least not in the absence of multiple specific examples of generosity (Blake, 2018; Blake et al., 2014; Du & Hao, 2018; Gummerum et al., 2008). Our single presentation of a moral tale, without further reinforcement of the meaning, may not have been likely to have had an enduring effect upon young children's subsequent decision making.

With further regard for the necessity of reinforcement, previous research has demonstrated that prompts focused on the prosocial meaning of a narrative can facilitate children's generalization and application of moral learning, when offered after a story (e.g. Rottman et al., 2020; Walker & Lombrozo, 2017), or prior to a moral narrative (Cingel et al., 2020). In line with this, several studies that report an effect of stories on subsequent prosocial behavior include a task to encourage attention on the meaning of the story. Examples include children being asked to articulate a moral evaluation of the story (Talwar et al., 2016), or direction to behave according to the prosocial message presented in the narrative (K. Lee et al., 2014). Whilst a few studies have found an immediate influence of prosocial story on behavior without such a prompt (Larsen et al., 2017; Yao & Enright, 2020), others have not (Kruse et al., 2021). Our recall task not only separated the story from the immediacy of donation but did not explicitly direct children's attention to the meaning of the story; we subsequently found no robust effect of a sharing theme. Together this suggests that the length of gap between story and task, along with the presence or absence of a retell activity (not specifically focused on the meaning of the tale) may be influential on observed prosocial outcomes. Future intervention studies should address these factors, and establish reinforcement tasks with the pedagogical power to enable children in classrooms to connect moral lessons from stories to their own actions.

In each model we found that age was a significant negative predictor of post-story sharing. On average, children in every experimental condition were more generous after the story than before (which we discuss further below). However, the effect was greatest for the youngest children (3- to 4-year-olds) and absent in the oldest age group (6- to 7-year-olds). This pattern may reflect the greater appropriateness and enjoyment of picture stories for younger children. An age effect was not seen in the previous study which examined 4- to 6-year-olds (Larsen et al., 2017). However, we considered a wider age range to include 3- to 7-

year-olds. The extant literature suggests that altruistic giving increases with age (e.g., Blake, 2018), a pattern we did not observe in pre-story sharing. However, detectable differences in sharing resources are frequently not observed until children over 7 years are compared with younger age groups (Benenson et al., 2007; Fehr et al., 2008; Yu et al., 2016). Future work that includes older children, measures engagement with (or enjoyment of) experimental materials and explores children's appreciation of the value of the resources (stickers) used might identify additional factors and age-related changes which shape behavior following prosocial stories.

We noted some interesting patterns in our data which warrant discussion. Our children donated more stickers post-story than pre-story, in every story condition. This pattern contrasts with that found in the original study (Larsen et al., 2017) which reported a reduction in generosity after a neutral story or anthropomorphized sharing story, unless influenced by specific (human) prosocial stimuli. However, the wider literature does not suggest a general shift in baseline sharing with increasing numbers of trials (Ben-Ner et al., 2017; List & Samak, 2013) and, indeed, most assume baseline sharing to be stable (e.g. Flook et al., 2019; Lu & Chang, 2016). A contextual explanation for the increase in generosity in the present study might be considered. A small body of work suggests a relationship between positive emotional states and subsequent prosocial action in both adults and children (Aknin et al., 2018; Eisenberg et al., 2016; Sabato & Kogut, 2019; Wang et al., 2014). As the sticker donation tasks were carried out in the second session, the children were already familiar with the experimenter. The session started with the 'reward' of stickers for work in the previous session. This was followed by a one-to-one story, a retelling task for which they were praised, and a further allocation of stickers. The perception of this individual attention as a positive and unquestionably profitable interaction within an otherwise ordinary school day, may have

influenced mood and subsequently increased children's generosity, irrespective of story theme.

Additionally, comment upon the large number of children who did not share, and the high levels variance amongst those who did, is justified. Approximately one third of our children did not donate any stickers at either invitation. The zero-inflated model showed that children who did not share pre-story were unlikely to share post-story; this suggests a stable predisposition towards not sharing in some young children. This finding is not unexpected; other similar studies find that a sizeable minority of children keep all their resources, for example, the modal level of sharing for 3 and 4-year-olds given ten stickers in Samek et al.'s study (2020) was zero. As such, the use of a zero-inflated model is supported, to separately consider the factors that predict not sharing and the factors that influence the level of sharing when it does occur.

Accordingly, the count portion of the model indicated no relationship between pre- and post-story generosity in children who did share and the variance in our data (as demonstrated by large standard deviations) was large relative to the mean. Such large variances in child dictator game tasks are not uncommon (e.g., Benenson et al., 2007; Stewart & McBride-Chang, 2000). This indicates that the variability between individual children's propensities to give was greater than any difference resulting from a response to a story. Whilst our raw scores suggested that children responded to the human sharing story with the greatest increase in generosity from baseline, a significant effect was not detected, despite conducting a well powered experiment.

Overall, our study raises important questions about the conditions under which children's prosocial behavior is influenced. Further work to identify the mechanisms that govern the development and expression of children's prosocial behavior is key. The disparity in findings may reflect not only experimental methods, but additionally have been influenced

by cultural variation, including socioeconomic and demographic factors that bear on children's prosocial development (Benenson et al., 2007; Callaghan & Corbit, 2018a; Stewart & McBride-Chang, 2000). Furthermore, anthropomorphism is not always associated with negative prosocial outcomes, as demonstrated in a study with Chinese children (Yao & Enright, 2020). This indicates a need for additional conceptual replications across cultures.

In conclusion, there is to date limited evidence concerning the role of character realism in children's moral development in response to stories. We suggest that further empirical work, across diverse populations is required before decisions can be made as to what constitutes optimal characters to portray in educational resources.

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**CHAPTER 5 Children's Narrative Retells: The Influence of Character Realism and  
Storybook Theme on Central and Peripheral Detail**

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Text as submitted to *Early Education and Development*

*Note.* Spellings are American English, as required by journal.

### **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. Disparities in comprehension and prosocial learning imply that greater support may be required to aid young children's application of messages from anthropomorphized 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.

### 5.1 Introduction

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 & Balçı, 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 the 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 & Balçı, 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 (Raymond A 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 the youngest children. A reduced connection of salient ideas could explain the findings that

anthropomorphised animal stories are sometimes less effective as a learning tool, as discussed above (Kotaman & Balçı, 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 were 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 idea 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, Strouse et al., (2018) review several key influences on children's learning from picture books. Interactions between young children's developing abilities and key characteristics in books have been found to facilitate, or hinder, the generalisation of knowledge from fiction: Young children gradually develop symbolic and analogical reasoning which enables their understanding of material in books as a source of generalizable information about the world. In addition, capacities to separate realistic elements from the fantastical ones must develop to ensure children isolate those features of stories which are not 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.

Interactive effects on children's retells have been reported by the current authors (Russell, Wang, & Cain, under review), revealing 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). We found that 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 present study 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 in response to 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 and prior world knowledge (Fecica & O'Neill, 2010; Kendeou et al., 2009) along with frequency of exposure to story books (Sénéchal, 2006; Sénéchal & LeFevre, 2002) are predictive of the comprehension of longer and more sophisticated narratives. 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 of stories 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 age (4 age groups: 3 to 4-, 4 to 5-, 5 to 6- and 6 to 7-year-olds; hereafter for brevity we refer to them as 3-, 4-, 5- and 6-year-olds) on both quantitative and qualitative indices of narrative recall. These serve as a

proxy measure of memory and understanding of narrative (Bishop, 2004; Miller & Keenan, 2009; van den Broek et al., 2012). First, we will examine if character, theme 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? We will then examine the total proportions of story units in retells for the influences of story character, narrative theme, age group and centrality. We will then further explore centrality, to determine if character, theme or age group influence children's central focus 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 been 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.

## 5.2 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 and were tested as part of a larger study investigating responses to anthropomorphized content in stories. Children in each year group were randomly assigned to one of the four storybooks. Story data from 13 additional children from the wider study were

not available 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 5.1). 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.

A series of checks were performed to confirm narrative equivalence across the four stories. We used the online automated computational tool, Coh-Metrix 3.0, to analyse and compare various linguistic features of the narratives (available online at [Index - Coh-Metrix 3.0 \(memphis.edu\)](http://Index-Coh-Metrix-3.0.memphis.edu), see Graesser et al., 2004, 2011). The scores for the key linguistic

characteristics indicate no substantial differences between conditions (see appendix E). 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 5.1).

**Table 5.1***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.

### *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. We followed the procedure outlined in Miller et al., (2013) and Miller & Keenan, (2011), to define 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 Miller et al.'s previous studies.

### *Receptive Vocabulary Assessment*

The British Picture Vocabulary Scale: Third Edition (BPVS3; Dunn et al., 2009) was administered and scored according to the manual guidelines. Standardized scores 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 elicited 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). The checklists used were developed and validated in previous research (L. Hamilton, 2014). Each comprised a series of real items (30 true children's book titles and 40 published children's authors) and an equal number of foils (30 plausible made-up titles and 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 checklist, a technique that adjusts the score for guessing (Stanovich & West, 1989). Internal consistency for the sample 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 available 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 completed the home literacy environment questionnaire and returned this to the researcher with the consent form. Children were then assessed in their schools in two 20-minute sessions. In the first session, the BPVS3 was administered, followed by a task related to the larger study (for details see, Russell & Cain, 2022). 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). At the end of testing, the children were debriefed in class by the researcher.

### **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, then 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 then scored for inclusion of the 61 idea units by a further research assistant who was blind to the centrality hypothesis. Participants were credited for recalling a given idea if the idea was represented verbatim or the gist was evident in synonymous language. This provided a binary value, indicating the presence or absence of

each unit idea. The first researchers 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 included in Appendix F.

### **Transcript Scoring**

From the transcribed stories, the mean narratives length (in words) and the mean length of utterances were computed, in order to address research question one, which explores the influence of character, narrative theme, and age group on these quantitative indices of narrative recall. 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 5.1.

Proportional scores were computed in line with previous studies (Miller et al., 2013; Miller & Keenan, 2009). The number of story idea units expressed in each retell was counted and used to compute a total proportional score of those received in the original 61 story-unit narrative. Similarly, the numbers of central and peripheral ideas in each retell were counted and proportional scores computed, as determined by the norming study (see Table 5.1). For example, a retell following a *sharing story* with 16 central ideas and 10 peripheral ideas would result 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) respectively.

### ***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 (which is used when two or more factors may be correlated). The analysis included both the Children’s Title Checklist (CTC) and Children’s Author Checklist (CAC) scores. In addition, scores related to the frequencies of book reading (shared and alone) and number of books in the home were included. Two separate factors emerged. The first related to objective

measures of print exposure (CTC score, CAC score, and the number of children's books in the home) and explained 47% of the variance. The second related parental reports of reading frequencies (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 G. The factor scores, labelled print exposure, and reading frequency were used in the main analyses.

### 5.3 Results

#### Descriptive statistics

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

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

Chi-square analysis strongly supported an age effect on the likelihood that parents reported anthropomorphic content in their children's favourite books,  $\chi^2(3, N = 169) = 15.35$ ,  $p = .002$  and film/TV viewing,  $\chi^2(3, N = 169) = 28.49$ ,  $p < .001$ . The reported preferences for anthropomorphic content decreased with increasing age group in both media. There was no significant effect of gender on the likelihood that favorite media contained anthropomorphic content: books  $\chi^2(1, N = 169) = .04$ ,  $p = .85$  and 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 5.2.

Correlations between child related characteristics and outcome variables are reported in Table 5.3. Receptive vocabulary ability score (BPVS-3 standardized score, which provides an ability score after adjustment for chronological age), was associated with higher syntactic complexity (as indicated by mean length of utterance) and greater total proportions and central proportions of the original stories in retells. There were small positive correlations between the print exposure score (home literacy environment) and the syntactic complexity and total and peripheral proportions of the original stories at retell, but no significant relationship with centrality. However, print exposure score correlated moderately with BPVS-3 (standardized), which informed our decision to include only BPVS-3 standardized score as a covariate in subsequent analyses.

**Table 5.2***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
BPVS3 (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
BPVS3 (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 5.3***Pearson's Correlations Between Child and Environmental Characteristics and Outcome Variables*

Variable	1	2	3	4	5	6	7	8
1 BPVS-3 (standardized)								
2 BPVS-3 (raw)	.446**							
3 Print exposure	.340**	.265**						
4 Reading frequency	.222**	.084	.287**					
5 Retell length	.128	.555**	.095	.056				
6 Mean length utterances	.160*	.640**	.170*	.105	.796**			
7 Total proportion	.268**	.655**	.178*	.095	.857**	.760**		
8 Central proportion	.179*	.558**	.146	.122	.755**	.715**	.858**	
9 Peripheral proportion	.275**	.551**	.158*	.035	.688**	.564**	.831**	.427**

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

\*  $p < .05$ .

\*\*  $p < .01$ .

We collapsed the data across gender and school location as preliminary analyses by a set of ANOVAs indicated no significant relationships between any of the outcome variables (*narrative length, mean length of utterance, proportion of original story, proportion of central story ideas, and proportion of peripheral ideas* in retells) and either gender of participant (all  $ps > .05$ ), or school location (all  $ps > .05$ ). Similarly, preliminary tests for equivalence between experimental groups (four storybook conditions) were conducted by ANOVA with BPVS3 (standardized) score, and parental scores for Child Title Checklist and Child Author Checklist, as outcome variables. Tests indicated no significant differences ( $ps > .05$ ) between any child related measure and the group to which participants had been allocated.

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

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

### **Narrative Length and Mean Length of Utterance**

To examine the influence of our storybook and age group variables on narrative length and mean length of utterances, 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 and BPVS-3 (standardized) entered as a covariate. The results are reported in Table 5.4a.

For both narrative length and mean length of utterance, BPVS-3 (standardized) score was included as a covariate, as it significantly adjusted the association between the predictor variables and outcome variables. On average, as expected from previous research, older

children produced longer retells and longer utterances (MLU) than younger children (see Table 5.4). Post hoc tests of multiple comparisons (Bonferroni) are reported in Table 5.5. There was a significant interaction between story theme and age group on narrative length. Simple main effects analysis showed that the retells from Year 1 children's sharing stories were significantly longer than their busy stories,  $F(1,154) = 7.23, p = .008$ , partial  $\eta^2 = .05$  (see Table 5.6). There was a significant effect of narrative theme on mean length of utterance (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,  $SE = 0.15$ ).

**Table 5.4a***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 5.4b***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>	$\eta_p^2$
<b>Predictor</b>								
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
<b>Within participants</b>								
<b>Predictor</b>								
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 5.5***Post Hoc Tests Comparisons for Age Adjacent 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 5.6***Simple Main Effect of Theme by Age Group on Narrative Length and Centrality*

Age Group	Narrative length			Centrality		
	<i>F</i> (1,154)	<i>p</i>	$\eta_p^2$	<i>F</i> (1,154)	<i>p</i>	$\eta_p^2$
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

### Proportional Data

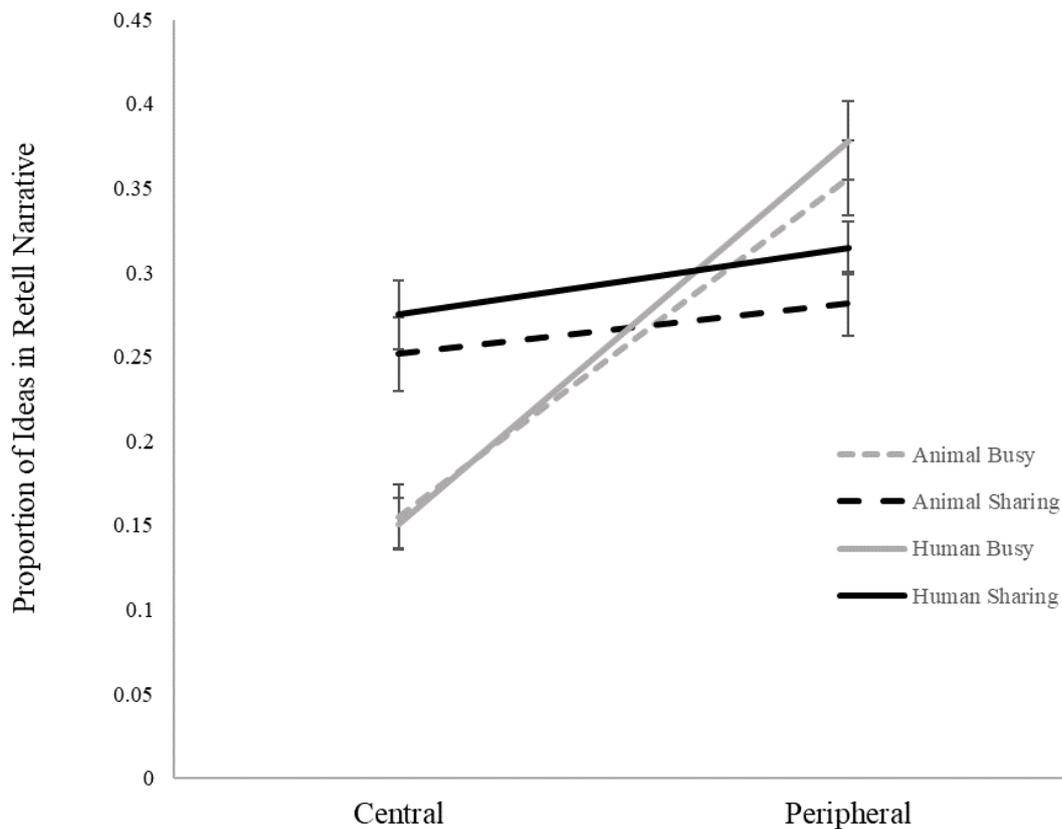
To address the main research question concerning centrality, we used a mixed design ANCOVA<sup>3</sup> with character (animal, human), theme (busy, sharing) and age group (4 age groups; 3-, 4-, 5- and 6-year-olds) as between subject factors, and centrality of story unit recalled (central, peripheral) as a repeated-measures factor to assess the effect of these variables on the total proportion of story recalled. BPVS-3 score was entered as the covariate as this measure significantly adjusted the association between the predictor variables and outcome variables. The full results of the ANCOVA are reported in Table 5.4b. There was a significant interaction between centrality and theme,  $F(1,154) = 93.47, p < .001, \eta_p^2 = .38$ . This interaction indicates that central ideas made up a greater proportion of the story ideas (i.e., at the expense of peripheral ideas) in retells following a sharing story, in comparison with retells following a busy story, as shown in Figure 5.1.

