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## Review

# The youngest readers' dilemma: A review of children's learning from fictional sources



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## ABSTRACT

Young children are surrounded by fictional media, including books, videos, and games. Often they are expected to learn new information from these explicitly fictional sources, while simultaneously avoiding confusion about what is true in the real world versus what is true only in fictional worlds. How do children navigate this “reader's dilemma”? The current review addresses this question by first examining whether fiction can change children's real-world knowledge or behaviors, both generally and through learning of specific pieces of information from fictional contexts. The bulk of this research suggests that children can learn new information from fiction. We then ask whether fiction teaches children more effectively than other types of activities or than nonfiction media, as well as whether there are differences in children's learning from realistic as opposed to fantastical fiction. Many open questions about these topics remain, including how selective children are when learning from fiction, which properties of the media affect their selectivity, how long children retain information learned from fictional contexts, and how child-level factors like age may affect this learning. We close the review by addressing these issues and offering some suggestions for future research in this area.

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## Introduction

Despite their fictional nature, stories present a wealth of true information about reality, like what life was like on a whaling ship (*Moby Dick*) or the virtues of friendship (*Harry Potter*). Readers or viewers can and should incorporate this kind of information into their background knowledge. Indeed, part of the pleasure we experience from consuming stories may come from vicariously experiencing new situations and emotions (Bloom, 2010; Gerrig, 1993; Green, 2010; Green & Brock, 2002; Harris, 2000; Lillard, 2001; Mar & Oatley, 2008). Although it is obviously important to distinguish fiction from reality, some aspects of the boundary between reality and fiction should be porous, so that we can learn new information from stories and so that our real attitudes can be enriched by our experiences in fictional worlds. But how do we know which aspects of stories can apply to real life, and which cannot?

This is known as the “reader's dilemma” (Gerrig & Prentice, 1991; Potts, St. John, & Kirson, 1989), to capture the difficulties we face in deciding whether a piece of information in a story could potentially be true in reality. This dilemma is present for readers of all ages, but it is especially acute for children: Many of the stories that young children hear are designed to teach them something and hence require them to solve this dilemma correctly. Stories like Aesop's fables, or modern-day equivalents of these tales such as *The Berenstain Bears*, are often used to illustrate morals or values that are important to

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a culture. Children are expected to learn these values and apply them to real life, but not to believe that other aspects of the story are real. When children hear a book like *The Berenstain Bears Visit the Dentist*, for example, they are expected to learn what dentists do and what typically happens during a visit to the dentist, but not that bears wear clothes, live in houses, and speak like people.

This dilemma is not limited to behaviors or values. Many television shows, like *Dora the Explorer* and *The Magic School Bus*, present children with new languages, cultural practices, and information about the physical world. Indeed, it is difficult to find a children's book, movie, or television show that does not aim to teach some sort of new fact or lesson. But to what extent are children successful at solving the reader's dilemma? What kinds of information do children export from fictional worlds into reality, and under what circumstances? How do children learn from fiction—that is, import some information from stories into reality—without coming to believe false things about reality (“representational abuse;” Leslie, 1987)? And can fictional sources be more effective ways of conveying educational material than non-fictional sources? This paper aims to answer these questions by presenting a comprehensive review of the literature on children's learning from fictional media.

We will begin with an overview of the skills that are required for solving this dilemma, which will place restrictions on the age groups and types of learning that we will consider. We will also introduce our working definition of “fiction” to further clarify our inclusion criteria for studies, and describe our search process for locating the articles we have chosen to include.

### *Experiencing the reader's dilemma*

The reader's dilemma occurs whenever readers encounter a novel piece of information in a context that they know to be fictional. Readers are then faced with the challenge of determining whether the information is true only of the fictional world or is also true of reality. This dilemma does not occur in the same way with non-fiction, because in non-fiction the content is intended to be true of reality. Thus, in order to experience the reader's dilemma, children must first be able to understand fiction as adults do: as a description of fictional events separate from reality. Without this understanding, children would always risk blurring what is true in a fictional world with what is true in the real world and could not be credited with successfully navigating the reader's dilemma.

Recent research has shown that children are able to make an explicit distinction between reality and fiction by about the age of three, though this ability continues to grow throughout the preschool years (Morison & Gardner, 1978; Skolnick & Bloom, 2006; Wellman & Estes, 1986; Woolley & Cox, 2007; see Lillard, Pinkham, & Smith, 2010; Weisberg, 2013 for reviews). Children around this age also understand that what happens in a fictional context does not really affect how things work in the real world (“quarantining;” see Leslie, 1987). Based on these results, it is not clear whether toddlers conceptualize information presented in print or screen media in the same way as older children. We thus use 3 years as a lower age limit for the purposes of this review, excluding studies that only focus on toddlers or younger infants.

This is not to say that fictional media does not affect children younger than 3. Indeed, even infants and toddlers can replicate actions that they have seen in videos (e.g., Barr & Hayne, 1999; Hayne, Herbert, & Simcock, 2003; Meltzoff, 1988; Simcock, Garrity, & Barr, 2011). And a large body of work shows that infants and toddlers can learn words from non-narrative videos (Krcmar, 2014; Krcmar, Grela, & Lin, 2007; Roseberry, Hirsh-Pasek, Parish-Morris, & Golinkoff, 2009; Vandewater, Barr, Park, & Lee, 2010, but see DeLoache et al., 2010; Robb, Richert, & Wartella, 2009) or simple picture books (Chiong & DeLoache, 2012; Ganea, Pickard, & DeLoache, 2008; Khu, Graham, & Ganea, 2014; Tare, Chiong, Ganea, & DeLoache, 2010; see Linebarger & Vaala, 2010 for a review). However, it's not clear that they are confronted with the reader's dilemma in the same way as older children who know that these media are fictional. Examining the behavior of children who have a more adult-like understanding of the reality/fiction distinction ensures that we are indeed studying the reader's dilemma: the ability to discriminate between information that should remain quarantined in a fictional world and information that can apply to the real world.

### *Solving the reader's dilemma*

Once the reader's dilemma has been experienced, what does it take to solve it? When novel information is encountered in fiction, readers or viewers must first decide if the information could plausibly be true of reality and then appropriately integrate it into their real world knowledge.

The first step involves an understanding of the structure of the real world in order to discriminate what types of information can potentially apply to reality and what types of information cannot. Some information in fiction directly violates real-world laws and thus cannot be true outside the fictional world. For example, Superman can fly and see through walls, which no real person could possibly do. Readers therefore should not incorporate information about Superman's powers into their knowledge of reality. By early preschool, children have rich knowledge of the workings of the physical, social, and biological world (Carey, 1985, 2009; Flavell, 1999; Keil, 1992; Wellman, 2011), though much of this knowledge is still developing over the course of the preschool and elementary school years. Thus, children starting around 3 years of age should be able to avoid incorrectly learning information in fiction that obviously violates real-world laws.

However, other information in fictional worlds is more ambiguous. Batman is a fictional character, but he is also a human being who does not violate any of the rules that govern the workings of reality, and so could potentially be real (Sharon &

Woolley, 2004; Woolley & Cox, 2007). Even considering the Superman example used above, many of the events depicted in these stories, such as working at a newspaper, do not violate real-world laws and could be real. Similarly, stories with extremely unrealistic events or settings may nevertheless depict characters with realistic, human-like thoughts and emotions (Mar & Oatley, 2008; Oatley, 1999). Negotiating this dual nature of fiction is at the heart of the reader's dilemma. Decisions about whether to learn these more ambiguous types of information are likely influenced by the larger context, such as the genre or the way the information is described (Corriveau, Kim, Schwalen, & Harris, 2009; Dore, Jaswal, & Lillard, 2015; Vaden & Woolley, 2011; Woolley, Ma, & Lopez-Mobilia, 2011; Woolley & Van Reet, 2006), issues that we return to throughout the course of this review.

Once a reader has decided to accept a piece of information from fiction as real, the second component of learning from fiction is applying the novel information to the real world—that is, generalizing. Some sort of ability to generalize is necessary for any kind of learning, but learning from fiction in particular requires children to notice the similarities between information presented in a fictional world and relevant aspects of the real world. For example, a story might illustrate a character using a particular strategy to avoid temptation. In order to learn this strategy, children would have to recognize that the instance of temptation shown in the story is relevantly similar to feelings that they might have in real life, and then apply the strategy as it is needed.

Even very young children have some learning and generalization abilities; for example, toddlers as young as 18 months will transfer novel object labels (e.g., Ganea et al., 2008; Vandewater et al., 2010) or novel actions from books and videos to real life (e.g., Barr & Hayne, 1999; Keates, Graham, & Ganea, 2014). Children in preschool and beyond are similarly able to draw analogies between contexts and thereby transfer information from teaching material to applicable real-world situations. This ability develops and matures during early childhood (e.g., Brown & Kane, 1988; Chen, 1996; Gentner, 1988; Holyoak, Junn, & Billman, 1984; Rattermann & Gentner, 1998).

### *The scope of this review*

Based on the considerations reviewed above, we use the age of 3 years as a lower boundary for the studies we have chosen to include, since it is not clear whether children younger than this age experience or solve the reader's dilemma in the same way as older children and adults. We did not place an explicit upper age limit on the studies that we chose to include; even adults face instances of the reader's dilemma (see Gerrig, 1993; Marsh & Fazio, 2006). However, nearly all of the research in this area tends to recruit children in middle school or younger, with most of the work focusing on preschool and the early elementary years. This limits the kinds of conclusions that we can draw about developmental changes in children's abilities to learn from fiction, an issue we return to in our discussion.

It is also necessary to establish which kinds of activities count as presentations of fictional worlds, as well as what counts as learning for our purposes. In terms of the first issue, we take a broad view, and include as fictional settings any kind of medium or interaction that involves some kind of imaginative processing (Weisberg, 2014; Weisberg & Gopnik, 2013). The only essential requirement for the fictional contexts that we will examine is that these contexts are both not real and are intended to be understood as such by their consumers. Most of the extant research focuses on storybooks, television shows, and movies, which present the clearest cases of fiction. But we will also include research that has examined learning from pretend play and some kinds of computer and video games, since these activities also require children to distinguish between reality and fiction. These contexts usually include a narrative component, which helps to signal that they do not take place in reality. However, a narrative is neither necessary (pretending that a block is a cookie is clearly fictional, even if no narrative is involved) nor sufficient (nonfiction stories, such as biographies, also use narrative formats). Our emphasis is thus on the need to explicitly navigate the boundary between reality and fiction, which is part of the defining issue of the reader's dilemma.