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<sup>3</sup> Arcsine transformations for proportional data were considered (Lin & Xu, 2020). However, log transformations are problematic for data that contains zero counts (K. 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.

**Figure 5.1**

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



As predicted, there was a main effect of age group on proportion of story units in retells,  $F(3,154) = 41.81$ ,  $p < .001$ ,  $\eta_p^2 = .45$ , with older children including a higher proportion of story units than younger children. Post hoc comparisons are reported in Table 5.5. We observed a significant interaction between age group and theme,  $F(3,154) = 4.24$ ,  $p = .007$ ,  $\eta_p^2 = .08$ . Simple main effects analysis showed that the retells from Year 1 children (5-year-olds) who had been presented with sharing stories had significantly greater centrality than those produced by children who had been presented with busy stories,  $F(1,154) = 12.43$ ,  $p = .001$ , partial  $\eta^2 = .08$  (see Table 5.6). Character was noted as approaching significance,  $F(1,154) = 3.33$ ,  $p = .07$ ,  $\eta_p^2 = .02$ .

To examine the factors that influenced the proportion of central story units included in their retells, we ran a 3-way ANCOVA with Character (animal/human) x Theme (busy/sharing) x Age Group (4 levels; 3-, 4-, 5- and 6-year-olds) as variables and BPVS-3 (standardized) entered as a covariate. 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 in retells than younger children. (Post hoc comparisons are reported in Table 5.5). There was a 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,  $SE = 0.01$ ).

#### 5.4 Discussion

Retell is widely used as an indication 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, the present study employed a retell task to explore the influences of character realism and narrative theme on both quantitative and qualitative indices of productions. These indices provided a proxy measure of 3- to 7-year-old children's 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, complexity, and focus on inclusion of story units, and increasing centrality. 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 the linguistic features we examined. However, story theme was a significant influence on mean length of utterance (a measure of syntactic

complexity) and on central story units, with sharing stories provoking greater syntactic complexity and greater proportions of central story units in retells than busy stories. Whilst on average, a sharing theme did not produce longer retells, an interaction of theme with age group was observed: 5-year-olds produced longer retells that included higher proportions of story units following sharing stories, compared with retells following 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**

It was important to establish that our methodology was sufficiently sensitive to detect age related differences in children's retells. As predicted, we found 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 those in younger age groups, which suggests an increased organisation and comprehension of key ideas from stories with increasing age. Our findings correspond with expected developmental trends of general increases in the quantity and complexity of language included in children's retells following stories over this age range (e.g., Lynch et al., 2008a; Westerveld & Gillon, 2010; Westerveld & Vidler, 2015). Post hoc analyses suggested no significant change in retell lengths, syntactic complexity, or total or central proportions between children in the part-time nursery classes (3-year-olds) and those in their first year of full-time education (4-year-olds). However, significant progression in these indices of story memory and understanding were observed between each of the age groups in full-time education. It is conceivable that the change from part-time play-based provision to formal full-time schooling of pupils in our sample, which includes explicit reading and comprehension instruction in the UK, had an additional influence on the progression observed between the older three age groups.

### **Character Realism and Retells**

A primary aim of this study 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 were interested in whether animal characters were associated with measurable indications of differences in narrative retrieval or connections between salient story ideas, relative to human protagonists. We found no evidence to support an influence of story character realism on children's retells. This suggests that animal characters are not necessarily an impediment to children constructing coherent representations of stories.

Children's abilities to enter the anthropomorphised story world may be facilitated by regular exposure to the genre. Almost 80% of returned parental questionnaire responses for our sample listed anthropomorphised content in children's favourite books or films or TV shows. 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 & 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 additionally explored the influence of story theme on children's retells, using a prosocial sharing story and a busy story of comparable length and linguistic complexity. Retells following sharing and busy themed were not significantly different in 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, and inclusion of central story units (at the expense of peripheral content), was greater in response to a sharing theme than a busy theme. This finding led us to consider whether the illustrations may have better supported the sharing theme, over the busy theme. To assess this, we recruited 15 adults, naïve to the research questions, and asked them 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. Additionally, the Coh-Metrix comparison had indicated equivalent lexical complexity of the central story units in each book. Therefore, neither the illustrations, nor lexicality of the central story units were likely to have caused the observed differences in response between sharing and busy stories. Our post-hoc exploration instead support us to conclude 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; Stothard & Hulme, 1991). 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 was 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 previous research that demonstrated earlier comprehension of moral theme than prudential theme in stories by 10-year-old children (Narvaez et al., 2010). Future work is suggested. First, exploring children's retention of story units from a wider variety of prosocial narratives, using control stories with matched valence is needed. Second, research that compares young children's 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.

We found an interesting interaction between age group and story theme. In our sample, Year 1 children's (5-year-olds) retells with the sharing theme were significantly longer and contained greater proportions of the original story units than those with the busy theme. 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 5- to 6-year-olds may reflect a step change in attention to such reasoning.

### **Centrality in Retells**

Our findings provide critical information that highlights new avenues of research to extend our understanding of centrality across development. 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 the retells from our 3- to 7-year-old sample. 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. Furthermore, in the present study, children's retells were supported by wordless picture books, which will have provided

significant scaffolding, and is likely to have elicited picture description, rather than fully accessing the situation models we had aimed to explore. However, our method was sensitive to detect differences in proportions of central story units in response 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 and a potential area for future work.

### **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, testing young children could additionally sample matched-aged children's ideas about the meaning of the stories used, as this commonly differs to the message intended by the adults (Mares & Acosta, 2008; Narvaez, 2002; Narvaez et al., 1999; Walker & Lombrozo, 2017). Further, exploration of children's salience ratings of story units, and analyses of frequency of story unit inclusion may offer converging evidence, and provide added insight into children's attention towards specific aspects of story

Future empirical work with diverse populations is needed to establish the reproducibility of our findings, as 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). This was a single study and our sample comprised mainly monolingual children, from low to middle SES backgrounds.

### **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 in 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.

We did not find evidence to support animal characters as an impediment to coherent representations of stories, at least character realism was not significantly influential on measures of retell length, syntactic complexity, or centrality. Previously found disparities in 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. 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.

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**CHAPTER 6: The Influence of Story Character Realism and Theme  
on Protagonists' Internal States and Dialogue in Children's Retells.**

Text submitted to *Cognitive Development* (currently in peer review)

*Note.* Spellings are American English, as required by journal.

### **Abstract**

Anthropomorphized animals are a prevalent character type in children's books. However, stories with fantastical protagonists are associated with poorer social learning than those with human protagonists. We explored whether children's representations of characters' internal states and dialogue in their retells of stories were related to story character realism (anthropomorphized animal or human), story theme (sharing or busyness), age, and vocabulary. Children 3-7 years ( $N = 171$ ) listened to one of four versions of an illustrated storybook that manipulated character realism and theme. There were clear developmental trends: Older children included more internal state references and dialogue in their retells than younger children. A key finding was that children who retold a prosocial story with a human protagonists included significantly more socio-relational language than those retelling the same story featuring animals. These findings imply that realistic protagonists may elicit more robust representations of social ideas in the minds of young children.

### 6.1 Introduction

Stories are commonly defined as causally linked events, which may be true or imaginary, presented in temporal sequences (e.g., Graesser et al., 1980). The reader or listener must interpret and encode the unfolding action, draw accurate inferences from significant elements, and form coherent connections between the events described (Lynch et al., 2008). However, even stories created specifically for very young children usually extend beyond basic episodic accounts, providing descriptions of the internal states that motivate and explain characters' actions and reactions. Consequently, stories have the potential to offer vicarious observation and exploration of others' internal states by those who read or hear them. Aspects of characters' ideas, beliefs, emotions, thoughts, moral decision processes, and perceived personal consequences are frequently included; thus, stories are not only eventful, but also psychologically rich. The current study sought to explore children's constructions of the internal world of characters by examining retells of stories that varied by character realism and the presence or absence of a prosocial theme.

When a child (or adult) listens to a story, they construct a meaning-based representation, or situation model, of the state of affairs described (Johnson-Laird, 1983). An event-indexing model, theorizes five key dimensions to these mental representations: Space, time, causality, protagonists, and intentionality (Zwaan, Langston, et al., 1995; Zwaan, Magliano, et al., 1995; Zwaan & Radvansky, 1998). Other lines of research similarly indicate that story comprehension entails the integration of both the action, for example the plotline and characters' behavior, and the inner world or consciousness of characters (Bruner, 1986; Pelletier & Astington, 2004). Clearly, understanding story characters and their internal states, which drive intentionality and action, are important dimensions for achieving a coherent understanding of the meaning of all, but the most basic of, storylines. However, understanding the internal motivations, goals and related behavior of story characters requires

reference to internal state concepts, which are emerging in young children. Two-year-olds begin verbalizing their own goals and desires (e.g., ‘I want’) and typically progress during the following year to extend their self-referential terms to include ‘know’ and ‘think’ (Bartsch & Wellman, 1995). Two-year-olds also demonstrate an understanding of others’ mental states and, incrementally, over the pre-school period children develop a grasp of the desires, beliefs, emotions of those with whom they interact (for a comprehensive review see Wellman & Liu, 2004). By 4 years, children begin to show explicit appreciation of the consequences of others’ thoughts and beliefs upon their subsequent actions (which supports competences assessed by classic false-belief tasks, e.g., Wellman et al., 2001).

This development in social understanding, often referred to as Theory of Mind (ToM), facilitates the capacity to understand, create and retell increasingly complex and psychologically rich stories, and develops with age (Aldrich et al., 2011; Longobardi et al., 2014; Pinto et al., 2016; Tarchi et al., 2019). In tandem with children’s developing mentalistic competencies, a shift is observed from the action-based oral narratives typically produced by 3-year-olds towards greater inclusion of character consciousness, belief, thought and intention in the stories articulated by 5-year-olds (Nicolopoulou & Richner, 2007). Indeed, ToM skill proficiency is related to the degree to which mental state words are used in 5- to 7-year-olds’ talk about picture books with a parent (Symons et al., 2005), and to 10-year-olds’ use of mental state terms in their recall of the content of both narrative and expository passages (Y.-S. Kim et al., 2021).

Whilst stories can be considered as simulated models of the social world (Mar & Oatley, 2008), many of the picture books aimed at young children depict fantasy characters. A particularly prevalent character type is an anthropomorphized animal. Whilst these animals retain many realistic physical characteristics of their species (they look like rabbits or bears, for example), they are afforded human-like thoughts, feelings, intentions, and behaviors. To

fully understand the meaning of an anthropomorphized story, the young listener must apply their social understanding, acquired within interpersonal exchanges between themselves and other people, to agents (e.g., rabbits or bears) that in real life never speak or concern themselves with most of the human matters presented in these tales.

The additional level of abstraction provided by an anthropomorphized story may contribute to findings that suggest that certain outcomes are poorer after exposure to fiction that depicts fantasy characters compared to humans. For example, following a tale with fantasy characters, young children's story comprehension, prosocial learning, and their ability to transfer solutions from fiction to real world problems is poorer than when following a story with human characters (Kotaman & Balçı, 2017, 2019; Larsen et al., 2017; Richert et al., 2009). Children are able to differentiate between real and fantastical characters with increasing accuracy from 3 years of age (Corriveau & Harris, 2015; Sharon & Woolley, 2004). Notably, when children's expectations about story character behaviors are assessed with a categorization task, many appear to expect animal, rather than human, behavior from anthropomorphic animal protagonists (Larsen et al., 2017). For example, in Larsen et al.'s study, children were asked to determine whether an anthropomorphized character might eat with a spoon or simply with their mouth. On average, only those children who imagined animal characters as capable of more human behavior (e.g., using utensils to eat) were prosocial in response to an animal story about sharing. In a related line of research, when young children's beliefs were examined in a picture task, children indicated anthropomorphized animal characters to have very similar internal state capacities (e.g., thoughts and feelings) to those of real animals, and significantly lower capacities to those of humans (Russell & Cain, 2020). It is conceivable, therefore, that when listening to stories that involve animal rather than human characters, young children find imagining internal states for, and interpreting the behavior of, such protagonists more difficult.

However, the ubiquitous exposure to anthropomorphized media from infancy may enable children to suspend their real-world understanding and enter into the fantasy worlds presented in books and on screen. The situation models they construct may include internal states regardless of the ‘reality’ of the protagonists. A proposed explanation for the poorer outcomes following fantasy stories in comparison with more realistic versions (as outlined above) is that the unrealistic elements of the story signal to the listener that much of the information inside of the fantastical context potentially needs to be ‘quarantined’ within, that is applied only to that story context and not be generalized to the real world (see Hopkins & Weisberg, 2017; Richert & Smith, 2011; Walker et al., 2015). Thus, ‘over-quarantining’ may explain the poorer transfer of solutions (Richert et al., 2009) and the lack of prompting of prosocial behavior (Larsen et al., 2017) following stories with greater fantasy content.

Nevertheless, the evidence suggests that factors additional to quarantining of information may be at play. One study found that young children’s immediate memory for the events and plots in the same story was lower for those with unrealistic (animal) than for realistic (human) characters (Kotaman & Balci, 2017). The researchers repeated their experimental paradigm with a new sample (Kotaman & Balci, 2019). In this second study, they found no significant differences between animal and human characters in their comprehension measures immediately after story presentation. However, a superior memory for the reasons motivating events for stories with realistic characters, in contrast to animal characters, was evident when children were tested one week later. Together, these studies indicate superior memory and understanding for stories with real characters, which is not easily explained by a lack of generalization due to ‘quarantining’.

The current study aimed to explore the content and quality of children’s retells after hearing a story told from a picture book, with a specific focus on the inner world of characters as a key element of children’s representation and comprehension of the story. The

inclusion of internal state terms in their retells, which can include both recall of internal state references (those recalled from the presented story) and internal state inferences (those additional to those in the original story), offer a window into children's constructions of the inner worlds of story characters.

Previous studies have explored developmental patterns in children's use of mental and emotional state terms in their narratives, for example in conversation (e.g., Bretherton & Beeghly, 1982; Ruffman et al., 2002) and in story creation tasks (Aldrich et al., 2011; Longobardi et al., 2014; Pinto et al., 2016, 2017; Ukrainetz et al., 2005). Children's storytelling and conversations include internal state terms with increasing frequency with increasing age (Tarchi et al., 2019; Ukrainetz et al., 2005). However, few studies have explored the inclusion of mental state terms in retells. Whilst Kim et al. (2021) investigated the mental state talk included in retells of short narrative texts from the Test of Narrative Language, their design focused on one school year group (10 year-olds). Our preliminary goal therefore was to validate our coding scheme by examining 3- to 7-year-old children's retells for age related progression in the use of internal state terms.

Related to internal states, character speech has been examined in previous research as an evaluation of character perspective (Ukrainetz et al., 2005). Utterances can be social tools, used within narratives to indicate character intentions, thought, feelings or belief, or to signal internal responses, such as an agreement, emotional reaction or counter-goals. Moreover, speech is a communicative device specific to humans, rather than animals. Children's use of dialogue as a device in storytelling has been previously examined in relation to age, where increased presence and frequency of character speech has been observed in stories told by 7- to 9-year-olds, in comparison with those told by 5- to 6-year-olds (Ukrainetz et al., 2005). We were therefore interested in exploring an influence of animal versus human protagonist on character speech, as an additional evaluation of character perspective.

We are not aware of any previous experimental work that examines the influence of character realism (human/animal) on the internal states and speech imagined for characters in children's retellings of fictional stories. The current study sought to explore whether anthropomorphic animals are associated with fewer references to internal state terms in retells, which we might predict given that children believe these character types to have less capacity for thought and feeling relative to human beings (Russell & Cain, 2020). An additional aim was to explore the use of dialogue in stories that varied by character realism, as speech is related to internal states and is, moreover, a distinctive human characteristic. Fewer references to character internal states in retells may relate to the poorer transfer of learning from anthropomorphized stories relative to human versions noted in the literature (Kotaman & Balci, 2017, 2019; Larsen et al., 2017).

Related research, however, suggests that even very young children accept animal characters as substitutes for humans. Parent-child (3- to 5-year-old) dyads were given the task of co-creating stories using picture prompts (Carrick & Richmond, 2021). The illustrations provided as initial stimuli varied by emotional valence and by character realism. The researchers observed that participants attributed human behaviors to the character, no matter whether the illustration was human or anthropomorphized (clothed) animal and did so without hesitation or discussion. Given that this type of fantasy character is ubiquitous across TV programs, movies and books aimed at the North American children from which the sample was drawn, it is perhaps unsurprising to find that anthropomorphized animals were so readily substituted. The stories created by the dyads were similar in construction, with equally developed and detailed story lines. However, whilst the stories included similar emotional themes across the fantasy/reality genres, when coded for emotional intensity on a 4-point scale, a higher score for a 'frightening tone' was found in stories that were prompted by a picture of a scared child, compared with those in response to an illustration of a scared

bear. This may have been an artefact caused by differences between the pictures used, or it may suggest a reduced imagined emotional connection when relating to stories which involve animal characters.

To test this further, we examined children's retell of stories that an adult had read aloud to them. We used a retell paradigm to explore the processes that may underlie previous experimental observations of children's poorer comprehension, prosocial and problem-solving responses to anthropomorphized stories they had heard, as outlined above (e.g., Kotaman & Balci, 2017a; Larsen et al., 2017). A study conducted by Kim et al. (2021) similarly considered 10-year-olds inclusion of mental state terms in retells of aurally presented narrative compared to expository texts. They differentiated between mental state references (mental state words recalled from the original text) and mental state inferences (additional mental state terms, not in the presented narrative). We similarly examined mental state terms (references and inferences together). Children include both verbatim and gist memories of presented language (e.g., Schönplflug, 2008), so differentiation between vocabulary that is gist and inference in retells can be problematic. Our main aim was to explore children's retells for differential use of internal state language in response to character realism or story theme. For completeness, an additional exploration of the mental state inferences (i.e., terms outwith those included in the original story) that children used in retells can be found in Appendix H

Kim et al. (2021) also found that the number of references to mental states varied significantly between the retells of stories of different themes. Unexpectedly, they found that the story which elicited the greatest number of both references and inferences was not the story with the most mental state terms within the original text. This suggests an influence of story theme on the encoding of characters' internal states in children's situation models. Additionally, previous research has examined the influence of moral messages in TV

programs on perspective taking by 4- to 6-year-olds; increased perspective taking was found post-viewing when a moral, rather than neutral, theme was presented (Cingel & Krcmar, 2019). Consequently, we were interested in whether picture books with a prosocial theme (sharing) would have a similar positive influence on perspective taking, that could be measured in retells. We used two similar stories; both had a social theme, which involved a main character who wanted to be included in a party. The theme of one story was strongly prosocial and incorporated a moral lesson concerning sharing resources. The other story was closely matched for length and syntax and was supported by identical pictures, but key words had been substituted in the narrative to provide a ‘busy’ (rather than prosocial) theme. We sought to explore whether these (subtle) differences in story theme might influence the internal state language used by children at retell, in addition to our primary goal of examining the influence of character realism (human/animal) on young children’s use of internal states, which is previously unexamined.