This definition excludes advertising, which deliberately blurs the line between reality and fiction; there already exists an excellent literature about how children understand advertisements (Adler, 1977; Kunkel, 2001; Wartella, 1984; Wartella & Hunter, 1983; Young, 1990, 2003). This definition also excludes many educational apps, board games, and video games, since it is not clear whether these contexts are explicitly fictional or not. For example, a child matching shapes in a memory game or clicking on objects to learn their names in a tablet app is likely to be learning something, but these activities do not clearly take place in a fictional world.

The most important aspect of the definition of "fiction," for our purposes, is the fact that it is not intended to be a literally true depiction of reality. Although almost all fiction includes at least some content that is true (London is real even though Harry Potter is not), it is still distinct from nonfictional media, which intend to depict only the truth about something that actually happened, and from reality, such as watching a live video feed. For the bulk of this review, we will not differentiate by media format (book, video, play, games), but we will discuss potential effects of format briefly at the end of the third section of this paper ("Do Children Learn Better from Fiction?").

Within the category of fictional stories, more fine-grained distinctions about genre can be made. The one we will consider here is the distinction between realistic and fantastical fiction. Fantasy is broadly defined as content that could not possibly be true of the real world; this includes ontologically impossible items or entities such as dragons or magic wands, and events that explicitly violate the laws of reality such as walking through solid walls or travelling through time. Realistic fiction, on the other hand, describes people, places, and events that *could* exist in the real world, but do not actually exist. We will consider studies that compare learning from realistic and fantastical fiction in their own section.

To find studies that fit all of these criteria, we began with a corpus search and with articles already in our own libraries. Because much of the literature is organized topically (e.g., studies that teach words through fictional media as opposed to studies that teach scientific concepts), and papers covering these different topics do not necessarily cross-cite, we included search terms to help us find these different bodies of literature (e.g., “fictional stories science”). For each article that we found, we looked at papers cited within the article and searched for newer studies that had cited the article. We repeated this process with every article until no new articles were found. Finally, we narrowed down this larger list to ensure that each article fit within our age restriction and our definition of “fiction.” We also included unpublished dissertations and manuscripts under review or in preparation that were either cited in articles we found, presented at conferences, or that we were aware of through personal communications. Only papers that were published or in preparation as of November 2015 are included.

The rest of this paper is divided into three main sections. The first of these discusses work on whether children can learn from fiction in general, paying particular attention to the different dependent measures used to answer this question. These studies typically assess the efficacy of learning from fictional media either through pre-test/post-test designs or by comparing children who were exposed to novel content through fictional media to children who had no exposure to the novel content.

In contrast, studies reviewed in the second section all include a comparison between learning from fiction and learning the same or similar content from some other type of source. We will consider comparisons between fictional media and other methods of instruction, between fictional and nonfictional media, and between realistic and fantastical fiction. This section thus addresses the questions of whether fictional media teaches better or differently from other types of media or instruction, and of which kinds of fictional media might be particularly effective. In the final section, we will draw out some of the general themes from this body of research and conclude with suggestions for future directions that this field might take.

### **Can children learn from fiction?**

In considering the reader’s dilemma, the primary question is whether children strictly quarantine all information presented in fictional contexts (Leslie, 1987) or whether this information has any impact on their lives. Generally, the answer to this question is that children do learn from fiction, both implicitly and explicitly. This section reviews the evidence for that claim in two parts. The first covers general effects of fiction on children’s knowledge or behaviors, and the second examines children’s learning of specific content from fictional sources.

Importantly, in considering this issue, careful attention needs to be paid to the way in which children’s learning is measured. For example, children may have difficulty explicitly reporting the lessons of stories (e.g., Mares & Acosta, 2008), but may nonetheless demonstrate changes in their behavior as a result of being exposed to these stories (e.g., Smith, 2014). Thus, the use of different dependent measures can influence the conclusions that are drawn about the extent to which children are impacted by fiction.

#### *General effects of fiction*

It has long been known that engaging with fictional materials can have measurable effects on children’s lives. Work in this area focuses on how fictional media in general can shape children’s knowledge and behaviors. Importantly, however, these studies do not assess direct learning of specific pieces of information from specific fictional stories. Rather, the research reviewed in this section demonstrates cumulative effects of media consumption on various aspects of children’s lives.

Perhaps the most prominent research in this area focuses on whether children are more likely to engage in violent or aggressive actions after seeing these actions modeled, and as such focuses largely on television and other screen media. Many reviews and meta-analyses have demonstrated an association between violent media and children’s aggressive behavior (Anderson et al., 2003; Drabman & Thomas, 1974; Huesmann, Moise-Titus, Podolski, & Eron, 2003; Johnson, Cohen, Smailes, Kasen, & Brook, 2002; Kirsh, 2006; Paik & Comstock, 1994; Wood, Wong, & Chachere, 1991; but see Ferguson, 2015), especially for children already high in aggressive tendencies (Friedrich & Stein, 1973). This research suggests that children’s real-world behavior can be affected by fictional media.

The same modeling processes involved in these cases of aggression are also evident in children’s success at retaining positive messages from media. For example, children who watch more Sesame Street have better academic performance (Fisch, 2005; Fisch, Truglio, & Cole, 1999). Further, hearing more books or watching more educational television is associated with improvements in general abilities, such as IQ, verbal ability, school readiness, social skills, or motivation (Anderson, 1998; Anderson et al., 2001; Calvert & Kotler, 2003; Fisch, 2005; Linebarger, 2005; Rice, Huston, Truglio, & Wright, 1990; Sénéchal, LeFevre, Hudson, & Lawson, 1996; see Scarborough & Dobrich, 1994 for a meta-analysis). Similar effects can be seen for children’s mathematical abilities (Schiro, 1997; Welchman-Tischler, 1992; see Flevaris & Schiff, 2014 for a review), as both children and adults spontaneously use math vocabulary and concepts when talking about math-themed picture books (Elia, van den Heuvel-Panhuizen, & Georgiou, 2010; Skoumpourdi & Mpakopoulou, 2011; van den Heuvel-Panhuizen & van den Boogaard, 2008; van den Heuvel-Panhuizen, van den Boogaard, & Doig, 2009).

This body of work clearly demonstrates that children's real-world knowledge and behaviors are affected by engaging with fictional stories. However, these studies do not necessarily provide evidence that children can solve the reader's dilemma, for three main reasons. First, much of this research has been conducted on children who are likely too young to make a firm distinction between reality and fiction. So while these studies show that children will certainly incorporate new actions into their behavioral repertoire when they have seen these behaviors modeled, this in itself does not tell us whether or how they solve the reader's dilemma, which requires an understanding of the fact that they are being presented with information in an explicitly fictional context.

Second, and relatedly, the materials used in some of these studies were not clearly fictional. This is the case for one of the most famous examples of children's learning from media: Bandura's research with a clown doll called Bobo (Bandura, Ross, & Ross, 1963). Children came into the lab and watched a video of a woman performing a series of violent actions on the doll, such as hitting it. When given the opportunity to interact with the doll themselves, most children tended to imitate these actions. This research gave some of the first indication that children's real-life behavior is affected by the behaviors they see on a screen. But because this study simply showed children the video clip without any further context, children might have interpreted this as being an instructional video rather than a fictional situation. Similarly, some work has used modeling videos to increase socially-isolated preschoolers' prosocial engagement in the classroom (O'Connor, 1969, 1972; Rao, Moely, & Lockman, 1987). These videos do indeed have their intended effects, but this research does not make it clear whether the content of the videos is fictional. The reader's dilemma thus does not apply to such cases, where the target media does not take place in an explicitly fictional world.

Third, as noted in the introduction to this section, even the studies that did include clearly fictional media looked only at general effects of the media on children. Although these cases do present some form of learning from fiction, they do not allow us to precisely trace the effects of particular features of stories or television shows on children's knowledge, behavior, or attitudes. The learning measured in these studies is too broad and too far removed from the content that was presented to adequately judge how children transferred information from the fictional source to reality or what variables were important in this process. This work thus has limited ability to tell us how children solve the reader's dilemma.

For these reasons, in the remainder of this review, we restrict our focus more narrowly to considering studies that examine how children who already possess an understanding of the reality/fiction boundary learn particular pieces of information from particular fictional media. These cases provide a stronger test of how children navigate the difference between real and fictional information presented in a fictional context and how they decide which information to apply to reality.

### *Specific learning from fiction*

To address the issue of whether children can learn specific pieces of information from fictional sources, we consider three main measures of learning. First, we review studies that measured children's ability to remember and report the information provided in the fictional media (*recall*). For example, studies of word learning present novel words embedded in fictional narratives and test children on their ability to recognize or define these words. Second, we review studies where children are asked to apply the information presented in the fictional media to a new situation (*generalization*). For example, some studies have assessed changes in children's gender attitudes after reading stories with counter-stereotypical characters by asking children to directly report which toys are appropriate for children of each gender. Third, we review studies that measure children's behavioral application of the information they learned (*application*). For example, rather than asking children directly about toys following the counter-stereotypical story, children are provided with a set of toys and researchers measure which toys they choose to play with and for how long. Different measures may lead to different conclusions about children's abilities to successfully solve the reader's dilemma.

#### *Recall*

This section focuses on studies where children were asked to recall specific information that had been presented to them through some form of fictional media. Much of the research in this area is focused on children's word learning from stories or videos. To take a representative example, in Elley (1989), 7-year-olds were read a commercially-available storybook by their teacher 3 times over the course of 1 week. The story contained 20 novel words. Children were pre- and post-tested on their receptive knowledge of the target words, using both a pictorial measure where children had to select the picture that matched the new word from a set of four pictures and a verbal measure where children had to select a synonym for the new word from a set of four words. On average, children's scores increased 15% from pre- to post-test, meaning that they learned approximately three novel words from exposure to the storybook.