### **The current study**

The purpose of this study was to examine young children’s retellings of stories that varied by *character* realism (animal/human) and story *theme* (busy/sharing). These retellings were collected as part of a larger experimental study which separately examined 3- to 7-year old children’s prosocial responses to the same stories (see Russell & Cain, 2022). The age-range was selected to encompass a comprehensive sample of young children, towards whom anthropomorphized moral stories are targeted. Our research questions for analyses in this study, address the influences of story and child characteristics on the presence and frequencies of *internal states* and *dialogues* attributed to characters in the retells.

We coded the *internal state* terms and *dialogue* form used by children in retells into broad categories, as has been developed in previous research (e.g., Bretherton & Beeghly, 1982; Pinto et al., 2017; Ukrainetz et al., 2005). This enabled an exploration of children’s

development in use of each of the categories of internal state terms (e.g., terms relating to character emotion, separately from those relating to cognition) and ways of expressing character dialogue (see below) in relation to the story theme and character.

Our preliminary research aim was to examine retells for age-related change in children's use of internal state terms and character dialogue to validate our coding scheme. We predict a main effect for *age*, with older children using more *internal state* terms (Aldrich et al., 2011; Tarchi et al., 2019) and more character *dialogue* (Ukrainetz et al., 2005) during story retelling than younger children.

Following this initial inspection of developmental change, our central aim was to examine the influences of *character* and *theme* on retells. We predicted a main effect of *character* on internal states and dialogue in retells; specifically, we expected greater reference to internal states and more dialogue for the retells of stories featuring human characters compared to those with animal characters. This is consistent with research, which found that young children imagine more capacity for internal states in humans than in anthropomorphized animals (Russell & Cain, 2020). Therefore, their situation models may include a greater representation of internal states for humans, relative to animals. Dialogue as a human trait, may occur more frequently in retells when congruous with a human story character. In line with the research by Cingel & Krcmar (2019), we also predicted a main effect of theme. Specifically, we expected to observe more internal state terms, primarily those terms in the socio-relational category, in the retells of stories that had the prosocial theme compared to the story without the prosocial theme. This is because children's retells about sharing will contain socio-relational terms that are directly related to prosocial concepts that are absent in the busy story. Whilst prosocial theme was predicted to influence the use of socio-relational language in retell, we predict no significant influence of story theme on the presence or frequency of dialogue. This is because, both story themes act similarly as the

motivation for the identical action in the two stories (i.e., the characters plan a party, which the main protagonist wishes to attend); thus, both provide similar impetus for dialogue around characters' plans and decision-making processes. To detect whether any effect of theme was general, or driven by character type, we explored the interaction between character and theme. Moral stories may offer a markedly salient context for human internal states representation, as ethical choices are a predominantly human, rather than animal, trait. Therefore, we predicted that the retells of stories that had both a prosocial theme and human characters would include the highest frequencies of *internal state references*. We did not predict a significant additional influence of theme and character interaction on frequencies of *dialogue* in retells.

General language abilities also influence on children's use of internal state terms (Aldrich & Brooks, 2017) and theory of mind development (see Milligan et al., 2007). Therefore, measures of participants' receptive vocabulary and capacity to imagine internal states for humans and animal characters were included in the current study. We predicted a positive relationship between age-adjusted receptive vocabulary and use of internal state terms and character dialogue in retells. Children's capacity to imagine internal states was assessed with a rating task using an instrument designed to assess children's thinking around internal state capacities for human and anthropomorphized animal characters (see Russell & Cain, 2020). In previous work we found that children who rated humans highly on the picture scale, were more prosocial in a post-story sharing task across experimental conditions (Russell & Cain, 2022). This suggested that responses to the human items on this scale indicated a general perspective taking capacity in children. This finding is in line with previous research, determining that perspective taking is predictive of prosocial behavior (e.g., Cigala et al., 2015; Eggum et al., 2011; Paulus & Moore, 2017; Yu et al., 2016). We therefore predict a positive association between human scores on our rating scale (as a

measure of general perspective taking capacity) and the inclusion of internal state terms in retells. Additionally, a child's internal states ratings for animal characters may relate to their use of internal state terms for such characters at retell. Therefore, we predicted that those who rated internal states for anthropomorphic characters more highly will make more internal state references in their retellings of animal stories, compared with those who gave anthropomorphic characters lower ratings.

## 6.2 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 North-West of England and tested as part of a larger study concerning responses to anthropomorphized content in stories. With permission from the schools, information and consent forms were sent home for parents to review, complete, and return. Children whose parents gave informed consent then provided verbal assent. Children in each year group were randomly assigned to one of the four picture books. Retell data from eight additional children from the wider study were not available due to audio equipment failure ( $N=7$ ) or participant unwillingness to retell the story ( $N=1$ ). We also excluded the data from participants with receptive vocabulary scores that were more than one standard deviation below the mean ( $N=5$ ), to exclude those with scores below the lower end of the range for their age group who may be at-risk of language impairment (ICD-10; World Health Organization, 1993).

The English state schooling system begins with an Early Years Foundation Stage (EYFS); children typically start in the nursery class at 3 years of age, followed by a full-time 'Reception' year beginning early in the September following their 4<sup>th</sup> birthday. Children then enter Key Stage 1 (KS1) for two years. Thus, our sample comprises participants from the full

age range in early state education in England, with all children receiving learning related to the Early Years Foundation Stage Statutory Framework (EYFS) or English National Curriculum (KS1). The study was approved by the Faculty of Science and Technology Ethics Committee (FSTREC; Lancaster University, UK).

## **Materials**

### ***Story books***

Book stimuli were developed to enable the simultaneous data collection to examine several different research questions (see Russell & Cain, 2020; Russell & Cain, 2022). Four book versions were designed. Two anthropomorphized books were created, using the illustrations in a published book called *Little Raccoon Learns to Share* (Packard, 2013). One book related a story with a sharing theme, similar to the original book, but adjusted so that key words could be changed to create a second ‘parallel’ book about ‘being busy’. The latter theme fitted the pictures but completely changed the meaning of the story. These books are referred to as the *Animal Sharing* and *Animal Busy* books.

Two books with human characters were created using the illustrations altered by Larsen et al. (2017) for their study; the animal characters in the pictures from *Little Raccoon Learns to Share* had been carefully replaced with drawings of human protagonists. These books contained identical narratives to those in the anthropomorphized stories, modified only for specific references to characters, so that, ‘Little Raccoon’ in the anthropomorphized stories became ‘Little Rachel’ in the human versions. These books are referred to as the *Human Sharing* 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.

### ***Anthropomorphic Picture Scale***

An adaptation of the Individual Differences in Anthropomorphism Questionnaire-Children Form (IDAQ-CF; Severson & Lemm, 2016) was administered (see Russell & Cain, 2020, for full details). The extent to which children attributed thoughts, feelings, self-knowledge or agency to examples of human, animal and anthropomorphized characters was assessed. Two participant scores, a human score and an anthropomorphic score, were calculated by averaging responses across the human and anthropomorphic items respectively (see Severson & Woodard, 2018). Mean scores for each subscale ranged from 0 (no endorsement of internal state) to 3 (full endorsement of internal states). Intentionality item responses loaded onto a separate factor and were excluded from the subscale mean scores (see Russell and Cain, 2020, for a discussion of this finding).

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

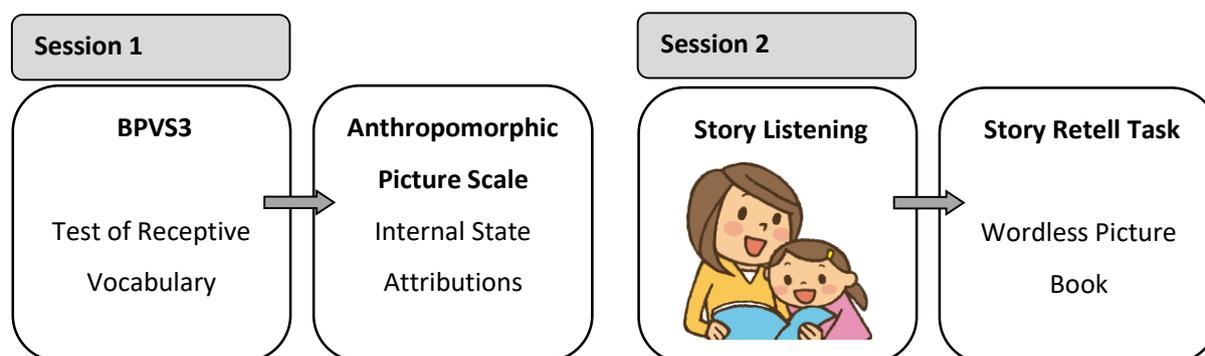
The British Picture Vocabulary Scale: Third Edition (BPVS3; Dunn et al., 2009) was administered and scored according to the manual guidelines. Standardized scores were used to exclude participants with weak language skills (more than 1 SD below the mean; included range 85-125). The standardized scores were used in subsequent analyses.

### **Procedure**

Children were assessed in their schools in two 20-minute sessions (see Figure 6.1).

**Figure 6.1**

*Overview of the Assessment Procedure for Children*



In the first session, the BPVS3 and the anthropomorphic picture scale were administered. In the second session, children listened to one of four versions of a story. They were asked to listen carefully and told they would have the opportunity to retell the story afterwards. The researcher read the scripted story straight through. 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 concerning prosocial behavior were also carried out (see Russell & Cain, 2022). At the end of testing, the children were debriefed in class by the researcher.

### **Recall Transcription**

The 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, then independently checked and parsed 20 randomly selected transcripts. Reliability was excellent: transcription accuracy (98.8%) and division into utterances (96.5%). Any disagreement was resolved by discussion. The number of utterances was computed for each retell.

### **Coding Systems and Reliability**

An additional trained research assistant, blind to the experimental hypotheses, scored the majority of the retells (74%) for the inclusion of expressions referring to character internal states, using an adaptation of a method developed by Bretherton and Beeghly (1982)

and modified by Pinto et al. (2017). Accordingly, internal states were coded into 6 broad categories: emotional, volitional (intentional), cognitive, perceptual, physiological, and socio-relational. Perceptual and physiological categories were collapsed together (as set out in Pinto et al., 2017), as very few physiological references were included in the retells. The assistant also scored the transcripts for character dialogue, using a method similar to that described in Ukrainetz et al. (2005). Thus, character speech was coded into three categories: semantically marked speech, using words such as ‘said’; unmarked (implicit) speech, often signaled by the child’s shift from narrator to first person character ‘voice’; and reported (indirect) speech which retains the narrator role to convey the gist of the character’s speech. A full description of the system used to score the transcripts is available in Appendix I and a summary and examples are provided in Table 6.1.

The primary researcher independently coded the remaining transcripts (which had been used in research assistant training). Additionally, the first researcher independently coded 35 of scripts scored by the assistant (20%) to provide inter-rater reliability.

Krippendorff (2004) scores demonstrated good to excellent reliability in all categories: emotion = .88; volitional = .98; cognitive = .99; perceptual and physiological = .93; socio-relational = .77; semantic speech = 1.00; implied speech = 1.0; and indirect speech = .93.

### **Analysis Strategy**

Descriptive statistics were calculated using SPSS version 27 and used to characterize the sample. As the dependent variable provides count data (number of internal state terms and incidences of dialogue), a number of suitable count distributions were considered using the software package R (R Core Team, 2019). Initial analyses indicated positively skewed data and a non-normal distribution, confirmed by Shapiro-Wilks tests indicating significant departures for normality for each outcome variable under test ( $ps < .001$ ). Inspection of models suggested overdispersion, with dispersion parameters that violated the assumptions of

Poisson modelling (where the dispersion parameter is fixed at one). This informed our decision to use negative binomial regression models in the planned analyses, to provide a more conservative estimate of p-values (see Atkins & Gallop, 2007).

A priori power analysis indicated a required sample of 160 participants to detect a significant medium effect in regression analyses with up to eight predictor variables, power of .95, and an alpha of .05.

**Table 6.1***Coding System for Character Internal State Words and Dialogue Used in Retells*

Internal state category	Description	Examples of terms	Examples from transcript (key words in <b>bold</b> )
Emotional	Feelings and emotional states	Sad	And then he walked away <b>sad</b> [110]
Volitional	Intentions towards goals	Favorite Want Decided	Her <b>favorite</b> word was ‘mine’ [2] And she didn’t <b>want</b> to sit down and share them [112] So, she <b>decided</b> to share again [42]
Cognitive	Relating to thought processes	Thinks Learned	She <b>thinks</b> it’s alright to go first [42] And then she <b>learned</b> how to share [7]
Perceptual	Conscious awareness of the world	See	But, because he didn’t <b>see</b> her he didn’t invite her [142]
Physiological	Bodily sensations	Tired, Feeling (haptic)	And they got a bit <b>tired</b> doing it [1] Then he had a <b>bad feeling</b> in his head [40]
Socio-relational	Moral and relational perspectives	Have to Selfish	Then she didn’t <b>have to</b> share [156] she was a little bit <b>selfish</b> [169]
Dialogue category			
Semantically marked	Dialogue marked with terms indicating speech	Said	And the bear <b>said</b> , ‘I’ll bring some honey to eat’ [151]
Unmarked (implicit)	Evident dialogue, but without a marker (narrator to first person perspective)	N/A	‘I will bring some honey’ [123]
Reported (indirect)	Speech indicated within the narration	Told Said that	And then she <b>told</b> her mum about the party [11] One of them <b>said that</b> he had caught lots of fish [38]

*Note.* Numbers in square brackets indicate transcript number

### 6.3 Results

#### Descriptive Statistics

Table 6.2 provides a summary of variable means, standard deviations, ranges and correlations for predictor variables. The mean length of retells in T-units for each age group is reported in Table 6.3. Preliminary analyses suggested that length of T-unit was not significantly related to the school location from where the data were collected ( $F(5,165) = 0.40, p = .846$ ), or gender of participant ( $F(1,169) = 0.01, p = .942$ ). A one-way analysis of variance (ANOVA), with age group as a categorical variable and length of retell in T-units as a dependent variable, was significant:  $F(3, 167) = 13.33, p < .001$ . Tukey's HSD Test for multiple comparisons found that whilst there was no significant change in length of retell between the 3 youngest age groups, the increase in mean length of retell between each of these groups and the 6- to 7-year-olds was significant (3- to 4-year-olds,  $p < .001$ ; 4- to 5-year-olds,  $p < .001$ ; 5- to 6-year-olds,  $p = .002$ ).

**Table 6.2***Means, Standard Deviations, Ranges and Pearson's Correlations for Predictor Variables*

Predictor Variable	M	SD	Min	Max	1	2	3	4	5	6
1. Age in months	67.2	13.87	38	91						
2. BPVS3 raw score	84.34	19.69	30	130	.832**					
3. BPVS3 standardized score	103.18	9.43	85	125	-.093	.446**				
4. Picture scale score: Human	2.73	0.45	0.67	3	.358**	.304**	-.075			
5. Picture scale score: Anthropomorphic	1.23	0.90	0	3	.060	.016	-.076	.080		
6. Number of utterances	19.77	7.61	4	56	.407**	.407**	.189	.172*	.121	

Note. BPVS3 standardized scores has a mean of 100 and standard deviation of 15

\* $p < .05$ , \*\* $p < .01$

**Table 6.3***Means, Standard Deviations and Range for Retell Length in T-units in each School Year**Group*

Age group	M	SD	Min	Max
Nursery (3-4 years)	16.45	6.91	4	35
Reception (4-5 years)	16.80	6.32	6	35
Year 1 (5-6 years)	19.43	6.20	8	32
Year 2 (6-7 years)	24.52	7.88	11	56
All year groups	19.77	7.61	4	56

**Age Related Developmental Patterns in Internal State Terms and Dialogue**

We examined the retells for developmental change in the use of internal state terms and dialogue. First, we coded each transcript for the presence of at least one example of each category to provide a binary variable (present or absent). These are reported as percentages in Table 6.4. Overall, the majority of retells included mention of at least one internal state (included in 79.3% of retells by 3- to 4-year-olds and 100% of those produced by 6- to 7-year-olds). Chi-square analyses (reported in Table 6.4) confirmed that the presence of each elaborative category increased significantly with age. In contrast, although character dialogue featured in the majority (66.1%) of retells, age-related change was found only for semantically marked and reported speech, but not for unmarked character speech.

Second, we examined the frequency with which each internal state and dialogue category was included in the retells. Using the same method as that used by Shiro (2003), we computed the density of each category by dividing the number of occurrences in each category by the number of T-units in each retell and multiplying this figure by 100. For example, a retell of sixteen T-units that included three terms relating to character emotion, would have a computed score of 18.75 ( $3/16 \times 100$ ) signifying that 18.75% of T-units included reference to character emotion. Additionally, two composite variables (one for internal states and one for dialogue) were computed, by first summing the occurrences of the

respective categories and computing values (as above) to provide figures that indicate the density of (all) internal states and of (all) dialogue in children's retells. The results are reported in Table 6.5. A one-way analysis of variance (ANOVA), with age group as a categorical variable and frequency of use of internal state term or dialogue type as a dependent variable showed an increase in frequency with age group to be significant in all categories, except unmarked dialogue (as reported in Table 6.5).

**Table 6.4**

*Presence of at least One Internal State Term and Dialogue in Children's Retells Reported by Age Group and Chi-Square Results (N = 171)*

	Presence of internal state terms (%)					$\chi^2$	Cramer's V
	Overall <sup>a</sup>	3-4 years	4-5 years	5-6 years	6-7 years		
Character internal state							
Emotional	72.5	34.5	58.7	86.4	94.2	41.99***	.496
Volitional	71.3	37.9	71.7	70.5	90.4	25.08***	.383
Cognitive	43.3	13.8	26.1	54.5	65.4	28.44***	.408
Perceptual/physiological	71.9	48.3	65.2	70.5	92.3	19.81***	.340
Socio-relational	39.8	13.8	17.4	43.2	71.2	39.38***	.480
Character Dialogue							
Marked (semantically)	47.4	24.1	26.1	54.5	73.1	29.33***	.414
Unmarked (implicit)	21.6	24.1	21.7	25.0	17.3	0.98	.076
Reported (indirect)	42.1	17.2	28.3	43.2	67.3	24.54***	.379

*Note.* Presence indicates the percentage of transcripts showing at least one example of the category.

<sup>a</sup> percentage of transcripts that included the presence of each category across the four age groups.

\*\* $p < .01$ , \*\*\* $p < .001$

**Table 6.5***Frequency of Internal States and Dialogue and One-Way Analyses of Variance in Children's Retells by Age Group*

	Frequency (%)					<i>F</i> ratio	<i>p</i>	partial $\eta^2$
	Mean <sup>a</sup>	3-4 years	4-5 years	5-6 years	6-7 years			
Character internal state								
Emotional	9.54	3.40	6.46	12.71	13.03	12.12	<.001	.18
Volitional	12.46	6.75	12.44	12.34	15.77	3.68	.013	.06
Cognitive	3.28	0.59	1.85	4.47	5.03	8.60	<.001	.13
Perceptual/Physiological	7.71	5.60	6.27	7.87	10.04	3.78	.012	.06
Socio-relational	3.20	1.04	1.63	3.88	5.23	7.56	<.001	.12
All internal states	36.20	17.38	28.65	41.27	49.10	18.97	<.001	.25
Character Dialogue								
Marked (semantic)	5.28	2.42	2.96	5.86	8.44	7.45	<.001	.12
Unmarked (implicit)	2.53	3.24	3.01	2.95	1.35	1.08	.358	.02
Reported (indirect)	3.18	1.11	2.09	3.08	5.40	7.70	<.001	.12
All dialogue	10.99	6.76	8.06	11.89	15.19	5.49	<.001	.09

*Note.* Frequency indicates the mean percentage of utterances per transcript that contain an example of each category and in each age group

<sup>a</sup> Mean frequency across age groups.

### The Influences of Character and Theme on Children's Retells

Examination of the internal state and dialogue categories used in each of the four book conditions (see Table 6.6) suggests that the most frequent internal states used by children relate to character volition (desires, needs, intentions), followed closely by references to emotion. Interestingly, the *Human Sharing* condition produced the highest density of references to volition and the highest overall density of references to character internal state.

**Table 6.6**

*The Presence of and Frequencies of Internal State Terms and Dialogue by Book Condition*

	Presence (%)				Frequency (%)			
	AB	AS	HB	HS	AB	AS	HB	HS
Character internal state								
Emotional	71.4	72.1	65.1	81.4	10.6	9.5	8.8	9.3
Volitional	66.7	67.4	74.4	76.7	11.8	10.9	11.1	16.1
Cognitive	40.5	37.2	39.5	55.8	2.7	2.7	2.8	4.9
Perceptual/Physiological	71.4	69.8	76.7	69.8	7.8	7.0	7.9	8.2
Socio-relational	33.3	44.2	23.3	58.1	1.8	3.9	1.1	5.9
Total internal state	92.9	93.0	93.0	95.3	34.6	34.1	31.7	44.4
Character Dialogue								
Marked (semantically)	54.8	51.2	37.2	46.5	7.0	6.0	4.1	4.1
Unmarked (implicit)	26.2	16.3	27.9	16.3	3.6	1.3	3.7	1.6
Reported (indirect)	35.7	41.9	46.5	44.2	3.2	2.6	3.3	3.6
Total dialogue	66.7	69.8	69.8	58.1	13.7	9.8	11.1	9.4

*Note.* AB = *Animal Busy*; AS = *Animal Sharing*; HB = *Human Busy*; HS = *Human Sharing*  
 Presence indicated the percentages of transcripts showing at least one example of the category.

Frequency indicates the mean percentage of T-units per transcripts that contain an example of the category.

We used negative binomial regression to model the influences of age, story character, and story theme on the quantity of character related internal state language and dialogue in children's retells. We included receptive vocabulary score (BPVS3, standardized score) in our models, to control for the influence of general language ability after adjustment for age. Verbosity was controlled for by including retell length (number of utterances) as a predictor

variable in each model. The results of the regression models are reported in Table 6.7. As expected longer retells were associated with more internal state language and greater use of dialogue in each category.

First, we consider children's use of internal state terms. In relation to child characteristics, older children included more internal state terms than younger children in every category (see Table 6.7 for the estimates of effects). Additionally, children with a higher receptive vocabulary (adjusted for age) included more emotional ( $B = 0.02, p = .009$ ), volitional ( $B = 0.02, p = .014$ ) and cognitive ( $B = 0.02, p = .032$ ) terms in their retells. There was no significant influence of receptive vocabulary score over and above the influence of age on the inclusion of perceptual/physiological or socio-relational terms. In relation to story condition, there was no significant effect of story character (animal/human) or story theme (busy/sharing), nor an interaction between these, on children's use of emotional, volitional, cognitive, or physiological/perceptual terms in retells. There was, however, a main effect of story theme on the amount of socio-relational language in retells; children were more likely to use socio-relational terms when retelling a prosocial (sharing) story compared with a story about a character who was busy ( $B = 0.66, p < .001$ ). This main effect was sizeable: the estimate suggests that retelling a sharing story was associated with a 93% increase in use of socio-relational terms. The effect was qualified by an interaction between story theme and story character: Children who heard a sharing story with human characters included more socio-relational language (on average) in their retell than children who had heard the sharing story with animal characters ( $B = 0.22, p < .05$ ). It can be seen from the means reported in Table 6.6, that the frequency of socio-relational language in retells was comparable in the Animal and Human Busy stories (1.8 and 1.1 respectively). The differences was far greater between the Animal and Human Sharing stories (3.9 and 5.9 respectively), with the Human Sharing story associated with the greatest frequency of socio-relational language.

Turning to children's use of character dialogue we found that, on average, older children included more character dialogue than younger children in semantically marked ( $B = 0.03, p = .002$ ) and reported speech categories ( $B = 0.05, p < .001$ ). A reduced use of unmarked (implied) speech was observed with increasing age ( $B = -0.04, p = .022$ ). There was no significant influence of receptive vocabulary score over and above the influence of age on the inclusion of any category of character dialogue. In relation to story condition, there were influences of the story character and theme on dialogue. Specifically, children who retold a human story were (on average) less likely to use semantically marked character speech than those retelling an animal story ( $B = -0.25, p = .013$ ). There was also a main effect of story theme on unmarked speech: Children who retold a sharing story were less likely to use unmarked speech than those retelling busy stories ( $B = -0.43, p = .027$ ). No other effects or interactions were significant.

**Table 6.7***Negative Binomial Regression Model for Internal State Language and Character Dialogue in Children's Retells*

Variable	B	SE B	z score	$p >  z $	Estimate	95% CI
<b>Emotional</b>						
Intercept	-2.83	0.77	-3.67	<.001***	0.06	[0.01, 0.27]
Number of utterances	0.07	0.01	8.70	<.001***	1.07	[1.05, 1.09]
Age <sup>a</sup>	0.03	0.01	4.96	<.001***	1.03	[1.02, 1.04]
Receptive vocabulary <sup>b</sup>	0.02	0.01	2.60	.009**	1.02	[1.00, 1.03]
Story character <sup>c</sup>	-0.03	0.06	-0.47	.640	0.97	[0.86, 1.10]
Story theme <sup>d</sup>	-0.02	0.06	-0.25	.801	0.98	[0.87, 1.12]
Story character x story theme	0.05	0.06	0.84	.402	1.05	[0.93, 1.19]
<b>Volitional</b>						
Intercept	-2.68	0.82	-3.27	.001**	0.07	[0.01, 0.35]
Number of utterances	0.08	0.01	8.06	<.001***	1.08	[1.06, 1.10]
Age <sup>a</sup>	0.02	0.01	2.75	.006 **	1.02	[1.00, 1.03]
Receptive vocabulary <sup>b</sup>	0.02	0.01	2.46	.014*	1.02	[1.00, 1.04]
Story character <sup>c</sup>	0.09	0.07	1.26	.208	1.09	[0.95, 1.25]
Story theme <sup>d</sup>	0.07	0.07	1.05	.295	1.07	[0.94, 1.23]
Story character x story theme	0.11	0.07	1.54	.124	1.11	[0.97, 1.27]
<b>Cognitive</b>						
Intercept	-4.40	1.24	-3.54	<.001***	0.01	[0.00, 0.14]
Number of utterances	0.06	0.01	4.62	<.001***	1.06	[1.03, 1.09]
Age <sup>a</sup>	0.05	0.01	5.08	<.001***	1.05	[1.03, 1.07]
Receptive vocabulary <sup>b</sup>	0.02	0.01	2.14	.032*	1.02	[1.00, 1.05]
Story character <sup>c</sup>	0.14	0.10	1.39	.164	1.15	[0.94, 1.41]

Story theme <sup>d</sup>	0.15	0.10	1.46	.144	1.16	[0.95, 1.42]
Story character x story theme	0.14	0.10	1.40	.162	1.15	[0.94, 1.41]
Perceptual/physiological						
Intercept	-0.22	0.73	-0.31	.760	0.80	[0.19, 3.32]
Number of utterances	0.04	0.01	5.64	<.001***	1.04	[1.03, 1.06]
Age <sup>a</sup>	0.02	0.01	3.41	<.001***	1.02	[1.01, 1.03]
Receptive vocabulary <sup>b</sup>	-0.00	0.01	-0.39	.695	1.00	[0.98, 1.01]
Story character <sup>c</sup>	0.07	0.06	1.12	.265	1.07	[0.95, 1.21]
Story theme <sup>d</sup>	-0.02	0.06	-0.26	.794	0.98	[0.87, 1.11]
Story character x story theme	0.06	0.06	0.99	.323	1.06	[0.94, 1.20]
Socio-relational						
Intercept	-3.76	1.14	-3.30	<.001***	0.02	[0.00, 0.21]
Number of utterances	0.07	0.01	6.03	<.001***	1.08	[1.05, 1.10]
Age <sup>a</sup>	0.04	0.01	4.50	<.001***	1.04	[1.02, 1.06]
Receptive vocabulary <sup>b</sup>	0.01	0.01	1.29	.199	1.01	[0.99, 1.04]
Story character <sup>c</sup>	-0.07	0.11	-0.63	.527	0.93	[0.75, 1.15]
Story theme <sup>d</sup>	0.66	0.11	5.95	<.001***	1.93	[1.57, 2.42]
Story character x story theme	0.22	0.11	1.98	.048*	1.25	[1.00, 1.56]
Semantic						
Intercept	-3.97	1.24	-3.20	.001**	0.02	[0.00, 0.21]
Number of utterances	0.10	0.01	7.42	<.001***	1.11	[1.07, 1.14]
Age <sup>a</sup>	0.03	0.01	3.17	.002**	1.02	[1.01, 1.05]
Receptive vocabulary <sup>b</sup>	0.02	0.01	1.51	.132	1.02	[1.00, 1.04]
Story character <sup>c</sup>	-0.25	0.10	-2.47	.013*	0.78	[0.64, 0.95]
Story theme <sup>d</sup>	-0.01	0.10	-0.09	.925	0.99	[0.81, 1.21]
Story character x story theme	0.07	0.10	0.69	.488	1.07	[0.88, 1.31]

Unmarked						
Intercept	-6.59	2.31	-2.86	<.004**	0.00	[0.00, 0.11]
Number of utterances	0.13	0.03	4.78	<.001***	1.14	[1.07, 1.23]
Age <sup>a</sup>	-0.04	0.02	-2.28	.022*	0.97	[0.93, 1.00]
Receptive vocabulary <sup>b</sup>	0.03	0.02	1.36	.174	1.03	[0.99, 1.07]
Story character <sup>c</sup>	0.06	0.19	0.29	.775	1.06	[0.72, 1.55]
Story theme <sup>d</sup>	-0.43	0.19	-2.21	.027*	0.65	[0.44, 0.95]
Story character x story theme	0.07	0.19	0.36	.718	1.07	[0.73, 1.58]
Reported						
Intercept	-2.77	1.18	-2.35	<.019*	0.06	[0.01, 0.61]
Number of utterances	0.04	0.01	2.85	.004**	1.04	[1.01, 1.06]
Age <sup>a</sup>	0.05	0.01	5.75	<.001***	1.06	[1.04, 1.08]
Receptive vocabulary <sup>b</sup>	0.01	0.01	1.17	.242	1.01	[0.99, 1.04]
Story character <sup>c</sup>	0.12	0.10	1.22	.224	1.13	[0.93, 1.37]
Story theme <sup>d</sup>	-0.02	0.10	-0.22	.823	0.98	[0.81, 1.19]
Story character x story theme	0.09	0.10	0.92	.357	1.10	[0.90, 1.33]

Note: Each of the models were estimated against a null model with the regressors removed. The Likelihood Ratio Test (LRT) statistics indicated that the models were good fits to the data: Emotional,  $\chi^2(8) = 114.98$ ,  $p = 2.2 \times 10^{-16}$ ; Volitional,  $\chi^2(8) = 81.55$ ,  $p = 1.7 \times 10^{-15}$ ; Cognitive,  $\chi^2(8) = 73.31$ ,  $p = 8.6 \times 10^{-14}$ ; Perceptual/Physiological,  $\chi^2(8) = 59.10$ ,  $p = 6.9 \times 10^{-11}$ ; Socio-relational,  $\chi^2(8) = 97.08$ ,  $p = 2.2 \times 10^{-16}$ ; Semantic  $\chi^2(8) = 74.58$ ,  $p = 4.7 \times 10^{-14}$ ; Unmarked,  $\chi^2(8) = 22.41$ ,  $p = 0.001$ ; Reported,  $\chi^2(7) = 60.80$ ,  $p = 3.1 \times 10^{-11}$ .

B = unstandardized estimate.

Estimates = Incidence Rate Ratios

<sup>a</sup>Variable centered on the mean.

<sup>b</sup>BPVS3 standardized score.

<sup>c</sup>Contrast coded, animal = -1, human = +1.

<sup>d</sup>Contrast coded, busy = -1, sharing = +1.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

### **Influence of Internal State Ratings for Humans and Animal Characters on Children's Retells**

Correlations between children's internal state ratings for humans (measured by an independent picture scale) and the presence and frequencies of internal state terms in their retells across all story conditions was explored. There were positive relationships observed between human internal state scores (on the picture scale) and the inclusion of at least one emotional ( $r(171) = .25, p = .001$ ), volitional ( $r(171) = .23, p = .002$ ), and socio-relational ( $r(171) = .18, p = .016$ ) term. There was also a positive relationship between the picture scale ratings and the overall frequency of internal state terms,  $r(171) = .25, p = .001$ . As predicted, children who gave higher ratings for internal states for people used internal state terms more frequently than those who rated people with lower capacities. Specifically, there were weak positive relationships observed between rating and frequency of emotional ( $r(171) = .19, p = .013$ ), volitional ( $r(171) = .20, p = .008$ ) and socio-relational terms ( $r(171) = .18, p = .018$ ). No significant relationships between picture scale ratings and the presence or frequency of cognitive or perceptual/physiological terms was observed.

Correlations between children's internal state ratings for humans and subsequent presence and frequencies of dialogue in retells were explored. A weak positive relationship between human rating score and the presence of semantically marked speech ( $r(171) = .25, p = .001$ ) and reported speech ( $r(171) = .18, p = .016$ ) was observed. There was no significant relationship between human score and the presence of unmarked speech. A weak positive relationship between human rating and frequency of character speech was only found for semantically marked dialogue ( $r(171) = .19, p = .015$ ).

We also examined the relation between ratings for animal characters for only those children who were presented with the anthropomorphized stories. A positive relationship between animal character rating score and the presence of unmarked character speech was

found ( $r(85) = .28, p = .009$ ). There were no significant correlations between picture scale ratings for anthropomorphic characters and the presence or frequencies of any other category of character internal states or dialogue in the retells.

#### **6.4 Discussion**

This study explored 3- to 7-year-old children's constructions of the internal world of characters by examining retells of stories that varied by character realism and story theme. We aimed to evaluate whether previously observed disparities in children's learning from picture books (e.g. Kotaman & Balci, 2017b; Larsen et al., 2017) might relate to differences in representations of character perspective. There were clear developmental patterns in the presence and frequency of internal state terms and in use of character speech, which were consistent with patterns observed in the extant literature (e.g., Tarchi et al., 2019; Ukrainetz et al., 2005). These findings confirm the sensitivity and validity of our paradigm to explore this issue.

Our primary aim was to examine the influence of story character realism on children's inclusion of five categories of internal state terms (i.e., those relating to emotional, volitional, cognitive, perceptual/ physiological, and socio-relational states) and character dialogue (subdivided into semantically marked, unmarked or reported speech) in their retells. Character internal state references and dialogue have been used previously to indicate protagonists' perspective, and dialogue provides a potential window to compare the extent to which a specific human trait (speech) is included in retells of stories about animal and human characters. We found that internal state language, with respect to emotion, volition, cognition, and perception/ physiology, was routinely included in retells but their inclusion was not influenced by story character or theme. In contrast, and as predicted, the retells of prosocial (sharing) stories contained more socio-relational language. Further, retells of prosocial stories with human characters contained significantly more socio-relational terms than of those with

anthropomorphized animal characters. Additionally, children were more likely to use semantically marked speech, when attributed to animal characters (e.g., “I will bring apples”, *said bear*). These findings and our observations from our exploratory analyses are considered in relation to the wider literature. We then discuss the wider implications of anthropomorphized materials when used as an educational resource.

### **The Influence of Age and Language Ability on Children’s Retells**

It was important to establish first that our retell methodology was sensitive to the age-related variation in the inclusion of mental state terms and dialogue that has been found with various narrative generation tasks (Aldrich et al., 2011; Ukrainetz et al., 2005). In line with that work and, as predicted, older children used proportionately more internal state terms than younger children. Additionally, acquisition patterns were noted. For example, as indicated by previous research the inclusion of moral/socio-relational terms was acquired later and more gradually compared with other internal states (Bretherton & Beeghly, 1982; Tarchi et al., 2019). This provided validation of our coding scheme and evidence for typical development in the sample.

Similarly, more semantically marked and reported character dialogue was included more by older children in their retells than by younger children. We also found that unmarked dialogue, where an explicit indication of which character is speaking is absent, decreased over our age range. This is plausibly related to the younger children’s immaturity in storytelling ‘artfulness’, the extent to which a storyteller uses various narrative skills to embellish their story for the listener, for example, indicating clearly which character is speaking (Shiro, 2003; see Glenn-Applegate et al., 2010, for a discussion). Conceivably, older children may mark semantic speech more often as they remember the character associated with a given dialogue. These findings imply that, across the 3 to 7 age range in this study, children’s mental models become increasingly elaborate and more precisely aligned

with the stories they hear. This may influence the extent to which children are able to extract meaning and learn lessons from fiction. If so, younger children may need more explicit support to achieve educational outcomes from lessons based around storybooks.