Similar rates of word learning have been shown in other studies in children between 3 and 9 years of age, both from books (Brabham, Boyd, & Edgington, 2000; McLeod & McDade, 2010; Robbins & Ehri, 1994; Sénéchal & Cornell, 1993; Wilkinson & Houston-Price, 2012) and from videos (Rice & Woodsmall, 1988). Additionally, Sénéchal and Cornell (1993) found that the novel words learned from a storybook were retained when tested 1 week later.

Similar success at directly learning new material from fictional stories has been shown for other types of content, including facts about the world. Such studies typically teach fewer pieces of information than the word-learning studies, usually just one or two, and tend to show that children retain their knowledge about this information when directly questioned later. For example, a recent study assessed whether children could learn information about cultural traditions from television shows (Mares & Sivakumar, 2014). Three-, four-, and five-year-olds watched a 3-min segment of *Dora the Explorer* that

depicted the traditions of Three Kings' Day or a 3-min segment of *Ni Hao, Kai Lan* that depicted the traditions of Chinese New Year. After viewing, they were asked questions about the holiday traditions, including what special food people eat and what special clothing they wear. Exposure to the shows significantly predicted children's knowledge of these traditions relative to a control group that had not seen the shows (see also [Bonus & Mares, 2015](#)).

As with word learning, children may learn only small amounts of factual information from fiction. Four-year-old children recalled an average of 2.23 pieces of information about a simple game (out of a possible 18) after repeated viewings of an episode of *Sesame Street* ([Sell, Ray, & Lovelace, 1995](#)). Six- to 8-year-old children learned an average of 3 out of 10 unfamiliar facts about TV news broadcasting that were presented in a storybook ([Dore, 2015](#)). This suggests that preschoolers can learn some factual information from television and books, but this learning appears to be limited and may require multiple exposures.

Similar procedures have been used to assess children's learning from pretend play. Notably, [Sutherland and Friedman \(2012\)](#) investigated children's learning about a novel animal from a simple episode of pretending. An experimenter introduced children to a puppet and told them it was a type of animal called a "nerp". The nerp then acted out various traits, such as eating and enjoying an apple or being scared of a frog. After putting the puppet away, children were shown a photograph of a real animal that they were told was a nerp, and they were asked general questions about nerps. Children were able to answer these questions successfully, though performance was better on forced-choice than on open-ended questions. The general conclusion from this body of research is that children can recall some information from fiction on later tests.

In all of these cases, children responded to explicit comprehension questions about some aspect of the content of the fictional situation (e.g., "What do nerps like to eat?"). Other studies have measured children's overall recall of the content of a story by asking them to retell it and measuring their accuracy. For example, [Legare, Lane, and Evans \(2013\)](#) read 5- to 12-year-olds narratives about bird populations that evolved in response to environmental pressure. The experimental manipulation involved the type of language used to describe the mechanism of evolutionary change in the story: Narratives used language that either emphasized the animals' desires ("Over time, eagles wanted to change to adapt to their surroundings"), emphasized their needs ("Over time, eagles needed to change to adapt to their surroundings"), or discussed more general process of natural selection ("Over time, eagles evolved"). Children were asked to retell the story the way that it was told to them. Children's retelling of the stories typically matched the narrative they heard; that is, after hearing the natural selection story children included natural selection mechanisms in their retelling. The same was true for the need-based and desire-based narratives (see also [Daly, Salters, & Burns, 1998](#)). Children were also more likely to endorse desire-based explanations for evolution after hearing the desire-based narrative than the other two narrative types.

Although this study revealed that children accurately remembered and reported the content of the narratives, studies with more open-ended prompts show that children often distort the information that they heard to fit their existing knowledge. For instance, children tend to misremember information about a female character who acted in a counter-stereotypical manner (see [Frawley, 2008](#); [Jennings, 1975](#); [Koblinsky, Cruse, & Sugawara, 1978](#); [Kropp & Halverson, 1983](#)). This contrast in results highlights the need to carefully consider how learning should be assessed and what should count as successful learning, a theme we return to throughout this review.

### Generalization

The previous section addressed children's explicit recall of specific pieces of information from fiction (e.g., "autumn" is another word for "fall"). To answer the sorts of questions presented in these studies, the primary burden on the reader is in deciding whether the information is true in the real world or purely fictional. Once this has been decided, the information can simply be added to the reader's existing knowledge base and retrieved when needed. However, information presented in fictional contexts can also be applicable to a wider range of examples. In such cases, the reader is faced with the difficulty of abstracting the information from the story and determining when and how to appropriately apply it to reality. In this section, we will review research on children's ability to generalize concepts presented in fictional contexts to different real-world contexts.

For example, [Crawley et al. \(2002\)](#) investigated whether children learned lessons presented on the television show *Blue's Clues*. Three- to six-year-old children watched an episode of *Blue's Clues* in which Blue lost something and eventually found it by returning to the last place she had it. When children were asked afterwards what they should do if they themselves lost something, 73% responded with the strategy presented in the show, "go back to where you were." However, the lack of a control group that had not seen the episode undermines the conclusion that this was learned from the show. Similar results about the positive effects of media on children's intended behaviors were obtained in a study on 9 and 10 year old girls who watched an episode of *The Simpsons* about vegetarianism. These children reported higher levels of intended behaviors related to vegetarianism than a control group ([Byrd-Bredbenner, Greci, & Quick, 2010](#)).

Another study showed children a *Sesame Street* episode about cultural traditions in Guatemala ([Bonus & Mares, 2015](#)); at a follow-up 5–12 days later, children were asked to pick out which food, instruments, and dances would be best for a party thrown for a friend from Guatemala. Five-year-olds, but not 3- or 4-year-olds, were significantly above chance on this task. Interestingly, children's learning was dependent on their judgment of the novel content as real: Better memory for the show at post-test predicted better performance on this transfer measure, but only for children who judged the traditions as real as opposed to "just in the show".

Many of the studies in this area are aimed at reducing prejudice against women and members of minority groups. These studies tend to present children with stories that feature characters engaging in counter-stereotypical behavior (e.g., a boy

playing with dolls, a female airplane pilot) or characters drawn from a variety of racial and ethnic groups (e.g., White characters who are friends with Black characters). Children are then questioned about their attitudes towards members of these groups. For studies on gender, this usually takes the form of providing children with a list of toys, activities, or occupations and asking whether each is “for boys/men,” “for girls/women,” or “for both.” Following a story-based intervention, children are generally more likely to say that the toys, activities and occupations are “for both” rather than being the exclusive domain of one or the other gender (Berg-Cross & Berg-Cross, 1978; Davidson, Yasuna, & Tower, 1979; Flerx, Fidler, & Rogers, 1976; Johnston & Ettema, 1982; Nhundu, 2007; Pingree, 1978; Scott & Feldman-Summers, 1979; Trepanier-Street & Romatowski, 1999; see Abad & Pruden, 2013 for a review). Of course, the very gender stereotypes that the books in these studies are aiming to combat have themselves been shaped in large part through fictional media (Calvert & Huston, 1987; Huston, 1985; Liben & Bigler, 2002; Signorielli, 1990). Less direct research has been done on this side of the coin, however, possibly because this stereotyping force is so prevalent and so powerful that it seems to need no further investigation.

For studies on racial or ethnic minority groups, participants are usually asked about their attitudes towards members of the minority group (e.g., “Would you prefer to play with a White child or a Black child?”). For example, Gorn, Goldberg, and Kanungo (1976) showed Canadian preschool children episodes of Sesame Street with either all White children or groups of children from other racial groups. These researchers found that children who viewed the non-White characters were significantly more likely to prefer them as playmates as compared to children who viewed the show featuring only White children. A follow-up study showed that this effect also extended to preferences for other children from the same racial groups who had not appeared in the episode (Goldberg & Gorn, 1979; see also Gimmestad & DeChiara, 1982; Mitnick & McGinnies, 1958).

However, in this study the positive effect of viewing the more diverse episode disappeared at a delayed post-test 24 h later, suggesting that any effect of fiction-based intervention on racial attitudes may be fleeting (Gorn et al., 1976). In support of this suggestion, Persson and Musher-Eizenman (2003) conducted a similar intervention and showed no significant changes in 5- and 6-year-olds’ racial attitudes from pre- to post-test (see also Cole et al., 2003; Dore, 2015; Greenberg, 1972).

Despite these inconsistent results, other research has shown consistently positive effects when using storybooks to change attitudes towards children with disabilities. For example, in Cameron and Rutland (2006), 5–10 year olds received a story and discussion activity focusing on children with disabilities once a week for six weeks. The stories all described a friendship between an in-group member and an out-group member (a child with a disability), but differed in how the out-group member was described. The control story did not provide any additional information about this character. One of the intervention stories provided additional information about this character’s preferences and other characteristics, and the other intervention condition included both this information as well as information about how the story characters were typical of their groups. Children were assessed before and after the intervention with a set of hypothetical scenarios measuring their willingness to interact with children with disabilities; scores on this measure improved for children in both intervention conditions as compared to the control condition. The researchers also found a pre- to post-test increase in positive attitudes towards the out-group only for the second intervention condition, though differences in pre-test attitude scores between conditions make this result difficult to interpret.

Similar results were obtained by the same research group when focusing on racial and ethnic out-groups and on refugees (Cameron, Rutland, & Brown, 2007; Cameron, Rutland, Brown, & Douch, 2006; Cameron, Rutland, Hossain, & Petley, 2011). One of these studies (Cameron et al., 2011) showed that the effect of the intervention on children’s intended friendship behaviors was mediated by their opinions about norms regarding inter-group friendships. These results suggest that interventions such as these may work in part by showing children that it is acceptable to be friends with children from other groups. Mares, Sivakumar, and Stephenson (2015) similarly found that the effect of exposure to television shows featuring minority characters was mediated by children’s interpretations of the programs. Children who regularly watched a show featuring an Asian character showed less preference for white characters over Asian characters, but only if they understood that the show depicted real cultural traditions (this relationship was not significant for a show featuring an Hispanic character). In a second study, viewing shows featuring minority characters predicted less racial bias, but only if children were able to correctly match the television characters with photographs of real individuals from the same racial or ethnic group. Thus, although fiction-based interventions aimed at reducing gender prejudice seem to have positive effects on children’s reported attitudes, similar interventions aimed at reducing prejudice towards racial and ethnic minorities have mixed results (see Mares & Pan, 2013, for a meta-analysis).

Intriguingly, despite the fact that children’s reports of their attitudes or intended behaviors do change based on these kinds of interventions, they have great difficulty reporting explicitly on what moral lesson a story is trying to teach (e.g., Goldman, Reyes, & Varnhagen, 1984; Johnson & Goldman, 1987; Mares & Acosta, 2008; Narvaez, 2001, 2002; Narvaez, Bentley, Gleason, & Samuels, 1998; Narvaez, Gleason, Mitchell, & Bentley, 1999; Smith, 2014). This body of work finds that children younger than 10 tend to report narrow, highly specific lessons, like “do not eat candy” (for a *Berenstain Bears* story about the importance of healthy eating) or “be nice to three-legged dogs” (for a *Clifford the Big Red Dog* story about tolerance to people with disabilities). Similarly, some studies in this area ask children whether the information they have heard in the story is true or real (e.g., Bonus & Mares, 2015; Brabham et al., 2000; Mares & Sivakumar, 2014). Children in preschool and early elementary school tend to have trouble with these kinds of judgments, demonstrating confusion about whether words in a foreign language are real words or “just made up for the show.”

This difficulty in explicitly transferring moral lessons from fiction into reality may be due more to children’s difficulties in spontaneously extracting general themes from narratives, rather than to any particular difficulty in exporting these themes from fiction into reality. Older children show somewhat more success at abstracting moral or social lessons from fictional

sources (e.g., [Narvaez et al., 1998, 1999](#)), and younger children exhibited better comprehension of a show's moral lesson when voice-overs were inserted into the show explaining key points of the lesson ([Mares & Acosta, 2010](#)). Nevertheless, the contrast between younger children's success at demonstrating behaviors and attitudes in line with stories' intended moral lessons in some studies and their failure to explicitly report these lessons provides a powerful example of the importance of the choice of dependent measure. The impact of fiction on children's behavior and knowledge may be underestimated if only explicit report measures are used.

### *Application*

The studies reviewed in the previous section provide some evidence that fictional stories can lead to children's transfer of new information to reality, particularly with respect to children's attitudes towards gender equality. However, these studies are limited in that they did not assess children's behaviors in real-life settings or towards actual out-group members; they asked only about children's intended behaviors or their attitudes towards hypothetical children or scenarios. Therefore, it is not possible to draw conclusions about how fiction-based interventions may affect children's real-life behavior. In this section, we review studies that use such behavioral measures to test whether children incorporate specific lessons from fictional stories into their real-world actions. This section covers studies that either provide prompts for children to demonstrate the knowledge gained from a fictional source behaviorally or apply this knowledge to a particular situation, or that do not provide such prompts and instead observe children's naturalistic behavior following exposure to fictional media.

The first major body of research that asks children to transfer a behavioral strategy from fiction to a new situation looks at whether children can abstract problem-solving techniques from stories and apply them to analogous contexts in reality. This involves applying the relations among elements observed in one area to another. In a common example ([Gentner & Toupin, 1986](#)), one can apply knowledge of the solar system to help understand the structure of the atom. To do this, the general concept "Smaller bodies orbit larger ones" must be abstracted from the solar system example and mapped on to the structure of the atom. Although early studies on children's analogical problem solving were not framed as testing children's learning from fiction, the novel problem-solving strategies were often introduced to children in illustrated stories. For example, [Holyoak et al. \(1984\)](#) told preschool children a story about a genie who wanted to move his jewels into a new bottle. In order to move the jewels, the genie rolled his magic carpet into a tube and used it to roll the jewels into the opening of the new bottle. After hearing the story, children were asked to find a way to move marbles from one bowl to another. In this and other similar studies ([Brown, Kane, & Echols, 1986](#); [Brown, Kane, & Long, 1989](#); [Chen, 1996](#); [Daehler & Chen, 1993](#)), preschool children who heard the stories were typically able to solve such transfer tasks at a higher rate than children in control groups who did not hear the stories.

Studies examining children's learning of scientific concepts also find that they are successful at learning from fiction when they are asked to apply information from the media to a particular new exemplar. For example, [Ganea, Ma, and DeLoache \(2011\)](#) tested children's learning about the principles of camouflage. These researchers read a storybook about camouflage to 3- and 4-year-old children; the book described how a predator animal could not find its prey when the prey blended in to its surroundings. At pre- and post-test, children were shown pictures of two animals on different backgrounds and asked which one the predator would eat. Children of all ages were significantly more likely to say that the camouflaged animal would not be eaten at post-test (72% correct) than at pre-test (57% correct). They also extended this learning to real animals, correctly identifying which of two live animals was better camouflaged about 90% of the time. Additionally, the majority of 4-year-olds cited camouflage when asked to justify their choices, suggesting that they had explicitly learned the lesson about camouflage from the story and used it to make future inferences. Similarly, children who heard about the principles of natural selection in a storybook were able to generalize the principles to different animals than those in the book ([Kelemen, Emmons, Seston Schillaci, & Ganea, 2014](#); see also [Shtulman, Neal, & Lindquist, 2016](#)).

A second body of research that has assessed children's behavioral responses to fiction simply places children into naturalistic settings and measures their spontaneous behavior to see whether it has been affected by their exposure to fictional media. One such set of studies examines stories with prosocial messages, in similar ways as those on attitudes towards women and minorities reviewed above. For example, in [Sprafkin, Liebert, and Poulos \(1975\)](#), first-graders watched either a prosocial clip from *Lassie* (where a human character helps *Lassie* rescue her puppy), a neutral clip from *Lassie* (where a human character wants to avoid taking violin lessons), or a control clip from the *Brady Bunch*. Then the experimenter told the children that she was helping at a dog kennel. Children were given headphones to listen to the dogs; if there was barking, they could tell an assistant to help the dogs by pushing a Help button in the room. All children heard the same recording over the headphones, which began with silence and then played "increasingly frantic barking." Children who saw the prosocial video were more likely to push the Help button and pushed it for longer periods of time than children in the other two groups, which did not differ from each other. This study demonstrates that prosocial television clips can have specific effects on children's helping behavior. Indeed, a meta-analysis of children's learning of prosocial lessons from audiovisual media revealed that watching videos that illustrated prosocial content (e.g., sharing, altruism) leads to larger effects on children's real-life prosocial behavior than watching something else or than watching nothing ([Mares & Woodard, 2005](#); see also [Friedrich & Stein, 1973, 1975](#); [Hearold, 1986](#); [Rosenkoetter, 1999](#)). The overall effect size for children's learning of prosocial behaviors was 0.27, comparable to an overall effect size of 0.32 for learning of aggressive behaviors.

Similarly, studies on gender attitudes have showed changes in children's behavior based on reading them stories with counter-stereotypical protagonists. Children are more likely to choose toys or engage in activities that are stereotypically seen as the domain of the other gender following the intervention, when compared to controls ([Ashton, 1983](#); [Cobb,](#)

Stevens-Long, & Goldstein, 1982; Katz & Walsh, 1991; Ruble, Balaban, & Cooper, 1981) and when compared to their own pre-reading preferences (Green, Bigler, & Catherwood, 2004).

One study in this category (McArthur & Eisen, 1976) measured boys' and girls' persistence on a difficult task depending on whether they had seen a story in which a boy was the active problem-solver while a girl was passive (stereotype-consistent) or a story in which a girl was the active problem-solver while a boy was passive (reversal). Children's willingness to persist increased when the same-gender character was active: Boys persisted longer when they heard the stereotype-consistent story, but girls persisted longer when they heard the reversal story. As with the studies that used toy choice as a dependent measure, these results indicate that the portrayal of gender roles in stories affects children's real-life behavior.

However, like the studies on children's explicit transfer reviewed above, the effects of these fiction-based interventions can be short-lived. In Teachman and Orme (1981), children first saw an aggressive, neutral, or prosocial video clip. Then they played a bowling game in which they won tokens that could be exchanged for a prize (based on design in Rushton, 1975; Rushton & Owen, 1975; Rushton & Teachman, 1978). They were shown a picture of another child, who had fewer tokens, and were told that they could give some of their tokens to this child if they wished. Children who saw the aggressive video donated fewer tokens than children in the other two conditions, which did not differ. This result suggests that aggressive videos depress children's level of giving, rather than that prosocial videos increase this level. However, these effects were not detected at a one-week follow-up, pointing to the fragility of the influence of fiction on children's unprompted behavior.

Additionally, although it seems likely that specific anti-social behaviors will transfer from fiction to reality in similar ways as specific pro-social behaviors, there is currently a lack of evidence for this claim. As noted above, reviews have shown that exposure to violent media is generally associated with increased aggressive behavior (e.g., Anderson et al., 2003). However, these studies tend to measure general increases in aggressive behavior following exposure to violent media rather than examining children's adoption of the specific violent actions modeled in the media.

#### *Conclusion: can children learn from fiction?*

This body of evidence demonstrates that children are able to learn from fiction, both explicitly and implicitly, transferring many different types of information into their real-world knowledge bases and behavioral repertoires throughout early and middle childhood. However, the way in which learning is assessed is a crucial factor in whether children appear to be learning or not. Measures of comprehension or recall of information give different results than measures that assess the ability to transfer or apply the information to a new context: Children might be able to remember novel information they read in a storybook (e.g., McLeod & McDade, 2010), but not be able to judge whether it is real (e.g., Brabham et al., 2000) or apply it to a real-world situation (e.g., Gorn et al., 1976). This contrast is particularly stark when considering work on children's learning of prosocial messages. Preschoolers' behavior (towards gendered toys, for example) and reports of their own attitudes can be altered by story-based interventions (e.g., Ashton, 1983; Ruble et al., 1981), but children struggle to report explicitly on what lesson a story is trying to teach until late in elementary school (e.g., Narvaez et al., 1999). On the other hand, at least one study showed that better comprehension of the message of a show was unrelated to changes in attitudes (Persson & Musher-Eizenman, 2003), leaving open the question of how these different kinds of learning may relate to each other.