We did not find a consistent influence of receptive vocabulary over and above the influence of age. Receptive vocabulary was associated with more emotional, volitional, and cognitive terms at recall, but no significant increase in use of perceptual/physiological or socio-relational terms or any category of character speech. This suggests that factors such as experience and cognitive maturity, rather than language ability, underpin (at least some of) our age-related effects. In a separate analysis, we are exploring whether retell accuracy and sensitivity to central detail are related to age and/or language ability (see Chapter 5 in this thesis).

### **The Influence of Story Character and Theme on Children's Retells**

In contrast with our predictions, there was no significant main effect of story character type on children's inclusion of internal state terms in their retells. This was despite the fact that children rated animals to have lower capacity for internal states than humans in our picture scale. One interpretation of these findings is that all age groups in this study were able to accept the fantasy premise and enter into the make-believe world. Children treated the anthropomorphized characters 'as if' human. This makes sense as children are extensively exposed to anthropomorphized literature, as suggested by observations of the fantasy genre's prevalence in classrooms (Kotaman & Balci, 2017; Larsen et al., 2017). Repeated exposure to stories aids the development of children's use of story language and structure, referred to in the literature as 'story schema' or 'story grammar', which includes aspects of protagonists internal responses and goals; these are then employed when recalling stories (Mandler & Johnson, 1977; Paris & Paris, 2003; Rand, 1984; Stein & Glenn, 1979). Exposure to stories portraying human-like internal states and interactions for unrealistic characters conceivably

establishes their presence within a child's fantasy story schema. The result being that despite articulating lower real-world capacity for thought, feeling and self-awareness, children engage with animal stories and respond within the fantasy framework 'as if' these agents have capacity in the same way as people do.

This interpretation of our findings is in line with the hypothesis that the story-world is 'quarantined' by children (Hopkins & Weisberg, 2017; Richert & Smith, 2011; Walker et al., 2015). The suggestion is that the poorer transfer of solutions (Richert et al., 2009) and the lack of prompting of prosocial behavior (Larsen et al., 2017) following stories with greater fantasy content may be a result of children's understanding that the content of fantasy stories may not be reliable for real-world scenarios. The factors associated with children's inferior memory for some aspects of fantasy stories compared with more realistic versions of the same tale (e.g., Kotaman & Balci, 2017b, 2017a) remain unclear.

Two findings in relation to story theme are worthy of discussion. First, as predicted we observed more internal state terms in the socio-relational category in the retells of stories with a prosocial (sharing) theme compared to those with a non-prosocial (busy) theme. The effect was more pronounced for older children, in general. Second, this effect of theme was moderated by story character: Children who retold a prosocial (sharing) story with human characters used significantly more socio-relational terms than those retelling the same prosocial story featuring animals. Our finding of an interaction between story theme and character points to a more nuanced understanding of the influence of these factors: It suggests that young children may specifically find understanding socio-relational aspects of a story more difficult if animals are the main characters. This may relate to children's experiences of parental and education provider focus on prosocial and moral development as a distinct aspect of expected, and specifically human, behavior (e.g., Berkowitz, 2011; Callaghan & Corbit, 2018).

The evidence to support this finding and hypothesis is currently limited. No previous studies have investigated internal state language in retells of stories that differ by character realism and prosocial theme. In one study exploring prosocial responses to stories, children in this age range demonstrated greater generosity (measured through a sticker sharing task) immediately after a prosocial story that featured human characters; this effect was absent following the same story illustrated with anthropomorphized animal characters (Larsen et al., 2017). Conceivably this may relate to the current finding that children understand and apply moral lessons about human prosocial behavior more easily in response to realistic characters. However, a small number of studies with a similar focus have not find that human characters prompted significantly more sharing than animal characters (Kruse et al., 2021; Russell & Cain, 2022). Future research using a wider range of prosocial stories is required to test the reproducibility of our finding that children's socio-relational focus is enhanced by stories that use human, rather than animal characters.

We did not find strong nor consistent effects of story character on the inclusion of dialogue in children's retells. There was no significant influence of character on reported or unmarked dialogue but retells of stories with animal characters included more semantically marked speech than those with human characters. It was not clear why this pattern was observed. Pictorial encoding cues may have played a role, making the representation of the name for the type of animal (e.g., 'bear', 'little racoon') more distinct than that for a human character (e.g., 'Claire'), in line with dual coding theory (Sadoski & Paivio, 2013). The tracking of characters is an important dimension in theories of text comprehension (Zwaan & Radvansky, 1998) so this effect should be explored further to determine the optimal support (e.g., verbal, pictorial, etc.) for encoding individual characters.

We did not predict a significant influence of story theme on the inclusion of character dialogue, as both story themes provide plausible motivation behind the characters' plans for

identical action in both stories (a party). However, there was a significant and positive influence of the busy theme on children's use of unmarked character speech. We note the low incidence of this feature (in fewer than 27% of retells) and suggest that dialogue is coded in future research to determine the reliability of this effect.

### **The Influence of Ratings for Human and Animal Character Mental State Capacity on Children's Retells**

Our ratings scale for mental state capacity in humans and animals was sensitive to variation and also age-related effects. As predicted, ratings for humans were related to greater inclusion of emotional, volitional, and socio-relational terms and to semantic and reported character speech in retells. There was no significant relationship between cognitive or perceptual/ physiological terms used, or unmarked speech. The questions on the scale were limited to thinking, feelings and self-awareness; there were no items concerning perceptual capacities, which might explain the lack of influence. Although it is surprising that ratings for humans was not associated with greater inclusion of cognitive terms, the relationships here suggest that this measure taps an important area of children's thinking. This has significant educational implications. Children may have a greater insight into and encoding of mental states for stories that involve human characters. Where stories seek to impart social, moral, or ethical information, greater learning of the message may be evident when the main events involve human characters. This is contrary to many instructional and therapeutic materials available; for example, *Badger's Parting Gifts: A picture book to help children deal with death* (Varley, 2013) is an anthropomorphized resource commonly used with young children to support an understanding of bereavement. It is important to establish whether resources which use fantasy characters are as effective as those with realistic protagonists when used as a tool in this way. Where they are used, it would be prudent to inform practitioners to make

clear and explicit links between the experiences of anthropomorphized characters in the stories and those of the child.

### **Limitations and Implications**

In addition to the limitations and implications noted above, these additional points are noteworthy. First, the reproducibility of these findings with children from different and diverse backgrounds and with different materials is critical. The efficacy of anthropomorphized content to deliver educational, moral, social, and ethical content is unclear. Our results suggest that human characters may be a more reliable way to deliver prosocial themed messages. Second, we assessed ‘memory and learning’ of a story with a retell task; we did not assess understanding directly, neither did we control for an independent measure of expressive language. A strength of the current study was the use of an independently validated method to assess comprehension and memory of orally presented texts (e.g., Hagtvet, 2003) and also the inclusion of receptive vocabulary scores in our predictor analyses. We note that, for older children, the association between the performance on retells and comprehension tasks is significant, but not perfect (Cao & Kim, 2021). Future studies in this area should seek to determine the most sensitive task to assess learning and appreciation of core text meaning in preschoolers and beginner readers, and also the influence of child characteristics, such as expressive language ability, on task performance.

In conclusion, the present study contributes to our understanding of children’s propensities to enter the inner world of characters in storybooks. We observed that children routinely include internal state terms and dialogue in their retells of stories with either animal or human characters. Our key finding was the inclusion of more socio-relational language in the retells of prosocial stories with human characters. This finding implies that realistic protagonists in picture book stories may elicit greater representations of social ideas in the minds of young children. Therefore, where stories seek to impart social, moral, or ethical

information, human characters may elicit greater learning of the intended message. If verified by further work, these findings have implications for how materials are chosen and used to support children in their social learning. Where anthropomorphized books are used with educational or therapeutic intent, practitioner awareness of the need to make unambiguous links between character and child experience may be particularly important. Prosocial stories about human characters may be a more reliable way to deliver prosocial messages to young children.

## CHAPTER 7: Summary, Critical Reflection and Further Research

### 7.1 Introduction

The general aim of this thesis was to investigate the influence of two key properties of children's stories - character realism (anthropomorphised animal or human) and prosocial theme (prosocial or non-prosocial) – on their subsequent sharing behaviour and recall. Previous research, in some contexts, has observed anthropomorphised books to be associated with lower rates of solution transfer from stories to real-world tasks (Richert et al., 2009), poorer acquisition of biological facts (Ganea et al., 2014), poorer plot recall and a weaker understanding of character reasoning (Kotaman & Balci, 2017b), and lack of facilitation of prosocial behaviour (Larsen et al., 2017). Children's comprehension of stories with an underlying moral theme appears to develop earlier than stories motivated by a character's prudential self-interest (Narvaez et al., 2010). However, whilst 6- to 10-year-old children can differentiate between moral and prudential rules (Tisak & Turiel, 1984), general theme extraction from stories remains a difficult task for children under 10 years of age and representations of these narratives tend towards a concrete focus on action (Goldman et al., 1984; Mares & Acosta, 2008; Narvaez, 2002; Narvaez et al., 1999; Walker & Lombrozo, 2017).

To explore the influence of character realism and story themes, the experimental work reported in this thesis aimed to (i) develop a method to measure 3- to 7-year-olds' internal state ratings for humans, real animals and anthropomorphised animal characters, based on previous work that measured anthropomorphic thinking about technology (Severson & Lemm, 2016); (ii) conduct a conceptual replication and extension of previous work that found an influence of story character realism on young children's prosocial responses to a sharing theme in a story (Larsen et al., 2017); and (iii) explore children's story retell narratives and examine the influence of character realism and the presence of moral theme on the central

focus of their retells, and separately, children's inclusion of character internal states and dialogue.

This chapter provides a general summary of the main experimental findings and how these contribute to our current understanding of children's responses to anthropomorphised literature and moral stories. This is followed by a critical reflection concerning the work carried out in the thesis and, in addition, more broadly the methods used to collect and analyse data in this area of developmental psychology. These ideas are then related to recommendations for future work.

## **7.2 Summary of Main Findings and Implications**

A summary of the experimental findings from Chapters 3 to 6 is outlined here, along with comment on the implications and how the work in this thesis extends our current knowledge concerning the influence of character realism and narrative theme on children's responses to stories.

### ***7.2.1 Anthropomorphic Picture Scale***

In Chapter 3, children's ratings of thought, feeling, self-knowledge and intention for humans, real animals and anthropomorphised animal characters was explored. The results suggested that 3- to 7-year-olds consider that people have higher capacity for thought, feeling, self-knowledge and intention than animals. A key finding was that young children imagined anthropomorphised animals as having similar capacities for mental and emotional states as animals, and dissimilar to the human characters these routinely replace in literature targeted at this age-range. This implies that young children do not necessarily view anthropomorphised animal characters as entirely interchangeable with human protagonists. These findings extend what was previously known about individual differences in children's propensities to anthropomorphise story characters.

It is conceivable that children's propensity to view anthropomorphic animals with lower internal states contributed to the poorer comprehension and lack of facilitation of prosocial behaviour for stories depicting anthropomorphic animals relative to humans seen in the literature (e.g., Kotaman & Balci, 2017a; Larsen et al., 2017). To this end, individual differences in children's ratings for humans and for anthropomorphised characters was examined in relation to their sharing responses to prosocial stories in Chapter 4 and their inclusion of character related internal state terms in retells of stories in Chapter 6.

In Chapter 4, an association between children's ratings for human internal states and their post-story sharing was found. This finding suggests that children who indicated awareness of the thoughts and feelings of people were more likely to share than children who has less appreciation of internal states. This is in line with previous research that has found a relationship between perspective taking and sharing behaviour observed in children (Cassidy et al., 2003; Cowell et al., 2015; Paulus & Moore, 2017; Wu & Su, 2014; Yu et al., 2016). However, there was no interaction between prosocial story theme and children's ratings of human internal states on their sharing. In our sample, children's propensity to take perspective (as assessed with this particular internal state attribution task) did not further influence donations in response to a sharing story. However, children's anthropomorphic character internal states scores did not predict their post-story sharing. The implication is that an orientation towards relating to anthropomorphic characters as if human, with human capacities for internal states, is not associated with increased prosociality in the way that increased understanding of internal states in people is.

Similarly in Chapter 6, children's internal state ratings for humans were related to greater inclusion and frequency of references to character emotional, volitional, and socio-relational states and to the presence of semantic and reported character speech in retells. The link between children's understanding of internal states in people and their use of related

language in story telling is unsurprising, and links between theory of mind proficiency and use of mental state terms in children's story narratives has been established (Y.-S. Kim et al., 2021; Symons et al., 2005). However, for those children presented with an anthropomorphic version of a story, there was no association between their apparent attribution of internal states to anthropomorphic characters in the picture scale and their use of internal state terms at retell. This implies that being proficient at imagining these characters to have thoughts and feelings did not drive an inclusion of related terms above that provided by perspective taking (as measured by this scale) for humans. There was no correlation between human and anthropomorphic animal scores, so children who rated humans highly were no more likely to show an orientation towards the anthropomorphism of animal characters. The limitations and development of the Anthropomorphic Picture Scale are further considered in later sections of the thesis.

### ***7.2.2 Prosocial Responses to Stories***

In Chapter 4 a conceptual replication and extension of the previous study conducted in Canada by Larsen et al. (2017) was reported. In contrast to the original research, a prosocial themed narrative depicting human characters was no more influential on children's subsequent prosocial behaviour than the other stories. Potential reasons for these findings were discussed fully in Chapter 4, which included consideration of the influence of methodology and indications that the findings in the original study may not be generalizable across diverse populations (see Kruse et al., 2021; Yao & Enright, 2020)

The influence of story character and narrative theme on prosocial response were considered as separate factors; no influence of character and no robust influence of prosocial story was found on children's post-story sticker donation. The implication is that young children do not easily generalize the message from a single exposure to a story. This is in line with previous research that finds that theme extraction is difficult for children under 10 years

of age (Narvaez et al., 1999) and demonstrates the benefit of prompts to focus children's attention on the prosocial lesson in fiction and to apply moral learning to their behaviour (Lee et al., 2014; Rottman et al., 2020; Walker & Lombrozo, 2017). This has clear implications for education and therapeutic practice, which must use effective reinforcement tasks to enable children to connect moral points in stories to their own actions.

Comment is warranted on the use of zero-inflated modelling, which revealed a stable predisposition towards not sharing in some young children. In general, high levels of selfishness are seen in 3- and 4-year-olds (Benenson et al., 2007; Fehr et al., 2008) and hoarding (sharing no resources) is a common occurrence in studies that include very young children (Samek et al., 2020). Significant increases in baseline sharing is typically only clear once children reach 8 or 9 years of age (Benenson et al., 2007; Blake, 2018; Fehr et al., 2008; Ongley et al., 2014; Posid et al., 2015; Yu et al., 2016). The implication is that the development of altruistic sharing is a gradual process over several years and that individual differences operate to influence hoarding behaviour. The use of zero-inflated modelling is further discussed in section 7.3 below.

### ***7.2.3 Central and Peripheral Detail in Children's Retells***

In Chapter 5, the influences of character realism and moral theme on the length, syntactic complexity and centrality of children's retells of stories was examined. The twin objectives were: (i) to assess whether previously observed negative influences of anthropomorphised characters relative to human characters on children's comprehension and learning from stories (e.g. Kotaman & Balçı, 2017b; Larsen et al., 2017) might relate to differences in representations of central parts of a story; and (ii) to consider whether moral stories are comprehended differently to stories involving only prudential self-interest (Narvaez et al., 2010).

There was no significant influence of story character on the measures examined. This implies that children's memory and understanding of stories, at least in terms of immediate ability to retell the events of the narrative, were not significantly influenced by anthropomorphic content. This implies that anthropomorphised literature does not always have a negative influence on children's responses to stories.

However, whilst retells with a prosocial (sharing) theme were a similar length to those with a non-prosocial (busy) theme, higher syntactic complexity and greater centrality was observed. The central message of the story with the prosocial (moral) theme was more strongly retained than the very similarly presented central message in a non-prosocial (prudential) story about a character who was busy. This potentially adds to our understanding of previous research that demonstrated earlier comprehension of moral stories compared with the comprehension of prudential stories in older children (Narvaez et al., 2010).

#### ***7.2.4 Characters' Internal States and Dialogue in Retells***

Chapter 6 examined retells of stories for inclusion of character internal states and dialogue. The aim was to evaluate whether previously observed disparities in children's comprehension and learning from story books that varied by character realism (e.g. Kotaman & Balci, 2017b; Larsen et al., 2017) might relate to differences in representations of character perspective. When considering both prosocial and non-prosocial stories together, there was no influence of story character on children's inclusion of mental state terms. This implies that children employ 'story schema' including aspects of a character's internal responses and goals when recalling stories (Mandler & Johnson, 1977; Paris & Paris, 2003; Rand, 1984; Stein & Glenn, 1979). This finding contributes to our understanding of children's propensities to enter the inner world of characters in storybooks.

However, children who retold a prosocial story with human characters included significantly more socio-relational language than those retelling the same story featuring

anthropomorphised animals. This suggests that realistic protagonists may elicit more robust representations of social and moral ideas in the minds of young children. The implication is that where stories seek to impart social or moral information, human characters may be a more reliable way to deliver prosocial messages to young children. Practitioners in education or therapy settings need to be aware that the use of anthropomorphised literature may require the links between character and child experience to be made more explicit.

### *7.2.5 Overall Summary*

When asked, children attributed internal states to anthropomorphised animals in line with real animals and unlike in humans (Chapter 3). However, within a dynamic story context, children appear to treat these fantasy characters as if human. In the experimental work, anthropomorphic characters relative to human characters had no significant negative influence on prosocial behaviour (Chapter 4), nor a deleterious influence on the length, complexity, centrality (Chapter 5) or inclusion of internal state terms in retells of stories (Chapter 6). Overall, these findings imply that anthropomorphic characters are not necessarily an immediate impediment to learning or comprehension and adds to the nuanced picture emerging in the literature.

However, whilst a prosocial sharing story did not provoke an increase in sticker donation in this sample of children (Chapter 4), there was an influence of moral theme on children's retells. Retells of moral stories had a stronger central focus (Chapter 5) and included significantly more socio-relational language for human compared with anthropomorphised animal characters (Chapter 6). Overall, this implies better comprehension in young children for a moral story and that human characters in moral tales may elicit great social learning.