The issue of whether and how children learn from fictional contexts is further complicated by the fact that the type of learning assessment tends to co-vary with the type of information being taught. Even very young children show success at learning words from fictional stories, but their learning is nearly always assessed through direct vocabulary tests, rather than providing them with contexts where they could use these words in natural speech, for example. And while children's attitudes towards members of racial or ethnic minorities can be affected by reading or watching media with diverse sets of characters, their reports of how they would behave towards members of these groups may not track their actual behavior. Future work should address this issue directly by employing multiple measures of learning within the same study in order to determine how robust children's transfer of information from fictional contexts really is. Across all types of information, it would be especially important to include measures of children's behavior in naturalistic settings, since the goal of education is for learning to be flexible enough to apply to multiple contexts and situations. When children learn new information from fictional media, it may not be enough simply to recall it later when asked a direct question. Rather, they should be able to use the information to explain new situations, draw deeper inferences, and solve novel problems. Thus, measures that merely assess children's recall of the exact information presented in a fictional source may overestimate how effective that media will be for children's deeper comprehension and generalizable learning.

Finally, various aspects of the learning context can affect the degree to which children learn new information from fictional media. For example, rates of word learning increase if the words are explicitly defined during reading (Elley, 1989; Houston-Price, Howe, & Lintern, 2014; Wilkinson & Houston-Price, 2012), or if the reader elicits active participation from the child (Ard & Beverly, 2004; Ewers & Brownson, 1999; Strouse, O'Doherty, & Troseth, 2013; Sénéchal, 1997; Sénéchal, Thomas, & Monker, 1995; Walsh & Blewitt, 2006). Children also learn better if they receive multiple exposures to the target words (Horst, Parsons, & Bryan, 2011; McLeod & McDade, 2010; Sénéchal, 1997; see also Wilkinson & Houston-Price, 2012). That is, unsurprisingly, many of the same factors that influence children's learning from real-life situations also influence children's learning from fictional scenarios. One crucial question that remains unanswered, however, is whether the fictional nature of these scenarios has any special role to play in children's learning. We take up this issue in the remainder of the paper, examining whether and how fictional media might be uniquely suited to conveying educational content.

## Do children learn better from fiction?

In this section, we will review studies that have compared how children learn the same content from different sources. We will first consider studies that compared learning from fictional media and games to learning from other methods of instruction, such as traditional classroom teaching or hands-on activities. Second, we will review studies that compare learning from fictional and nonfictional media, and finally we will consider comparisons between realistic and fantastical fiction. These different comparisons help shed some light on the role that fiction itself may play in children's learning, namely whether fiction is better, worse, or the same as other ways of teaching the same information.

### *Fiction vs. other methods of instruction*

All of the studies we found that compared fiction to other types of instruction came from the literature on math education. For example, [Young-Loveridge \(2004\)](#) conducted an intervention with kindergarteners, in which children in the experimental group read math-related stories and played math-related games in pairs with a teacher. Children in the control group received a standardized math curriculum. All children were pre- and post-tested with measures of counting, numerical recognition, addition, subtraction, and other mathematical concepts, both immediately following the intervention, six months later, and 15 months later. The intervention activities led to significant increases in children's knowledge compared to the control activities, and although the effects diminished over time, scores in the experimental group remained significantly higher than scores in the control group at both delayed post-tests.

One reason why fiction may be more effective for teaching math than other types of instruction is because fiction is engaging and interesting to children. Therefore, it may increase their motivation to engage with the material, leading to better learning outcomes. [Hong \(1996\)](#) found that 4- to 6-year-olds who read books with math themes performed better on tests of spatial and numerical knowledge than those who read control books; additionally, children in the experimental group were more likely than children in the control group to say that the math corner of the classroom was their favorite and were more likely to voluntarily play in the math corner, illustrating that math-based stories can spark young children's interest in and engagement with math. [Jennings, Jennings, Richey, and Dixon-Krauss \(1992\)](#) found that a five-month story-based intervention for kindergarteners led to greater gains on a standardized math test than the standard curriculum. In addition, observations of children's play in this study showed that children in the intervention group spontaneously used more math concept vocabulary words than children in the control group. Together, these studies provide further support for the idea that storybooks and games that use fictional narratives can aid learning by making material more interesting to children.

These results are unsurprising given research showing that guided play is more effective than direct instruction ([Alfieri, Brooks, Aldrich, & Tenenbaum, 2011](#); [Weisberg, Hirsh-Pasek, Golinkoff, Kittredge, & Klahr, 2016](#)). When children are interested and actively engaged in an activity, they are more likely to learn ([Chi, 2009](#)). A more stringent test of whether fiction specifically motivates learning involves comparing learning from fiction to learning from other enjoyable, playful methods of teaching. A series of studies by Beth Casey and her colleagues begins to address this question with the 'Round the Rug Math' series of books and accompanying activities ([Casey, Erkut, Ceder, & Young, 2008](#); [Casey, Kersh, & Young, 2004](#)). This classroom-based intervention used narrative picture books to scaffold preschool through second-grade children's learning about spatial relations, geometry, and measurement, among other concepts. Each book is structured as a "saga," in which characters encounter multiple problems and the solution to each problem builds on previously presented material. The lessons within each book are reinforced following the reading by a hands-on activity (e.g., finding hidden shapes in a set of tangrams accompanies a lesson about different types of triangles).

In a test of one of the books focusing on geometry, kindergarteners who heard the story and engaged in the activities made greater gains in their spatial and geometrical knowledge than children who received more traditional geometry instruction ([Casey et al., 2008, Study 1](#)). Children who both heard the story and engaged in the activities also made greater gains than children who received the activities without the story ([Casey et al., 2008, Study 2](#)), illustrating that the story itself played a role in improving these children's mathematical knowledge. However, this study did not directly measure children's motivation, so we cannot draw any conclusions about whether the books were more interesting to children than the activities alone.

Other studies that did measure motivation have shown that games with narrative frames increase motivation more than control games. [Cordova and Lepper \(1996\)](#) constructed an educational game to teach arithmetic to fourth and fifth graders. The basic version of the game involved children solving arithmetic problems to advance along a number line. This was compared to performance in a version of the game that included a narrative cover story (finding hidden pirate treasure, navigating a spaceship to a distant planet). Children who played these narrative versions of the game showed significantly greater improvement from pre-test to post-test than children who played the control version. These children also reported liking the game more, were more motivated to keep playing, and were more likely to choose to play the game at a more difficult level (see also [Parker & Lepper, 1992](#)). Thus, the game with a narrative frame increased motivation and learning more than a control game. However, the control game in this study was very simple and may not have been particularly interesting for children of this age. Therefore, it is difficult to conclude from this study that fictional educational materials would increase motivation over other types of fun and engaging learning activities because these two games were not necessarily matched

for engagement. Future studies should match stimulus materials more closely for interest level to better assess the specific impact of fiction on learning.

Another potential benefit of using fictional material to teach abstract concepts such as math is that a narrative frame can contextualize and ground material in a way that makes it more accessible. For example, children who are simply taught the rules of arithmetic may have a harder time seeing how they relate to their everyday lives than children who read a story about a character that uses arithmetic to solve a real-world problem. This is an alternative explanation for the increase in math vocabulary during play found by [Jennings et al. \(1992\)](#): Children who participated in the story intervention made more connections between the math content they were learning and the themes of their play. However, no studies have directly tested this hypothesis.

In sum, studies that have compared learning from fictional stories to traditional instruction have shown that children learn better from the stories and show increased interest in the material and motivation to continue learning. These effects have been seen in preschoolers and elementary school children. However, one major limitation to this area of research is that the studies have all focused on teaching math. We do not know how fictional media compare to other educational materials for different types of content. If fiction is effective because it increases interest and motivation, then this effect should hold for other types of information, particularly those subjects where intrinsic motivation is lower. However, if fiction is effective because it helps to ground abstract concepts, then it will be less beneficial for teaching information that is already relatively accessible for children.

### *Fiction vs. nonfiction*

The studies reviewed in the previous section suggest that there may be some benefit to using stories and narrative games to teach children new information. What these studies do not address is if it matters whether such media are fictional. That is, will children learn better from a story or video that they know is not intended to be literally true versus one that is intended to depict actual events? On the surface, the latter seems like a better choice for teaching. Why would children believe that information in a fictional story is also true of the real world? As reviewed at the beginning of this paper, we know that children understand the difference between fiction and reality, and they generally believe that characters and events in stories do not exist in the real world. By this view, we would not expect children to learn as much, if anything, from fictional media compared to nonfiction. The studies reviewed in this section all compare learning from fictional and nonfictional media to address this issue.

One study suggests a potential benefit of learning from fiction versus nonfiction, but other differences between the stimuli used limit the conclusions that can be drawn ([Leal, 1993](#)). This study compared how well third graders learned facts about space and earth science from informational storybooks and nonfiction books. There were significantly greater gains from pre- to post-test for children who read the fictional storybook; the same result was found with a delayed post-test administered six weeks later. However, because commercially available storybooks were used, the stories were not perfectly matched between conditions, so it is difficult to know which properties of the fictional stories may have been driving the effect. All the books used were designed for children and contained colorful, cartoon illustrations, but the fictional stories used a narrative framework while the nonfiction books did not. Thus, it is not possible to determine from these results whether it was the narrative structure of the storybooks or the fact that they were fictional that led to more learning.

[Browning and Hohenstein \(2013\)](#) conducted a closer comparison that could help address this question. This study, involving children between 5 and 8 years old, used a narrative about how prehistoric apes evolved to walk on two legs. They created two versions of the story: an expository text that included photographs and realistic drawings and a fictional text that included cartoon illustrations, used personal pronouns to refer to the characters, and used the context of a grandfather telling his grandson a story. Despite these differences, both versions of the story used a similar narrative structure. For example, the expository story contained the text, "A long, long time ago, there were no humans on Earth. . . One day some apes were born who were different. They could walk on two legs!" After hearing the story, children were asked a series of questions about how and why apes began to walk on two legs (e.g., "Why do you think that the ape's babies could walk on two legs too?", "Why could the apes walking on four legs not go out into the grasslands?").

Overall scores on these questions were higher for the narrative text condition than the expository text condition, but only for the oldest children in the sample (7–8 year olds). There was also an effect of pre-existing knowledge: Children who "provided an answer bearing resemblance to the meaning of evolution" when asked what evolution meant in a pre-study interview were characterized as having pre-existing knowledge. These children scored higher than those without pre-existing knowledge, but the effect of text type still held among children with no pre-existing knowledge. These results leave open the possibility that the fictional nature of a story may be beneficial to children's learning, over and above the use of a narrative structure. However, the lack of a specific pre-test in this study makes it difficult to know how much children learned from either type of story, and other differences between the two stories (e.g., type of illustrations) limit the conclusions that can be drawn about the benefits of fictional as opposed to non-fictional texts.

These studies highlight the fact that there are many properties of fictional stories that could have an impact on children's learning from them. Fictional media for children typically (but not always) uses unrealistic, cartoonish illustrations and contains a narrative story structure. However, nonfictional media can have these properties as well. To address the question of which properties of stories have the biggest impact on children's learning, studies must use more carefully controlled stimuli that differ only on a single variable of interest. [Nagy, Anderson, and Herman \(1987\)](#) statistically controlled for various textual

properties (e.g., sentence complexity) when investigating word learning from fictional stories compared to expository texts by third, fifth, and seventh graders. These researchers found no difference in learning between the fictional and non-fictional texts once these other textual features were taken into account. This suggests that, at least for learning vocabulary in elementary and middle school, effects of learning from fiction may be due to textual properties that tend to covary with fictional status rather than to the fiction itself.

Pingree (1978) tested this issue more directly by showing the same videos to all children in the study, but manipulating whether children were told that the videos were real or fictional. This study investigated whether commercials could be effective in changing children's perceptions of traditional gender roles. Third and eighth graders watched television commercials in six conditions, crossing type of portrayal (woman in stereotypical vs. nontraditional role) with the experimenter's explanation about what the commercial portrayed (real people, actors, or a no-instruction control). After the viewing, all children were asked about their perceptions of women (e.g., whether women are competent, what roles women can have). Children who saw nontraditional commercials had less traditional attitudes about women—except for eighth-grade boys, who showed the opposite pattern. For these older boys, seeing women in nontraditional roles seems to have reinforced their stereotypes rather than reducing them, highlighting the need to take individual differences into account when discussing the effectiveness of these kinds of interventions. Relevant to the current question, children who were told that they were seeing actors, rather than real people, demonstrated less traditional gender attitudes. This latter result suggests that something about the perceived fictional nature of the commercials may have played a role in changing children's attitudes.

One other study that also compared learning from fiction and non-fiction showed that children could learn simple information from pretend play, but additionally showed that learning from pretense differed in some ways from learning the same information from a non-pretend context (Hopkins, Dore, & Lillard, 2015). Preschool children were told a novel label and function for a familiar object, either in a real setting (“This screwdriver is also a ‘sprock’”) or in a pretend setting (“Let’s pretend that this screwdriver is a ‘sprock’”). Children in the real condition seemed to learn the novel word as simply another label for the familiar object, selecting another screwdriver when asked to choose a sprock from a set and demonstrating that sprocks are used to screw in screws. In contrast, children in the pretend condition seemed to form a new concept of the category “sprock”; they showed a bias to assume that real sprocks would be shaped like screwdrivers, choosing long, skinny objects when asked to find a real sprock. When asked what real sprocks do, they selected a novel function they had been taught (out of 3 possible options) on 60% of trials. Children were thus capable of learning from both the pretend and real contexts, but the inferences they drew about the novel objects differed depending on the learning context.

These latter two studies suggest that fiction may have an effect on children's learning simply by virtue of being fictional. Children may process information differently if they believe they are hearing about it in a fictional context, possibly because it makes the information more generalizable. In Pingree (1978), children who believed they were watching real people who defied gender stereotypes may have dismissed the videos as an atypical example. In contrast, a fictional portrayal of counter-stereotypical behavior may be viewed as representative of a wider trend (see Cameron et al., 2011). Similarly, children in Hopkins et al. (2015) who heard a novel label associated with an object in a real setting drew the narrow conclusion that the label was a different name for an already familiar object concept. In contrast, children who heard this in a pretend context made the inference that the single pretend episode was representative of a new object category.

The question of whether fiction is better for children's learning than non-fiction is far from settled. To begin with, most of the work that has addressed this comparison has been done with elementary school children, but preschoolers are often the target audience for educational fiction. The study on evolution reviewed above did compare between age groups, finding that older children were more affected by text type than younger children (Browning & Hohenstein, 2013). But other issues with this study, such as the lack of a specific pre-test to control for existing knowledge, make the age effect difficult to interpret.

More importantly, even for studies that show positive effects of fiction, it is unclear why fiction may be more effective. As noted above, there are many ways in which fiction can differ from nonfiction, and nonfiction can come in many flavors. Fictional media may be effective for learning because a narrative structure helps contextualize novel information; in this case, fiction would be more effective than expository text, but not necessarily more effective than narrative non-fiction. On the other hand, if there is a benefit to learning from fiction specifically because it is not literally true of the real world, then fiction should outperform nonfiction even when all other properties of the media are matched as closely as possible. Future work should also include measurement of covariates that could help us better understand the role of fiction in learning, such as children's engagement and motivation, their understanding of the fictional nature of the media, and the role of their own prior knowledge and skills.

### *Realistic fiction vs. fantastical fiction*

Up to this point, we have discussed effects of fiction broadly, but have not considered more fine-grained distinctions within the fiction genre. In particular, educational fiction designed for young children often contains elements of fantasy; that is, things that cannot occur or exist in the real world. Fantasy can include a wide range of characters and events, including talking animals, non-real creatures like dragons or unicorns, impossible events like magic or flying, and entirely fictional worlds like Narnia or Neverland. A growing body of literature suggests that such fantasy content has an impact on how children learn from fiction, although the results are inconsistent as to whether the impact is positive or negative.

There are many reasons to think that fantastical stories would be less beneficial for learning than realistic ones. For one, we know from research on analogical reasoning that both children and adults are better able to transfer information from

one context to another if there is a high degree of similarity between them (e.g., Brown et al., 1986; Daehler & Chen, 1993; Holyoak et al., 1984). Fantastical fiction is, by definition, less similar to reality than realistic fiction. Thus, children may have a harder time transferring educational material from fantasy stories.

Additionally, learning from fictional media depends on the extent of overlap the reader perceives between the fictional world and the real world; in other words, are the events in the story likely to be true of real life? Previous research has shown that adults are influenced by the degree of realism in a story. Weisberg and Goodstein (2009) asked participants whether certain real world facts (“two plus two equals four” and “Washington, DC, is the capital of the United States”) were true in the world of a story they had read, even though they were not explicitly stated in the story. They were more likely to say the real-world facts were true in the story if the story contained no explicit violations of reality. However, when the story character could do impossible things, such as teleport or talk to animals, adults were less likely to infer that facts about the real world applied to the world in the story. If children have similar intuitions about the extent to which fictional worlds overlap with reality, then they would be less likely to learn from fantastical fiction than from realistic fiction.

Several studies support this conclusion. For example, Walker, Gopnik, and Ganea (2015) read preschool children a storybook that contained a novel type of flower (“popples”) that caused hiccups when smelled. After hearing a realistic version of this story, 72% of children said that a real person who smelled popples would get hiccups. However, significantly fewer children (25%) generalized the novel information in this way after hearing a story with fantastical content, such as a talking tree. Similarly, Sutherland and Friedman (2013) taught children about properties of a novel animal through an episode of pretend play. They found that children were less likely to extend the properties to real animals if the initial pretend scenario was implausible (e.g., the animal drove a truck and sang a song) than if it was realistic.

A similar deficit in learning from fantastical stories is observed when children are asked to transfer information from a story to an analogous real-world setting. In these studies (Richert, Shawber, Hoffman, & Taylor, 2009; Richert & Smith, 2011) children heard stories in which a protagonist used a novel solution to solve a problem; for example, a teacher had more apples than she could carry and so wrapped them up in a blanket to bring them to her students. Children were later given an analogous problem to solve: They had to move marbles to the other side of the room and could use a towel to wrap them up and carry them.

When the source stories were realistic, children were successful at applying the novel solution to the real-world problem the majority of the time. However, as in Walker et al. (2015), the addition of fantasy content led to less transfer; children who heard stories containing fantastical content or characters were significantly less likely to use the solution from the story to solve the analogous real-world problem. Similarly, Lehr (1988) found that kindergarteners, second graders, and fourth graders were less able to extract themes from folktales than from realistic stories.

Together, these studies support the hypothesis that children learn less from fantastical fiction than from realistic fiction. In some ways, this is the sensible strategy. Fantastical worlds contain many things that are not possible in the real world. To avoid erroneously learning false information, it is best to be cautious about accepting novel information from fantastical contexts. On the other hand, fantasy could potentially help children’s learning by highlighting that the story’s content is unusual and requires more careful processing (Weisberg, Hirsh-Pasek, Golinkoff, & McCandliss, 2014). A growing body of studies supports this latter possibility, showing that in some cases children learn more from fantastical media than from realistic media (see Rapp, Hinze, Slaten, & Horton, 2014 for similar findings with adults). In a recent study on this topic, 4-year-olds attending low-income preschools (e.g., Head Start) were taught new words using either a realistic or fantastical set of storybooks (Weisberg et al., 2015). Children who were taught words in the fantastical context made more gains on a productive vocabulary measure than children who were taught words in the realistic context (see also Stahl & Feigenson, 2015; Weisberg & Hopkins, submitted for publication).