### 7.3 Critical Reflections

Following the summary of main findings and contributions to the literature, this section provides critical reflections on aspects of the experimental work carried out that are not already addressed in full in the discussion sections of the experimental chapters. Future directions are considered both during this reflection where appropriate, and more widely in Section 7.4 at the end of the chapter.

#### *7.3.1 Measuring Anthropomorphic Thinking in Children*

This adaptation of an original scale developed by Severson and Lemm (2016) was a first step in understanding children's attributions of internal states for the types of anthropomorphised animals 3- to 7-year-olds commonly encounter in literature. The innovation was to use pictures, to help the youngest children engage with the task in a meaningful way. The finding that children viewed anthropomorphic animals in very similar ways to real animals and not like humans was novel. Additionally, it was clear that 3- to 4-year-olds were able to distinguish between animals, humans and anthropomorphised animals and did so in similar ways to the children in the older age-groups. However, the youngest children did not distinguish clearly between the inanimate nature and the two animal categories. This indicates a developmental process in children's understanding that inanimate natural items such as a stone, the sea, or rain are generally considered to be without thought, feeling or self-knowledge (at least in the UK mainstream culture from which the participants were drawn). This finding is in line with previous research, which suggests that young children have difficulty in reasoning about the psychological properties of objects - particularly natural rather than manmade things, and objects with a capacity for movement (e.g., M. Kim et al., 2018; Richards & Siegler, 1984).

A further point of interest arose from the line of questioning concerning item intentionality. Children in the UK did not respond in the same way as the original sample

of Canadian children to the question ‘Does [item] do things on purpose?’ (Severson & Lemm, 2016). UK children appeared to interpret this question negatively, in terms of doing something with bad intention. This may be a cultural or regional interpretation of the phrase and the line of enquiry into intentionality requires adjustment in order to tap into the intended construct in any future work.

As discussed, the scale showed clear differences in children’s attributions for the internal states of anthropomorphised animals compared with humans. However, ratings for anthropomorphised animal pictures did not appear to relate to how children behaved in response to these fantasy characters in the fictional context. For example, ratings for anthropomorphised animal internal states were not related to children’s use of most classes of mental state terms for these character types when retelling a story (other than socio-relational language in moral stories). There are several potential reasons for this finding. First, it is possible that as retells involve the use of language and concepts already provided, children simply use the same terms. Second, story schema acquired when listening to anthropomorphised stories may equip children to include internal state language and suspend their real-world knowledge beliefs about levels of mental and emotional states that are associated with various types of character.

Future work to explore the development of and individual difference in children’s anthropomorphic thinking is required. First, pilot work to find a suitable rewording for the intentionality question is required. Second, choosing static natural objects (stone, stick, sand), may provide a clearer baseline category. Third, children’s attributions given in response to this questionnaire method could be validated against other methods. For example, responses to human items compared with results from a range of Theory of Mind tasks (e.g., Wellman & Liu, 2004). Additionally, questions about character internal states could be incorporated within a storytelling session (for example using an interrupting puppet who wants to

understand the thoughts and feelings of particular characters) as a method to capture children's internal state attributions for animal and human characters when engaged with a narrative. This could then be compared with their respective questionnaire scores. Finally, responses to the questionnaire may be more usefully related to children's storytelling, rather than to aspects of a retell task.

### ***7.3.2 Measuring Altruistic Sharing***

As discussed in Chapter 2, economic games are used in experimental psychology to study the development of prosociality from early childhood (e.g., Benenson et al., 2007; Fehr et al., 2008; Gummerum et al., 2010). However, an examination of the literature reveals that there are, to date, no standardized tasks to measure costly sharing in children (see section 2.4.1). Therefore, careful thought is required when considering the methods used to quantify children's altruistic sharing in experiments. For a resource allocation task to be considered a measure of costly sharing, the items must meet certain criteria: The resources should be of value to the child and unequivocally owned by the child; additionally, the decision to share should not be one made under social pressure.

For these reasons, the economic game used in Chapter 4 was modelled closely on that developed and described in Benenson et al. (2007). First, like that task, stickers were used. Stickers are clearly a prized resource to a young child. This is evidenced by observations that children under 8 years frequently keep more items than they donate when invited to share their stickers (e.g., Cowell et al., 2015; Rochat et al., 2009). Second, children chose their own stickers from a diverse array, rather than being allocated a resource (sometimes of identical type); this adds potential personal value for the individual, reducing the likelihood of simply donating unwanted researcher-assigned items. Third, the donation was anonymous to the recipient, who is not told who donated, and the researcher does not watch the allocation of stickers by the child. This decreases proximal social influences on the child to share (Fujii et

al., 2015; Sampaio & Neto Pires, 2015). In the experiment outlined in Chapter 4, unlike the original task, the ownership of the stickers was further emphasised by the notion that the allocation was a ‘reward’ for their work in a prior session, partly to give ‘human sense’ to a relative stranger providing a gift of very nice stickers. More importantly, without very clear signals about resource ownership, results from experiments have less capacity to be generalised to effective nudges for children to share real possessions owned in real life.

Given the diversity in methodology in resource allocation tasks that intend to measure altruism in children, it is difficult to synthesise an understanding of the factors that influence prosociality and developmental trends in sharing across samples. A symposium to consider the influence of methodology, that includes open dialogue concerning the development of standardized methods to satisfy research needs, may be a productive way to move the field forwards.

### ***7.3.3 The Home Environment***

A home literacy environment measure was incorporated into the research design, as is typical for studies investigating children’s responses to literature (Sénéchal et al., 2008). It was useful to characterize the sample, for example, assessing children’s preferences for anthropomorphic content in books and TV shows. Both objective and subject evaluations of children’s exposure to stories, were taken and the two-factor outcome in the principal component analysis confirmed the validity of the approach taken (see Chapter 5). However, the objective measure was not found to be uniquely predictive of children’s memory and understanding of stories over and above that predicted by the test of receptive vocabulary. As there is an established association between children’s receptive vocabulary development and their exposure to language and literacy in the home, this is not an unexpected finding (Hamilton et al., 2016; Sénéchal, 2006; Sénéchal et al., 1998, 2008).

Several options could be considered in future work to explore and understand better the influence of the home environment on children's responses to prosocial and/or anthropomorphised stories. First, an assessment of *how* parents provide linguistic interactions during book sharing to scaffold their child's story comprehension may relate to individual differences in children's memory and understanding of stories, above that provided simply by vocabulary. For example, a measure to estimate the inclusion of dialogic questioning by parents and carers may be useful, as this scaffolds children's understanding of stories (Silva & Cain, 2019). Furthermore, measures that capture cultural differences may be useful. First, children's prosocial development is strongly influenced by cultural (e.g. Cowell et al., 2017; Rochat et al., 2009; Samek et al., 2020) and subcultural (Benenson et al., 2007) contexts. Second, differences across cultures are associated with significant variation in adult-child interactions and use of language, and in the stories children hear, which influences children's linguistic development (Heath, 1982). Measures of cultural or sub-cultural variation may provide a broad socio-cultural framework and more fruitful avenue of exploration in future work to better understand environmental influences on prosocial development.

#### ***7.3.4 Statistical Models***

A key aspect of this thesis was the use of appropriate statistical tools to evaluate and interpret the data. This section will specifically focus upon the issue of count data as an outcome variable, in relation to the sticker donation task in Chapter 4. Count data frequently have data distribution patterns that violate the assumptions of more commonly used methods of analysing data (e.g., ANOVA, linear regression) in developmental psychology. If regression modelling is used that does not account for the distribution of count data, biases in estimates of effect are likely, with a related risk invalid inferences being made (Beaujean & Morgan, 2016).

A first step in each analysis in the thesis was the visualisation and testing of the distributions of outcome variables. This is exemplified in Chapter 4 where the number of stickers (out of ten) provided the dependent variable, which provides a discrete rather than continuous variable. Initial analyses indicated a non-normal distribution. Under circumstances where positive integer count data are present a Poisson model may be considered. However, exploration of the sticker sharing data revealed an over-dispersed distribution, with the variance in the data greater than the mean, which violates a critical assumption of a Poisson distribution.

Negative binomial models can incorporate over-dispersion (Beaujean & Morgan, 2016). However, a zero-inflated count, confirmed by a zero-inflated tolerance check, was also evident in my data; some 40% of children made no donations of stickers post-story. As noted in Chapter 4, this is not unusual behaviour by young children in altruistic sharing tasks. As a result of the data distribution, consideration of models that additionally adjust for zero-inflation was necessary. Hurdle models are useful for data where the zero-counts are produced by two separate processes - the first producing only zero counts and the other producing counts of one and above (Loeys et al., 2012; Zeileis et al., 2008). A hurdle model could, for example, separate patients into those admitted to hospital or not (not being the zero count), and then separately the number of days in hospital for those who are admitted (count data that is always a positive number of 1 or more). Zero-inflation is not clear-cut in this way when considering mechanisms that influence children's sharing decisions. Therefore, zero-inflated models, which fit a mixture of two distributions were explored. In these, two regression analyses are estimated in parallel. A zero-inflation component estimates the probability of not engaging with the sharing behaviour post-story and a count component estimates whether the model predictors explain the sharing observed, across the full

distribution, including decisions not to share; unlike hurdle models there are two sources of zeros in the data (Beaujean & Morgan, 2016; Zeileis et al., 2008).

An evaluation of a typical linear regression against Poisson, negative binomial, zero-inflated Poisson, and zero-inflated negative binomial (ZINB) distributions and inspections of model fit to data informed the decision to use ZINB models in the analysis of the data in Chapter 4 (see Appendix C). Not only does the use of this type of analysis avoid potential bias in estimates (Atkins & Gallop, 2007), but it enabled interesting patterns in donation to be explored more fully. The published paper presented in Chapter 4 therefore adds to the literature by illustrating the power of a relevant, but little used, statistical tool that will be of interest to those researchers who work with count data in the field.

#### **7.4 Overall Contribution of the Thesis**

Following the summary of findings and critical reflections, this section considers the contribution this programme of study makes overall and outlines some key educational implications of the studies in relation to children's social, cognitive and linguistic development.

##### ***7.4.1 The Contribution of The Programme of Work***

Narratives are frequently used in the education of young children and this programme of work informs their use in general teaching and for imparting moral messages. This thesis made an important contribution as it examined the influence of two factors that might influence children's abilities to understand and retain the gist of stories; story theme (moral or prudential) and character realism (anthropomorphic animal or human). Understanding if and how these factors influence children's comprehension and memory of text is important educationally; moral stories are a prevalent genre and used in general classroom activities and, more importantly, may be selected for use in educational assessment and testing. Knowing how theme or character and the combination of these have influences on children's

comprehension and behaviour (even subtly) is important if the best materials are to be chosen for teaching and for assessment. Moreover, moral stories are integral to the teaching of social and personal education, at least in the UK. Whilst this isn't formally tested in school, this thesis aimed to examine the idea that human characters are significantly more useful in imparting a prosocial message in comparison with one depicting animal characters.

The overall findings in this programme of work are relatively robust with regards to moral versus prudential themed stories but nuanced with respect to character realism. Addressing moral theme first, the evidence presented in this thesis suggested that whilst a moral story has no immediate influence on young children's prosocial sharing, or internal state terms (other than those relating to moral ideas), children retain a significantly greater proportion of the central points of a moral story compared with a closely matched prudential version of the tale. This suggests that moral narrative theme can influence children's attention towards or encoding of the central meaning. This evidence may support the use of carefully selected resources in the development of educational materials and in comprehension testing (see section 7.4.2 below). Whilst the literature around children's understanding of stories is vast, a focus on the differences in educational outcomes for children presented with tales with a moral message and those focused on characters' prudential self-interest remains relatively unexplored (see Narvaez et al., 2010). This thesis further explored this important area.

With respect to character realism, the programme of work found no robust influence of character realism on the majority of outcomes under test: anthropomorphised animals in stories were not significantly related to sharing responses, or children's retells with respect to length, complexity, gist of the story, or inclusion of internal state language. These findings suggest that when presented with static pictures of patently anthropomorphised animals (upright stance, clothed etc), children do not appear to re-evaluate the characters' capacities for internal states in light of their humanised appearance; children view them as similar to

real animals and not like humans. However, within the dynamic context of hearing and retelling oral stories supported by pictures of such characters, young children appear to treat animal characters ‘as if’ human. This last point may have implications for the best choice of characters when used outside of a story context, for example in educational apps (see section 7.4.2 below).

To understand whether humans as accepted moral agents are superior as characters in books that seek to impart a moral message, this thesis explored the interaction between character realism and moral theme. The findings suggest that children do not respond differently to animals as moral agents in stories in most of the outcomes measured here. That is, there were no significant interactions in relation to their post-story prosocial behaviour, the length, syntactic complexities or focus on the central story points in retells. However there appeared to be a benefit of depicting realistic characters on the use of socio-relational terms, when retelling moral stories. Thus, the programme of work suggests that whilst anthropomorphised characters are not significantly detrimental to certain important educational outcomes, moral and socio-relational ideas are more salient if human characters are depicted. Given that the previous literature suggests how problematic young children find extracting the intended meaning from moral stories (e.g., Narvaez et al., 1999), a greater understanding of key features, such as character realism, that may subtly influence understanding is clearly valuable to educators and carers.

#### ***7.4.2 Educational Implications Arising from The Thesis***

There are a number of potential educational implications arising from this thesis. There was some evidence that moral rather than prudential theme was more strongly associated with children’s focus on the salient points of a story. That narrative theme can influence children’s attention to the central meaning of a story suggests that educational materials should be developed and selected with care; depending on the combination of moral

and prudential themed stories in initial and final assessment, misleading conclusions could be drawn. For example, if a moral story is used in initial assessment and a prudential story is used in final assessment, a child's comprehension ability may have appeared to have regressed, but this could be due to the type of story rather than the child's ability. Therefore, in the future, educators may need to consider using the same type of theme at initial and final assessment in order to rule this out as a complicating factor in the outcomes. Moreover, other areas involved in comprehension evaluation, for example formal speech and language assessment, may need to bear this factor in mind.

Whilst this thesis does not look at moral development, this body of work demonstrates that on a child's moral journey using human characters is easier for them to access the socio-relational language than having to process the meaning via an anthropomorphic character. Therefore, it is suggested that resources developed for or used to provoke young children's socio-relational thinking might optimally depict human characters. There are similar implications for resources aimed at children who are developing theory of mind.

Other than for moral and socio-relational language, overall, within a story context, children treat animals 'as if' human. But outside of a story context, children do not appear to evaluate anthropomorphised animal characters' capacities for internal states in light of their humanised appearance; children view them as similar to real animals and not like humans. This would suggest that resources that use static pictures of anthropomorphised animals and pose questions about thoughts and feelings may not be highly effective. For example, in the development of educational apps aimed at supporting children's developing internal state understanding, human characters may offer an advantage over animal characters. As such, this thesis has relevance to the development of educational resources.

## 7.5 Future Directions

### 7.5.1 *General Areas for Development*

There is clear value in further research to understand the key discrete features of stories on children's responses, given the role of storytelling in literacy and language teaching (Aram & Aviram, 2009; Kotaman, 2013; Lynch et al., 2008; Sénéchal et al., 2008), school-based social and moral education (K. Lee et al., 2014; Leming, 2000; Talwar et al., 2016; Walker & Lombrozo, 2017) and bibliotherapy to mitigate difficult life experiences (Lucas & Soares, 2013; Montgomery & Maunders, 2015; Pardeck & Pardeck, 1993). The development of evidence-based materials that best communicate our learning intentions to children is critical.

First, in relation to character realism, the evidence in this thesis suggests that anthropomorphic characters are not viewed as having internal state capacities equivalent to the humans they replace in fiction (see Chapter 3; Russell & Cain, 2020) and are associated with poorer memory for socio-relational and moral language a story with a prosocial theme, when assessed with a retell task (see Chapter 6). In view of this, along with previous research that observed poorer learning from anthropomorphised books in relation to more realistic versions (e.g., Kotaman & Balci, 2017b; Larsen et al., 2017; Richert et al., 2009), further work with diverse samples of children is proposed. Potentially, the use of visual world and other eye tracking paradigms of picture stimuli during storytelling (e.g., Engelen et al., 2014; Huettig et al., 2011), along with causal connection analysis and more direct comprehension measures, for instance question and answer methods (e.g., Lynch et al., 2008), may provide more clarity over how and when children process fantasy elements in fiction. Such paradigms can provide insight into the locus of processing differences between children and materials. The development of improved methods to measure anthropomorphic thinking in children is previously discussed (see section 7.3.1).

Further work to explore children's preferences, engagement and enjoyment for fantastical and realistic elements in fiction would extend the limited information in the existing literature (Barnes et al., 2015). Given that topic preferences have been shown to significantly influence comprehension, particularly in boys (Lepper et al., 2022; Oakhill & Petrides, 2007), the influence of reality or fantasy preference could similarly affect learning outcomes in response stories.

Future work also stems from the finding of greater story centrality in the retells of a moral story in comparison with one that contains only prudential self-interest. The observation of this influence in 3- to 7-year-olds may relate to previous research that demonstrated earlier comprehension of moral theme than prudential theme in stories by 10-year-old children (Narvaez et al., 2010). It would be informative to investigate the development of children's comprehension of fiction that varies by moral and prudential theme, using a wide range of methods to explore children's memory and understanding of these story types; an evaluation of young children's abilities to distinguish between morality and prudence would necessarily be included in the research design (see Tisak & Turiel, 1984). If stories that include moral messages are comprehended earlier than those that involve only prudential self-interest this has clear implications for materials selected for standard assessment tasks or used in experimental paradigms.

### ***7.5.2 Future Study Proposals***

Based on the findings of this thesis and in the context of the general areas for development outlined in the section above (7.5.1), two specific follow-up studies are proposed that further explore the optimal conditions that support young children's comprehension of picture book stories.

First, the thesis does not present converging evidence for a strong influence of character realism on children's learning from stories. However, children apparently view

these characters as animals, rather than human (Chapter 3) and there was an influence of character realism on the socio-relational language used in the retells of moral stories (Chapter 6). Moreover, the extant literature suggest that solution transfer is influenced by this key variable, with realistic characters associated with better learning in comparison with fantasy characters (Richert et al., 2009; Richert & Smith, 2011). Given the findings in this thesis, a future study is envisaged that conceptualises the issue of learning from a moral story from a solution transfer standpoint. The presentation of a prosocial sharing story that varies by character, followed by an analogous prosocial task, may indicate more clearly whether children learn moral lessons better from human characters when the relationship between the story and the task is matched and more explicit. Using similar procedures to Richert and Smith (2011), children will be asked questions concerning the solution to the problem in the story after receiving it, and before being presented with the analogous classroom task. Moreover, the clear problems identified in resource sharing tasks (as outlined in sections 2.4.1 and 7.3.2) will also be avoided in this follow up study. Rather than a contrived and arguably context free task involving children sharing stickers with an absent unspecified peer, both the story and the follow up activity will be framed around moral decisions about unequally distributed resources within a group of children. Children's sharing behaviour will be observed and rated, as is typical in naturalistic studies of prosocial behaviour (e.g., Conte & Pepe, 2018; Kato-Shimizu et al., 2013).