This study, as well as those that showed negative effects of fantasy on learning, compared stories with high amounts of fantasy to those with very low or no amount of fantasy. One reason for the inconsistency across studies may be due to variation in the types of fantasy stories used; that is, different types of fantasy may have different effects on learning. To assess the impact of specific types of fantasy on learning, Hopkins and Lillard (submitted for publication) used multiple versions of a story that systematically varied in the type and amount of fantasy content. All versions of the story taught the same problem-solving strategy, using a similar procedure as in Richert et al. (2009), described earlier. Telling children that the story took place on another world or including fantastical beings like dragons had no impact on transfer of the problem-solving strategy. However, the inclusion of violations of physical laws (the protagonist could fly and walk through walls) led to a significant *increase* in transfer. This suggests that the effect of fantasy on learning may be fine-grained: Some types of fantasy may have an impact although others do not.

The amount of fantasy may also affect learning. Richert and Schlesinger (in preparation) found that children learned problem-solving strategies better from stories that contained moderate amounts of fantasy content compared to those that had no fantasy or those that contained high amounts of fantasy. Thus, stories that are slightly different from reality may benefit learning by encouraging more attention or cognitive effort, but children may avoid learning from stories that are too dissimilar from the real world (Valkenburg & Cantor, 2000; Weisberg et al., 2014). More research is needed to test this hypothesis.

We can conclude from this body of work that it may not be productive to talk about fantasy as a unitary property of fictional media. As with the discussion of nonfiction in the previous section, it is important to note that fantasy also comes in many flavors. Different types and different amounts of fantasy may have different impacts on how children learn, and may have differential effects depending on the target educational content. Although it may be harmful in some cases, some types

of fantasy could actually be beneficial to learning. Future research should more carefully control for the properties of the media used to better determine exactly how fantasy affects learning.

One particular property of fantasy stories that has in fact been investigated in a number of studies is anthropomorphism. Anthropomorphized characters – non-human characters that exhibit human-like characteristics – are ubiquitous in media directed at young children. These studies show a similar pattern as the results regarding fantasy more generally: Some studies find negative effects of anthropomorphism on learning, but others show that in particular cases it can be beneficial.

There are two potential negative outcomes associated with using anthropomorphism in children's educational media. The first is that it can lead children to exhibit confusion about whether animals and objects actually have human-like properties in real life. For example, in one study 2nd, 3rd, and 4th graders were read a storybook that was told from the perspective of a meteor that had landed on Earth (Brabham et al., 2000); after hearing the story, 35% of 2nd graders said that meteors can really think and have feelings. In another, children who heard stories about novel animals that contained anthropomorphic language and illustrations of animals engaged in human-like behaviors were significantly more likely to incorrectly attribute human-like qualities to the novel animals afterwards compared to children who heard realistic versions of the stories (Ganea, Canfield, Simons-Ghafari, & Chou, 2014; see also Li, Boguszewski, & Lillard, 2015; Mayer, 1995). That is, even though generalizing human features to other animals is common in childhood (Carey, 1985; see also Herrmann, Waxman, & Medin, 2010; Waxman, Herrmann, Woodring, & Medin, 2014), stories with anthropomorphic characters increase this tendency.

The second issue is that the use of anthropomorphism may interfere with learning the intended educational material. In the study just described, children who read the anthropomorphic versions were less likely to correctly answer questions about the animal facts presented in the story (Ganea et al., 2014). In contrast, Smith (2014) found a potential benefit of anthropomorphic animal characters when teaching healthy eating behavior. In this study, 4- to 5-year-olds were exposed to the storybook *The Berenstain Bears and Too Much Junk Food*, which emphasizes healthy eating, or to a modified version of the same book that included human versions of the characters. After hearing the books, participants were left alone with bowls of vegetables and candy, giving them the opportunity to behaviorally demonstrate whether they had internalized the lesson of the book. Children who heard the version of the story containing the anthropomorphized animal characters ate less candy than children who heard the story containing human characters. However, this was confounded with familiarity: Children who had higher levels of exposure to the *Berenstain Bears* books were especially affected by the use of those characters.

Another study that used slightly more realistic, although still anthropomorphic, depictions of animals showed that children gave more sophisticated explanations of camouflage after hearing about it in a story with anthropomorphic pictures compared to a control group (Geerdts, Van de Walle, & LoBue, 2016). It may have been easier for children to make connections between these partially anthropomorphized animals and their own real-world knowledge. Consistent with this view, Pinkham, Kaefer, and Neuman (2014) found that 5-year-olds learned novel animal names from a story better when the animals exhibited behaviors common to their taxonomic category: Children in this study learned the names of novel birds better if the birds were depicted building nests as opposed to sleeping in beds, even though both versions of the story employed some degree of anthropomorphism. The authors argued that the use of familiar taxonomic category information helped children link the novel label to their existing knowledge.

Thus, as with fantasy as a whole, moderate deviations from reality may be better for children's learning than either completely realistic or highly dissimilar depictions. Highly anthropomorphized characters may confuse children in some circumstances, but more moderate uses of anthropomorphism may benefit their learning in others. More research is needed to further clarify the inconsistent results across studies (see Geerdts, 2016 for a review).

### *Comparisons among media formats*

The previous sections reviewed research on how the content of fictional media affects learning, but another important aspect of fiction is the format. Children engage with fictional worlds through television, movies, books, pretend play, and games. Are there differences in children's learning from these different sources? Media formats may differ in effectiveness because children have different expectations about them. Salomon (1984) found that middle-school children thought learning from video would be easier than learning from text; however, children who read the text were better at making inferences about the content than children who viewed a film version. Thus, if children believe that learning from a video or movie will be easier than learning from a book, they may put in less effort or pay less attention, leading to poorer learning outcomes.

Only a few studies have done carefully matched comparisons of different media types, so this remains an open question. Some studies compared live-action video to animation and showed no differences in learning (Persson & Musher-Eizenman, 2003; Teachman & Orme, 1981), but others suggest that learning outcomes can be affected by media format (e.g., movies versus books). Preschool children were significantly more likely to imitate healthy eating behaviors (Smith, 2014) and aggressive actions (Smith, Richey, & Lillard, submitted for publication) when they were presented in a storybook than when they were presented via video. In both of these studies, the content and presentation of the storybook and video were closely matched. The storybooks were made up of still images from the videos, and the experimenter simply read the story or showed the video to the child with no additional interaction or discussion. These results are in contrast to what Salomon (1984) found with middle-school students, suggesting that not only can media formats lead to different learning outcomes, but that the relative efficacy of different formats may shift with development as children's experience with and expectations

about media change. The small number of studies that have conducted such comparisons among media formats prohibit us from drawing any strong conclusions, but this is an important question for future research.

#### *Conclusion: do children learn better from fiction?*

Before recommending the use of fictional media in educational settings, we need solid evidence that fiction is as good as or better than other ways of teaching the same information. However, the current body of evidence does not allow us to conclude definitively whether learning from fiction is the same, better, or worse than learning from other sources. Research on using stories and narrative games to teach math typically showed that they were more effective than the standard math curriculum (Casey et al., 2008; Cordova & Lepper, 1996; Jennings et al., 1992; Young-Loveridge, 2004), but other studies that compared fiction and non-fiction sources have shown mixed results. We did not identify any studies that showed that realistic fiction led to poorer learning outcomes than nonfiction, but it remains unclear whether fiction is better (Browning & Hohenstein, 2013; Leal, 1993; Pingree, 1978) or simply different (Hopkins et al., 2015; Nagy et al., 1987) than nonfiction for teaching information from a variety of domains.

The methodology employed by Pingree (1978) is particularly informative for this question because the videos children saw were identical between conditions; the only difference was in what children were told about the nature of the videos. Designs such as this can help isolate the effect that fiction has on children's learning. Children may process media differently when they believe it to be fictional. On the other hand, it is possible that there is no effect of fiction per se, but that typical fiction and nonfiction media differ in other properties that influence learning, such as the style of the illustrations, the type of language used, or the way information is contextualized. Comparisons between closely matched fictional and nonfictional media as well as closer analysis of commercially available educational materials are needed to determine whether fiction is a more beneficial context for teaching than other types of media.

One key property of fiction for young children that requires further investigation is the use of fantasy. Unlike the fiction/nonfiction comparison, there is some evidence that fantastical fiction can lead to poorer learning outcomes than realistic fiction (Richert & Smith, 2011; Richert et al., 2009; Sutherland & Friedman, 2013; Walker et al., 2015), but a number of studies have also shown the opposite (Cordova & Lepper, 1996; Hopkins & Lillard, submitted for publication; Lehr, 1988; Parker & Lepper, 1992; Richert & Schlesinger, in preparation; Weisberg et al., 2015). These inconsistent results may reflect the fact that the effect of fantasy depends on the type and amount of fantasy, the type of information being taught, the child's existing knowledge of the subject area, or the child's ability to distinguish between fantasy and reality. Future research should make more fine-grained distinctions between types of fantasy to further investigate these questions.

## **General discussion**

The main conclusion to draw from this literature is that children are capable of learning from fictional media, in spite of the potential difficulties involved in transferring information from a fictional world to reality. In all of the areas reviewed here, children were generally able to take information presented to them in a story, video, or pretend play episode and apply it to a new, real-world context. This suggests that children do not automatically quarantine all fictional content from their knowledge of reality and indicates that fictional sources could potentially be used as educational material for young children.

However, there are several important considerations that limit the strength of this conclusion about children's learning from fictional media. As discussed in the previous section, there is not enough research comparing fiction to nonfiction to determine whether fiction is more effective than other types of instruction. In the next sections, we will discuss three other open questions regarding the effectiveness of fiction as an educational tool. First, we do not know under what conditions children are appropriately selective about learning from fiction. Second, few studies have examined the long-term retention of information learned from fiction. Finally, more attention needs to be paid to child-level variables that impact whether and how individual children learn from fictional media.

#### *Selectivity of learning from fiction*

Transferring information from fiction to reality is only one part of the process of learning from fiction. To truly be credited with solving the reader's dilemma, a reader must be selective about the information they transfer. One can learn from reading *The Adventures of Sherlock Holmes* that Bohemia was a place in Europe, but should not learn that Dr. Watson was a real person who lived in 19th century London. Although the studies reviewed here show that children can transfer from fiction, there is also evidence that they are not always appropriately selective about what they are transferring. For example, children who read stories containing misinformation were more likely to respond with that information on a post-test than children who read accurate stories (Fazio & Marsh, 2008). Similarly, Legare et al. (2013) found that children who read stories containing a desire-based description of evolution later endorsed incorrect, desire-based explanations, and Brabham et al. (2000) found that elementary school children were not very accurate when asked which parts of a story were real and which were made up by the author. This latter study also showed that some children may be aware of this difficulty; 41% of 2nd graders said that they were confused about which parts of the story were true.