Similarly, other aspects of moral behaviour could be explored. Aspects of honesty or helping behaviour may be interesting to consider with respect to character realism. The aim of my research was to understand how children learn from stories and how this learning is applied by children to their understanding of situations in their real lives. These future studies may provide further evidence about the role of character realism in solution transfer and learning from stories, particularly those with moral messages. This information may be

valuable to the teaching of personal, social and moral education. Not only may character realism be relevant, but using stories that are very closely related to the intended learning point may be critical for outcomes in young children.

Second, further work to test the optimal conditions for children's learning and consolidation from stories presented in educational settings is suggested. A key finding from this thesis is a difference between children's understanding of the gist of a moral story in comparison with a prudential version. This builds on previous findings of earlier comprehension for moral over prudential stories (Narvaez et al., 2010; Tisak & Turiel, 1984) but which is a relatively unexplored area of enquiry. The findings in this thesis also suggest that human characters are associated with more socio-relational terms in retells than anthropomorphic animals. Pulling these findings together, follow up studies will explore the influence of moral messages in stories using realistic characters, rather than anthropomorphized animals.

A future study will aim to gain an insight into how children are building mental models of the moral and prudential stories. The active processing of the narrative can be examined using think aloud tasks. These have been used successfully in previous research, such as that by Ronfard and Harris (2014), who asked children questions about characters' emotions during storytelling. An interrupting puppet paradigm (i.e., a puppet who doesn't understand what is happening) could be used to provide an ostensible context for asking the child to verbalize their thinking during the story (see Coyne et al., 2021; Remer & Tzuriel, 2015). The aim would be to gain insight into how children are building their mental models and whether sensitivity to moral stories as distinct from prudential tales can be observed in children's online processes. The outcomes may be informative to the types of stories used in educational and language testing. Additionally, interspersing story episodes with questions, may provide and scaffold active processing that is not necessarily present in the absence of

this method (Silva & Cain, 2019). It may be pragmatic to control for this by comparing the story comprehension of children asked focused questions by the puppet during the story reading with those tested without examining their online processes.

### **7.5 Concluding Remarks**

A key finding of this thesis is that children consciously attribute internal states to anthropomorphic animals at similar levels to real animals, and unlike that of humans. Additionally, the thesis has demonstrated that anthropomorphised animals do not necessarily present a clear impediment to children's memory for the central message of a story, nor to the general inclusion of internal states for these characters when children retell stories. However, children's inclusion of significantly more socio-relational language in their retells of moral stories that depicted human in relation to anthropomorphised animal protagonists suggests that prosocial stories about human characters may be a more reliable way to deliver moral or ethical messages to young children. Moral stories may provide a particular context within which key story elements are remembered and understood. A comparison of children's comprehension of stories that vary by the inclusion, or otherwise, of a moral theme appears to have attracted little consideration, to date. My hope is that the work in this thesis will be a catalyst for future research that considers the influences of realism and moral theme on young children's responses to stories.

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## Appendix A

### Administering the Anthropomorphic Picture Scale

#### Preparation

Shuffle the 16 test items cards and place face down

Place the Thumbs UP/DOWN and rating scale pictures in front of the child

Retrieve the 3 training items (food pictures)

#### Rating Scale Training

Give the child the following instructions:

- I am going to ask you some questions in a minute
- You can decide whether your answer a question is 'YES' or 'NO' and you can *tell* me 'YES' or 'NO', or you can point to these thumb up/down cards to help you answer (refer to the printed card)
- Thumbs UP means 'YES' and Thumbs DOWN means 'NO'
- For some questions I'll ask you 'How much?'
- You can answer 'a little bit', 'a medium amount' or 'a lot' (indicate on rating scale)
- There aren't any right or wrong answers; I just want to know what you think!
- Let's practice using some questions about food

Present the 3 food items one at a time, ask:

- Do you like [sweets/broccoli/chips]?

For 'YES' responses, ask:

- How much do you like [sweets/broccoli/chips]?

Place the picture card near the part of the scale indicated in the child's answer and summarise the responses, pointing to the scale positions. For example,

- So, I see that you like broccoli a lot, sweets a little bit and you don't like chips at all!

Discuss with child what food items might fit the missing rating(s). Ensure that each part of the scale is considered. For example,

- Can you think of a food that you like a medium amount? So, more than sweets, but not as nice as broccoli? (using the scale to indicate the position)

Remove the training items before testing

**Test administration**

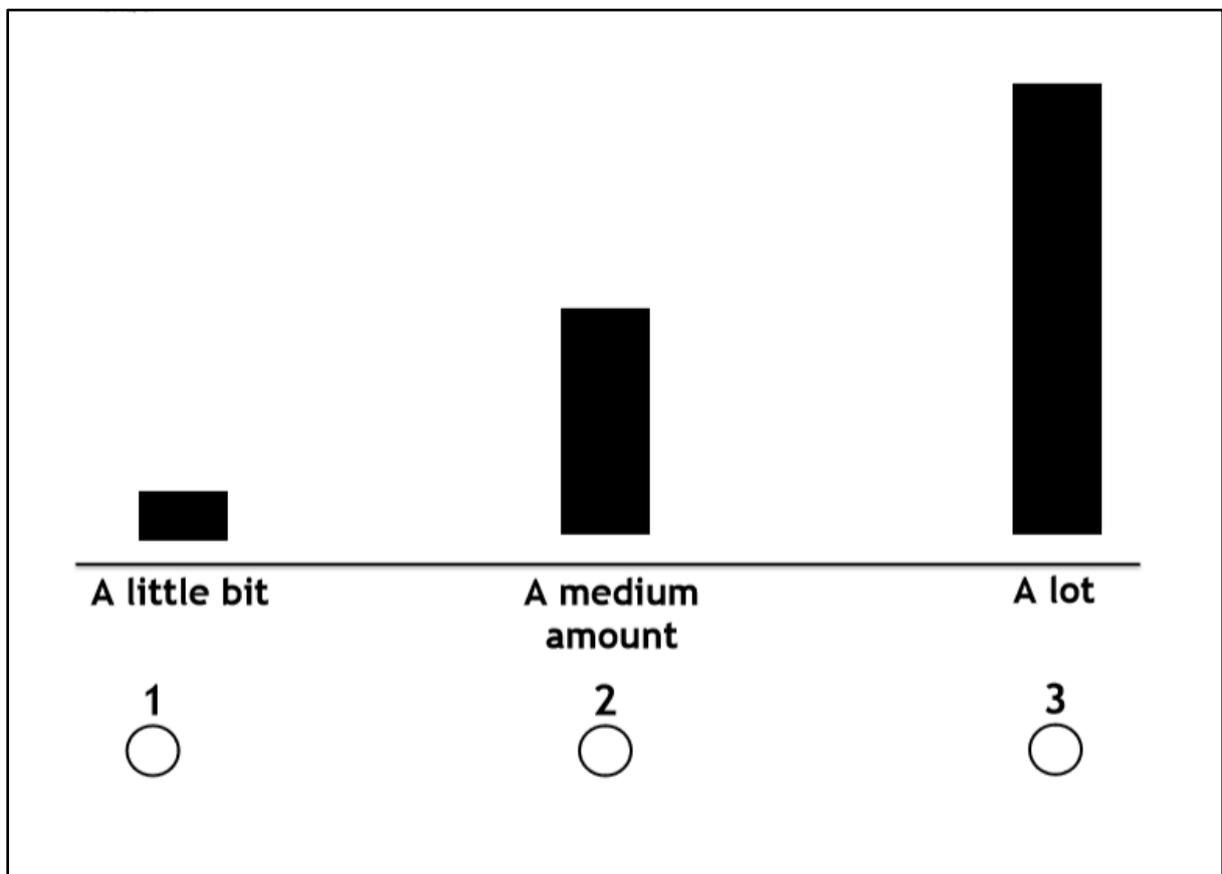
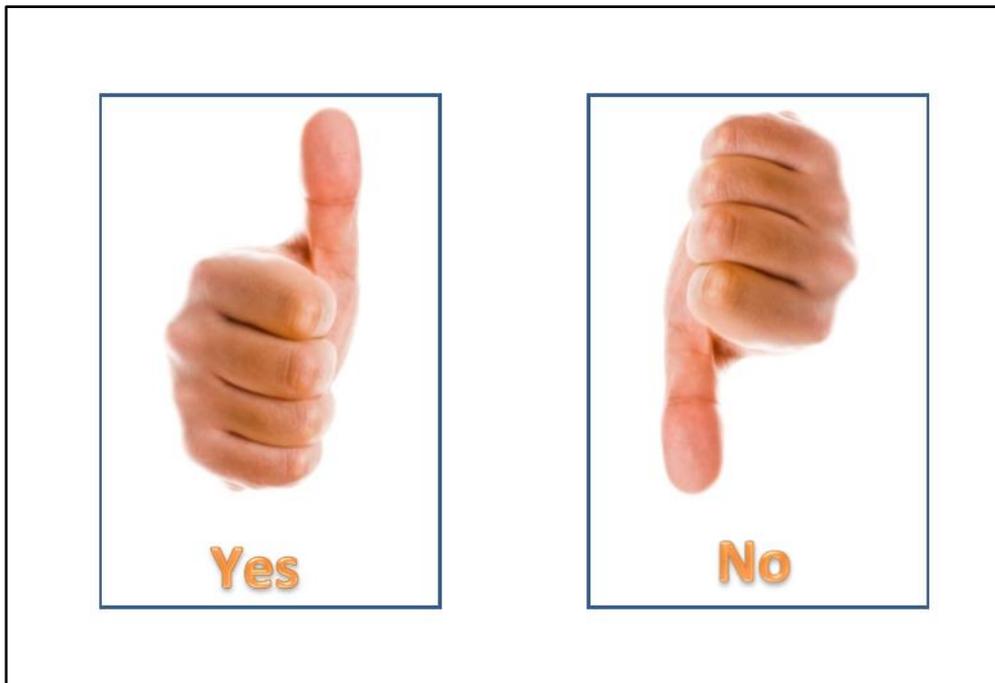
Tell the child:

- I'm going to ask you some questions that are not about food. These questions are about thinking, feeling, knowing and doing things on purpose.
- Remember that the answers can't be right or wrong, I'm just interested to know what you think.

Present each of the 16 items in random order

Mark the child's response on the score sheet and then discard the item face down away from the scale.

**Rating scale pictures presented to children (kindly supplied by Severson)**



## Items Description

			Colour Picture (5cm <sup>2</sup> )
<b>Training Items</b>			
Sweets			Mixture of colourful confectionary
Broccoli			Broccoli florets
Chips (Fries)?			French fries on a plate
<b>Animal Items</b>			
Version 1	A1	Does a rabbit have feelings like happy and sad?	Natural brown/grey rabbit (wild type)
	A2	Does a mouse think?	Natural brown/grey mouse (wild type)
	A3	Does a chicken know it's a chicken?	Brown/black hen with red comb
	A4	Does a toad do things on purpose?	Green mottled toad
Version 2	A1	Does a badger have feelings like happy and sad?	Young black/grey/brown badger
	A2	Does a rat think?	Grey rat (wild type)
	A3	Does a duck know it's a duck?	Grey/Green Mallard duck
	A4	Does a frog do things on purpose?	Green frog
<b>Human Items (both versions) – all pictures head and shoulders only, neutral facial expression</b>			
	H1	Does a person have feelings like happy and sad?	Boy, approximately 8 years old
	H2	Does a person think?	Girl, approximately 8 years old
	H3	Does a person know they're a person?	Young adult man
	H4	Does a person do things on purpose?	Young adult woman
<b>Anthropomorphised Animal Items</b>			
Version 1	F1	Does a badger have feelings like happy and sad?	Upright badger dressed in waistcoat and jacket
	F2	Does a rat think?	Upright rat wearing jumper and leggings, right hand raised to point
	F3	Does a duck know it's a duck?	Duck wearing a bonnet and shawl
	F4	Does a frog do things on purpose?	Upright frog clothed in shorts, holding a bouquet
Version 2	F1	Does a rabbit have feelings like happy and sad?	Upright rabbit wearing shorts and t-shirt
	F2	Does a mouse think?	Upright mouse clothed in a coat and belt and brandishing a sword
	F3	Does a chicken know it's a chicken?	White chicken with red comb, wearing shorts, t-shirt and glasses
	F4	Does a toad do things on purpose?	Upright brown toad, wearing trousers, waistcoat, tie and coat, holding a small stick
<b>Natural Objects</b>			
	N1	Does a mountain have feelings like happy and sad?	Single mountain, set against a blue sky with clouds (no trees)
	N2	Does a stone think?	Single grey lined jagged rock
	N3	Does the sea know it's a sea?	Ocean with sky in background (no other objects)
	N4	Does a raindrop do things on purpose?	Raindrops falling

### Anthropomorphic Picture Scale Scoresheet (Version 1)

		No	A little bit	Medium	A lot
<b>Training Questions</b>					
T1	Do you like sweets?	0	1	2	3
T2	Do you like broccoli?	0	1	2	3
T3	Do you like chips (Fries)?	0	1	2	3
<b>Questions – random order</b>					
A1	Does a rabbit have feelings like happy and sad?	0	1	2	3
A2	Does a mouse think?	0	1	2	3
A3	Does a chicken know it's a chicken?	0	1	2	3
A4	Does a toad do things on purpose?	0	1	2	3
H1	Does a person have feelings like happy and sad?	0	1	2	3
H2	Does a person think?	0	1	2	3
H3	Does a person know they're a person?	0	1	2	3
H4	Does a person do things on purpose?	0	1	2	3
F1	Does a badger have feelings like happy and sad?	0	1	2	3
F2	Does a rat think?	0	1	2	3
F3	Does a duck know it's a duck?	0	1	2	3
F4	Does a frog do things on purpose?	0	1	2	3
N1	Does a mountain have feelings like happy and sad?	0	1	2	3
N2	Does a stone think?	0	1	2	3
N3	Does the sea know it's a sea?	0	1	2	3
N4	Does a raindrop do things on purpose?	0	1	2	3

### Anthropomorphic Picture Scale Scoresheet (Version 2)

		No	A little bit	Medium	A lot
<b>Training Questions</b>					
T1	Do you like sweets?	0	1	2	3
T2	Do you like broccoli?	0	1	2	3
T3	Do you like chips (Fries)?	0	1	2	3
<b>Questions – random order</b>					
A1	Does a badger have feelings like happy and sad?	0	1	2	3
A2	Does a rat think?	0	1	2	3
A3	Does a duck know it's a duck?	0	1	2	3
A4	Does a frog do things on purpose?	0	1	2	3
H1	Does a person have feelings like happy and sad?	0	1	2	3
H2	Does a person think?	0	1	2	3
H3	Does a person know they're a person?	0	1	2	3
H4	Does a person do things on purpose?	0	1	2	3
F1	Does a rabbit have feelings like happy and sad?	0	1	2	3
F2	Does a mouse think?	0	1	2	3
F3	Does a chicken know it's a chicken?	0	1	2	3
F4	Does a toad do things on purpose?	0	1	2	3
N1	Does a mountain have feelings like happy and sad?	0	1	2	3
N2	Does a stone think?	0	1	2	3
N3	Does the sea know it's a sea?	0	1	2	3
N4	Does a raindrop do things on purpose?	0	1	2	3

## 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 Checklis

t

*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		Roslyn 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

### Regression Model Evaluation

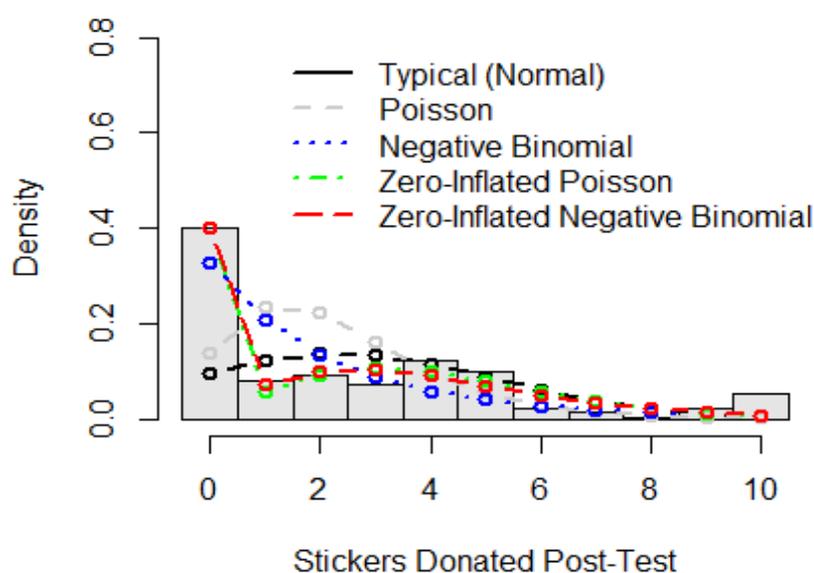
We evaluated a typical linear regression against Poisson, negative binomial, zero-inflated Poisson and zero-inflated negative binomial distributions, using R (R Core Team, 2019). Figure S1 shows the actual count and model predicted values.

We inspected AIC, BIC and model-predicted and observed counts for each model. Both zero-inflated models provided a superior fit for the data, compared with models that did not offer an additional probability weight for zero counts. A zero-inflated tolerance check\* (using a Poisson distribution) further confirmed that observed zeros (72) were larger than model predicted zeros (25), indicating that the model was underfitting zeros.

The AIC and BIC values and model-predicted counts were very similar for zero-inflated Poisson and zero-inflated negative binomial models, and there was no statistically significant difference a comparison of the two zero-inflated models using the Likelihood Ratio Test (LRT). The dispersion statistic suggested that the zero-inflated negative binomial model was closer in value to 1. This informed our decision to use this model in the planned analyses (see Atkins & Gallop, 2007).

### Figure S1

Sticker Donation Response Density and Predicted Values by Model



*Note:* Color should be used for this figure

\*[https://rdrr.io/cran/performance/man/check\\_zeroinflation.html](https://rdrr.io/cran/performance/man/check_zeroinflation.html)

## Appendix D

### **Non-Parametric Supplementary Analysis of Age-Related Influences on Children's Prosocial Responses to Stories**

A Krustal-Wallis H test was used to explore the change in sticker donations made by children in each year group. Younger children were more likely than older children to increase the number of stickers donated post-story compared with pre-story,  $H(3) = 15.19, p = .002$ . Dunn's pairwise post hoc test revealed that the youngest children (Nursery, age 3-4 years) were significantly more likely to increase their sticker donation post-story compared with the oldest children (Year 2, age 6-7 years),  $p = .001$  (adjusted using the Bonferroni correction). There were no significant differences between the intermediate age ranges.

### Appendix E

#### *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 F

### Coding The Story Data for Story Units

#### **Background:**

Individual children (aged 3-7 years) heard a story with from a picture book.

Each child heard either a story about a character who learned to share, or about a character who learned to relax. The stories were very similar in structure and length.

After the story, children retold the tale, supported by a wordless version of the same book. These were recorded and transcribed.

#### **Your task:**

You are provided with a transcript of the two original stories. These stories have been divided into 61 'idea units' based on clausal structure (these units are not equal, but for the purposes of the study this is ok). These units are numbered.

Your task is to look at each child's retell, line by line and indicate the presence of content from the original story. Childrens retells have been divided into lines and put into a spreadsheet for ease of coding. In column B you will mark which numbered unit (if any) the child's idea relates to from the original script.

#### **Note:**

You will need to use the correct script (Sharing or Busy) to code the transcript.

Children (and adults) do not generally remember a story verbatim (i.e., using identical words). You should mark an idea present if the gist of it is evident. We will discuss this further at training.

Additionally, children's grammar in this age range is still developing and the transcripts reflect what the child said, verbatim. You may need to think about what some children are trying to convey in order to decide if they remembered the gist or created another idea.

If ideas are not related to the original story script, leave column B blank in response.

If a retell contains two lines that relate to the same story unit, score only the first occurrence. Each unit Idea (1-61) can only be used once for each child.

Children's ideas do NOT have to be in the order they were presented in the original story, you may need to work back and forwards across the transcript in places.

If a line in the retell contains the gist of two (or more) ideas, add sufficient blank lines below to list the story unit numbers each idea captured.

One-word-only responses, e.g., 'flowers', with no other related element are NOT scored as enough to portray the gist of the story unit (these usually related to the child pointing out an element of the picture, rather than recalling the story).

Items included/listed within a more complex sentence which summarise the story elements are counted for as many of the elements they capture the gist for (this is good use of language!).

Make no changes to the transcripts or spacing, even if spaces appear within words.

The presence or otherwise of correct character name or animal type is not needed for the child to score for 'gist'. Therefore, the names are not provided in the story scripts you have.

### Appendix G

#### *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.

#### **Factorability in the Home Literacy Measure**

The factorability of the 5 items relating to home literacy exposure (title recognition, author recognition, frequency of child being read to, child reading alone frequency and number of books in the home) was examined. Several well recognised criteria for the factorability of a correlation were observed. Firstly, all 5 items correlated with 2 or more of the other items and 3 items correlated at least .3 with at least one other item (see Table X); this suggests reasonable factorability Secondly, the Kaiser-Meyer-Olkin measure of sampling adequacy was .68, which is above the commonly recommended lowest value of .6, and Bartlett's test of sphericity was significant ( $\chi^2(10) = 241.00, p < .01$ ). The diagonals of the anti-image correlation matrix were also all over .5. Finally, the communalities were all above .3, which further confirmed that each item shared some common variance with other items. Given these overall indicators, factor analysis was deemed to be suitable with all 5 items.

Principal components analysis was used because the primary purpose was to identify and compute composite scores for the literacy exposure factors underlying the parental questionnaire. Initial eigen values indicated that the two factors explained 47.7%, and 21.5% of the variance respectively. No further factors had eigen values of over one. This 2-factor solution, which explained 69.3% of the variance, was supported by the ‘levelling off’ of eigen values on the scree plot after two factors. All 5 factors contributed to this 2-factor structure, meeting the minimum criteria of having a primary factor loading of .4 or above.

The solution was initially examined using varimax and direct oblimin rotations of the factor loading matrix. There was little difference between the two factor varimax and oblimin solutions. However, as the factors should theoretically be related to one another (for example parental recognition of book title, should be related to reading with their child) the pattern matrix from the oblimin rotation was used for the final solution.

All items in this analysis had primary loadings over .5. Only one item had a cross-loading above .3 (Number of books), however this item had a strong primary loading of .72. The factor loading matrix is presented in Table X.

Factor labels were given to the 2 factors. The first factor was ‘Book Exposure’ (encompassing the items, Title recognition, Author recognition and Number of books in the home) and the second factor was ‘Reading frequency’ (items Frequency of being read to, and child self-reading frequency).

The internal consistencies for each scale were examined using Cronbach’s Alpha. The alpha was moderate for the Book Exposure subscale at .71 (3 items). The alpha for the Reading Frequency subscale was poor at .41 (2 items). However, Cronbach’s alpha has limited value for scales with very few items (ref)

## Appendix H

For completeness, we report an examination of inferred mental state terms in the narrative retells: these were mental state terms that were not stated in the original telling. We observed that 93.6% of children made at least one reference to an internal state term that they had heard in the original story and 39.2% of children made at least one additional internal state inference in their retell. No child made an internal state inference, without also including at least one reference in their narrative. The presence of internal state terms in each age group, subdivided into references and inferences is shown in Table H.1 (below). The youngest children included fewer categories of internal state inferences: For example, no cognitive, volitional, or perceptual/physiological inferences were made by nursery-aged children (3- and 4-year-olds), but all categories are represented by Year 1 children (5- and 6-year-olds). Inspection of the inferences made in each story condition, suggests that internal state inferences are made for both animal and human characters, particularly by older children (see Table H.2).

**Table H.1**

*Percentage of Retells Including the Presence of Internal State References and Inferences in Each School Year Group*

	3-4 years (N=29)		4-5 years (N=46)		5-6 years (N=44)		6-7 years (N=52)	
	Reference	Inference	Reference	Inference	Reference	Inference	Reference	Inference
Character internal state								
Emotional	24.1	24.1	52.2	15.2	81.8	25.0	92.3	28.8
Volitional	37.9	0.0	67.4	15.2	70.5	9.1	88.5	17.3
Cognitive	13.8	0.0	26.1	4.3	47.7	11.4	59.6	11.5
Perceptual/Physiological	48.3	0.0	65.2	0.0	70.5	2.3	92.3	3.8
Socio-relational	10.3	6.9	10.9	8.7	36.4	15.9	69.2	7.7

Note: Presence = percentage of narratives showing a binary presence

**Table H.2**

*Number (percentage in brackets) of Children Making Internal State References per Age Group and per Book Condition*

Book Condition	Nursery 3-4 years		Reception 4-5 years		Year 1 5-6 years		Year 2 6-7 years	
	Reference	Inference	Reference	Inference	Reference	Inference	Reference	Inference
Animal Busy	N=7		N=12		N=11		N=12	
Emotional	1 (14.3)	2 (28.6)	7 (58.3)	4 (33.3)	8 (72.7)	1 (9.1)	11 (91.7)	5 (41.7)
Volitional	2 (28.6)	0 (0)	7 (58.3)	1 (8.3)	8 (72.7)	2 (18.2)	10 (83.3)	1 (8.3)
Cognitive	1 (14.3)	0 (0)	4 (33.3)	1 (8.3)	3 (27.3)	1 (9.1)	7 (58.3)	1 (8.3)
Perceptual/Physiological	4 (57.1)	0 (0)	9 (75)	1 (8.3)	5 (45.5)	0 (0)	0 (0)	1 (8.3)
Socio-relational	1 (14.3)	0 (0)	0 (0)	2 (16.7)	1 (9.1)	1 (9.1)	9 (75.0)	1 (8.3)
Animal Sharing	N=7		N=12		N=10		N=14	

Emotional	1 (14.3)	1 (14.3)	6 (50.0)	2 (16.7)	8 (80.0)	5 (50.0)	13 (92.9)	5 (35.7)
Volitional	2 (28.6)	0 (0)	8 (66.7)	1 (8.3)	6 (60.0)	0 (0)	13 (92.9)	2 (14.3)
Cognitive	0 (0)	0 (0)	2 (16.7)	0 (0)	5 (50.0)	2 (20.0)	7 (50.0)	1 (7.1)
Perceptual/Physiological	3 (42.9)	0 (0)	7 (58.3)	0 (0)	9 (90.0)	1 (10.0)	11 (78.6)	0 (0)
Socio-relational	2 (28.6)	1 (14.3)	1 (8.3)	0 (0)	4 (40.0)	2 (20.0)	12 (85.7)	1 (7.1)
<b>Human Busy</b>		<b>N=8</b>		<b>N=11</b>		<b>N=12</b>		<b>N=12</b>
Emotional	2 (25.0)	3 (37.5)	3 (27.3)	0 (0)	10 (83.3)	2 (16.7)	11 (91.7)	3 (25.0)
Volitional	5 (62.5)	0 (0)	8 (72.7)	1 (9.1)	8 (66.7)	1 (8.3)	10 (83.3)	2 (16.7)
Cognitive	1 (12.5)	0 (0)	2 (18.2)	0 (0)	5 (41.7)	1 (8.3)	8 (66.7)	2 (16.7)
Perceptual/Physiological	5 (62.5)	0 (0)	7 (63.6)	0 (0)	9 (75.0)	0 (0)	12 (100.0)	1 (8.3)
Socio-relational	0 (0)	0 (0)	0 (0)	0 (0)	2 (16.7)	2 (16.7)	5 (41.7)	1 (8.3)
<b>Human Sharing</b>		<b>N=7</b>		<b>N=11</b>		<b>N=11</b>		<b>N=14</b>
Emotional	3 (42.9)	1 (14.3)	8 (72.7)	1 (9.1)	10 (90.9)	3 (27.3)	13 (92.9)	2 (14.3)
Volitional	2 (28.6)	0 (0)	8 (72.7)	4 (36.4)	9 (81.8)	1 (9.1)	13 (92.9)	3 (21.4)
Cognitive	2 (28.6)	0 (0)	4 (36.4)	0 (0)	8 (72.7)	1 (9.1)	9 (64.3)	3 (21.4)
Perceptual/Physiological	2 (28.6)	0 (0)	7 (63.6)	0 (0)	8 (72.7)	0 (0)	13 (92.9)	0 (0)
Socio-relational	0 (0)	1 (14.3)	4 (36.4)	2 (18.2)	9 (81.8)	2 (18.2)	10 (71.4)	1 (7.1)

## Appendix I

### Internal States and Dialogue Coding

**Table H1**

*Coding System for Internal State Words Used in Recalled Narratives*

Category	Description	Examples
Emotional	Feelings and emotional states	Angry, sad, likes
Volitional	Intentions towards goals and ability	Choose, decide, want, need, can
Cognitive	Relating to thought processes	Know, think, forget, learned
Perceptual experience	Conscious awareness of the world	Hear, see, hide
Physiological experience	Bodily sensations	Hungry, tired
Moral/Socio-relational	Moral and relational perspectives	Should, must, have to, being bad

Each narrative was coded for the inclusion of expressions referring to internal states, using an adaptation of a method originally developed by Bretherton & Beeghly (1982) and modified by Pinto et al. (2017). Accordingly, in this study, internal states were coded into 6 broad categories: emotional, volitional (including intentional, ability and willingness terms), cognitive, perceptual, physiological, and socio-relational (including moral judgements). Perceptual and physiological states were collapsed into a joint category, prior to analysis, to provide the same five broad categories used by Pinto (2017).

It should be noted that whilst lines between categories provide a way to organise children's use of these terms, these divisions are drawn in slightly different ways across the literature, particularly with respect to what is included and excluded. The following define the ways the data is coded in this present study, with our rationales for doing so.

#### *Distinctions between Internal State Experience and Action*

Wellman et al. (2000) categorizes internal state perceptual references in terms of either experiences or actions. Thus, a character described as ‘seeing’ is labelled as a perceptual experience, whereas a character ‘looking’ is labelled as a perceptual action. Similarly, physiological terms can be conceived of as physiological experiences for a character, such as ‘hunger’, or ‘feeling tired’, which is distinct from physiological actions, such as ‘eating’, or ‘sleeping’. A number previous studies included references to both experience related and action related internal state terms (e.g. Bretherton & Beeghly, 1982; Pinto et al., 2017).

Clearly, as our paradigm included the use of a wordless picture book, reported character action (such as sleeping) may represent descriptions of the illustrations, rather than relating to perceived internal states. Therefore, we did not include action terms in this present study. Rather, only those terms relating to the internal state experiences imagined of characters were included in our coding scheme.

Whilst the inclusion of physiological internal references, such as tiredness or hunger, appears in some studies concerning children’s narrative language (e.g., Pinto et al.), it is absent in others (e.g. O’Neill et al., 2004; Ruffman et al., 2002). We included internal physiological internal experience references, to maintain a wide focus on character internal states, whilst excluding observable physiological action, such as sleeping.

### ***Moral/Socio-relational terms***

These are included in the internal states coding schemes used in a number of previous studies (Bretherton & Beeghly, 1982; Pinto et al., 2016, 2017; Tarchi et al., 2019). These terms are concerned with the moral perspectives and relationships between characters. We included internal dispositional and moral attributions (e.g., a character described as ‘selfish’, being shy, being mean, being good, being bad etc.), moral obligations (e.g., have to, should, must, ought etc.) and terms relating to permission.

By applying the Wellman (2000) distinction between internal state experience and internal state action (as described above for perception and physiology), we distinguished between moral and socio-relational internal experience (as above) and observable moral or socio-relational action (being alone, being with others, helping, sharing). We did not include moral or socio-relational action terms in our coding for the present study.

### ***Modal Verbs***

Modal auxiliary verbs were given very careful attention. These verbs indicate modality, indicating ideas such as ability, permission, capacity, obligation, frequency or likelihood. Modal verbs are used in conjunction with base verbs, which provide the related semantic content. In the example, ‘Yes, you can go to the party’, *can* is the modal verb which provides information (permission, in this example) about the action (of going). However, not all modalities are concerned with internal states and context was used to decide whether character internal states were being clearly expressed before they were classified.

Thus, if the child recalled, ‘This girl will bring apples’, the context suggests that the child is reporting ‘will’ simply as a future action. This therefore is not a character focused internal state. However, ‘The girl said, “I will bring these apples”’, conveys character intentionality, and such instances were counted as character volition. Similarly, ‘would’ is only interpreted as intentional if it is being used in a similar way to will, as described above, e.g., ‘She said she would bring apples’ was counted, as it is a reported character intention. Most uses of ‘would’ were not counted as clearly intentional. For example, ‘she would go on the swing’, ‘she wouldn’t stop’ were not included as they can be viewed as statements of likelihood, rather than unambiguous indications of intentionality.

The term ‘can’ was another commonly used modal verb. It was frequently used in terms of ability, e.g., ‘I can (or cannot) eat these fish’. This was categorized as a volitional term if it related directly to character intention (also see Bretherton & Beeghly, 1982; Pinto et al., 2017). ‘Can’ may also indicate permission, e.g., ‘You can go to my party’, which was coded as a socio-relational use of the term (see Bretherton & Beeghly). Context was used to decide whether specific incidences related to volition (including ability), or permission, or was not related to the character (and was therefore not coded at all). Where the parental character was reported as telling the child character what they can (or can’t do), we categorized this as permission (socio-relational), rather than a statement of ability, across all scripts. Similarly, when ‘could’ is used as the past simple of ‘can’, it is categorized as an appraisal of ability (volitional) or as permission (socio-relational) according to context. If ‘could’ is expressing an appraisal of likelihood (possibility), e.g., “she could go to the party,” this was not categorized as an internal state.

Where a modal verb was used with an internal state base verb, e.g., ‘could see’, ‘couldn’t decide’, this was counted as a single example of an internal state and categorized as indicated by the base verb (i.e., see, decide).

Other examples of modal verbs, such as ‘must’, ‘should’ and ‘have to’ were categorized as socio-relational indicators, where they represent social obligation.

Contracted modal verbs were coded as the full word would be, for example, ‘I’ll fetch the apples’ includes the contracted form of the word ‘will’ and was coded appropriately as a volitional term.

### *Other Coding Clarifications*

Words with more than one meaning were counted only when internal states are suggested. For example, ‘let’ when meaning ‘allow’ was categorised as volitional (intentional) e.g., ‘She let him have a turn’. But when used in the imperative form (i.e., ‘let us’), e.g., ‘Let’s go’, or ‘let’s make a cake’, no mental state is implied, the term was not counted.

All variations of terms concerned with of ‘being alone’ were coded as socio-relational in meaning (see Pinto, et al.).

When ‘like’ was used as a figure of speech was not categorized, e.g., ‘he, like, went to the party.’

The child’s self-referential states were excluded, e.g., ‘I think she went on the swing’, as these not related to *characters* internal state.

For the purposes of this study, we coded the use of ‘hiding’ as a perceptual term. As the book illustrations give the child who was narrating the story a clear view of the character, it can be assumed that “she hid in the bushes,” relates to the characters perceptual understanding (along with cognitive and volitional aspects), not the child’s own viewpoint. References to a character who “went in the bushes” (action) were not counted as an internal state reference.

Examples in the transcripts include:

Emotional	Volitional	Cognitive	Perceptual	Physiological	Moral/Relational
Likes	decided	Think	Saw	Tired	Selfish
Favourite	Want	Forgot	Heard	Feeling (body/haptic) e.g., feeling hot, feeling bad in body	Being mean, good, bad, nice etc Became good (moral judgement)
Sure/unsure	Need	Learned	Hid		
Fun	Would	Plan	Noticed		
Sad	Can (able)	Remember			
Scared	Will (intentional)	Realise			Have to
Worried	Let (allow)				Should (ought) to
Enjoyed					Can (permission)
Feeling mad (angry)/good/selfish etc					
Bothered about					

### *Dialogue*

Dialogue between characters (but not reported character thought) was categorized in one of three ways (see Ukrainetz, 2005):

1. **Semantic:** speech with a semantic marker, e.g., She said, 'I will bring apples' was categorized as semantic. Where the semantic marker appeared once in several lines where the speech was clearly the same character, each T-unit was coded as semantically marked speech.
2. **Implicit:** where no marker was provided e.g., 'I will bring apples,' without any indication of who was speaking, the line was coded as implicit speech.
3. **Reported:** If the speech was reported indirectly, e.g., *she said that she would bring apples*, or, *she told her mum about the party*, this was coded as reported speech.