To be fair, this process is difficult even for adults, who have also been shown to answer test questions using misinformation encountered in fiction (e.g., [Marsh, Meade, & Roediger, 2003](#)). The problem at the very heart of the reader's dilemma is that it can be difficult to distinguish truth from fiction, particularly when stories are realistic and thus highly similar to the real world. However, in some of the studies reviewed above, children learned false information from fiction even in cases where adults would view that information as clearly fantastical. This is most obvious in studies of the effect of anthropomorphism in children's literature. After reading stories about animals and objects behaving like humans, children reported that whales have names ([Mayer, 1995](#)), birds can talk ([Ganea et al., 2014](#)), trains have human-like properties ([Li et al., 2015](#)), and meteors have thoughts and feelings ([Brabham et al., 2000](#)). [Brabham et al. \(2000\)](#) tested 2nd, 3rd, and 4th graders, so it is not only young preschoolers that are susceptible to such misinformation (but see [Geerds et al., 2016](#); [Smith, 2014](#)).

These findings that children incorrectly ascribe human-like properties to animals and objects after reading anthropomorphic literature seem to contradict the fact that preschool children already have a good understanding of the difference between real and fantastical entities ([Harris, Brown, Marriott, Whittall, & Harmer, 1991](#); [Harris, Pasquini, Duke, Asscher, & Pons, 2006](#); [Woolley & Wellman, 1990](#)) and are generally accurate at ascribing human-like properties only to real entities ([Sharon & Woolley, 2004](#)). Given this propensity to accept misinformation from stories and the fact that so much of children's literature contains fantastic or inaccurate information ([Rice, 2002](#)), more research is needed on the selectivity of children's learning from fiction. Under what circumstances will they resist transferring novel information from a fictional context? Can they learn true information while avoiding unrealistic information from within the same story?

Two studies suggest that in some circumstances children are able to avoid false information from stories. First, [Sutherland and Friedman \(2013\)](#) found that children did not transfer information from a story when the information conflicted with their prior knowledge: When they saw a pretend cat that was scared of a mouse, they did not subsequently report that real cats are scared of mice. Thus, novel information in fiction may not be persuasive enough to overwrite strongly held beliefs. The more stringent test of children's selectivity comes when they have no prior knowledge or only an incomplete understanding of a topic. [Bonus and Mares \(2015\)](#) found that children's judgments about the reality status of novel cultural traditions predicted whether they would transfer those traditions to a new context (see also [Mares & Sivakumar, 2014](#)). This confirms that children will avoid transferring information they believe to be purely fictional, but more research is needed on what influences their initial reality judgments.

At the very least, this research suggests that we should be cautious about the types of fiction used to teach young children. Care should be taken to avoid media that contains inaccurate information, and parents and teachers may need to make an effort to highlight the educational content and explain the fantastical nature of educational media they use with children. Indeed, parents and teachers who read or view fictional media with children may already be using strategies that help the children navigate the reality/fiction boundary. More research on how adults structure these media experiences for young children could further inform our understanding of whether and how children benefit from fictional educational materials.

### *Retention of learning from fiction*

An important part of determining the efficacy of using fiction as an instructional tool is investigating the long-term retention of information learned from fiction. Almost all of the studies reviewed here used immediate testing; only a few followed up with children after a delay ([Goldberg & Gorn, 1979](#); [Kelemen et al., 2014](#); [Parker & Lepper, 1992](#); [Sénéchal & Cornell, 1993](#); [Young-Loveridge, 2004](#)). In four of these studies, children's learning was still evident weeks or even months later ([Kelemen et al., 2014](#); [Parker & Lepper, 1992](#); [Sénéchal, 1997](#); [Young-Loveridge, 2004](#)), but one showed that positive effects of a video on racial attitudes disappeared at a 24-h delayed post-test ([Goldberg & Gorn, 1979](#)). Although showing that children can acquire information and use it in the short-term is an important first step, it must be shown that children can use the information beyond the immediate learning situation for fiction to be truly useful in educational contexts. On the other hand, immediate testing may sometimes underestimate children's learning as it may take time for new knowledge to consolidate ([Henderson, Devine, Weighall, & Gaskell, 2015](#); [Williams & Horst, 2014](#)). Thus, future studies should test learning at multiple time points to get a better picture of children's acquisition and retention of new information from fiction.

### *Child-level factors*

Even if more research determines that fiction on average is more effective for engendering long-term learning than other types of instruction, it will still be important to investigate whether certain children may benefit more than others from fictional educational materials. Several areas of research have already shown that children's pre-existing knowledge or ideas will affect how much they learn from fiction. In the word learning literature, children's vocabulary level affected how many words they learned from stories, although the results were inconsistent as to whether higher ([Penno, Wilkinson, & Moore, 2002](#); [Robbins & Ehri, 1994](#); [Sénéchal et al., 1995](#)) or lower ([Elley, 1989](#); [Justice, Meier, & Walpole, 2005](#)) vocabulary led to more learning. Children's own gender ([Daly et al., 1998](#); [Green et al., 2004](#); [Pingree, 1978](#)) and the strength of their existing gender stereotypes ([Green et al., 2004](#); [Ruble et al., 1981](#)) affected how much they were influenced by stories containing non-conventional gender roles. Similarly, children's experience of interacting with out-group members affected the efficacy of interventions aimed at improving racial attitudes ([Cameron et al., 2011](#); [Cole et al., 2003](#)).

Children's level of engagement with stories has been also understudied with regards to learning, although we know from other areas of research that transportation into the world of a narrative and identification with the characters is an important

part of the process of consuming fictional media (e.g., Green & Brock, 2000). Like adults, children track the perspective of characters in narratives (O'Neill & Shultis, 2007; Ziegler, Mitchell, & Currie, 2005) and sometimes adopt the traits of fictional characters (Dore, Smith, & Lillard, submitted for publication), although how this affects their learning from such narratives has not been investigated closely.

A few studies have considered whether identifying with the protagonist of a story affects children's learning. McArthur and Eisen (1976) found that children were more affected by books about persisting towards a goal when the protagonist was the same gender as the child; this may be because they were more likely to learn from a character with whom they identified more strongly. Similarly, in a study conducted with fifth-grade students in Italy, participants who read and discussed passages from the Harry Potter books that related to prejudice showed greater pre- to post-test improvement in their attitudes towards immigrants if they identified strongly with Harry Potter (Vezzali, Stahl, Giovannini, Capozza, & Trifiletti, 2015). However, two more recent studies that directly measured identification did not find any relations with learning. Children did not learn more from a storybook when the protagonist was of their own race despite identifying more with that character (Dore, 2015), and children's identification with a character in a video was unrelated to their learning of a problem-solving strategy from that video (Schlesinger, Flynn, & Richert, 2016). More research is needed on this topic, as well as other child-level factors that might influence learning, such as their enjoyment of the media or their familiarity with the story and its characters (e.g., Lauricella, Gola, & Calvert, 2011; Smith, 2014).

Finally, the role of development has been understudied in this area. Most of the studies reviewed here studied narrow age ranges, and only a handful report significant age effects. A variety of factors that could influence how children learn from fiction are likely to change with age. For example, as already discussed, children's judgments about what is and what is not real affect whether they learn new information from fiction, and this ability to distinguish reality from fiction improves as they get older. Several of the studies included in this review showed that older children were more accurate at judging the reality of the content of fictional media than younger children, both within the narrow range of 3–5 year olds (Mares & Sivakumar, 2014) and across wider age groups in elementary school (Brabham et al., 2000; Pingree, 1978). Thus, learning from fiction may increase with age as children learn more about what is and can be real (see Richert & Schlesinger, 2016), but much more research comparing different age groups is needed to support this conclusion.

Potentially in contrast to this view is the finding from one study that 7-year-olds were more likely to learn false information from a story than 5- and 6-year-olds (Marsh & Fazio, 2006). This would seem to contradict the view that older children are better at detecting what is real. However, the stimuli used in this study were all very realistic, as opposed to the more fantastical media used in other studies, and detecting false information in an otherwise realistic story may be a more difficult challenge. The authors of this study argue that older children's increased rates of learning were due to better episodic memory and a stronger ability to connect new information with existing knowledge compared to younger children, rather than to any issues with the fiction/reality distinction.

As children's understanding of media and the difference between reality and fiction and their general cognitive skills develop, the role that fiction can play in learning may change. Fiction and fantasy could be more effective than other types of instruction at some ages, but not at others. Browning and Hohenstein (2013) found that 7- and 8-year-olds learned more from a fictional story than a nonfictional one, but 5- and 6-year-olds showed no differences between the two text types. This could be evidence that fiction is more effective for older than younger children, but more studies, including careful assessment of children's pre-existing knowledge, are needed before this conclusion can be stated with any real confidence.

### Final conclusions

Young children are surrounded by fictional stories in a variety of formats, and they are often expected to learn from them. As this review shows, children do generally seem capable of learning new information from these stories, but the effectiveness of fiction as an educational tool can vary considerably depending on the type of information being taught, properties of the fictional media, and properties of the child as an active learner. Understanding how best to use fiction in educational settings is a critical issue given the amount of time that young children spend interacting with various forms of media (Rideout, 2013; Rideout, Foehr, & Roberts, 2010). Children's early exposure to topics such as language, science, math, prosocial behaviors, healthy habits, and members of out-groups will shape their knowledge and attitudes for the rest of their lives. The fictional media that children experience thus has the potential to be an incredibly powerful tool that can influence all aspects of development. The research reviewed here and future research on this topic will enable us to wield this tool properly.

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### References

- Abad, C., & Pruden, S. M. (2013). Do storybooks really break children's gender stereotypes? *Frontiers in Psychology*, 4, 1–4. <http://dx.doi.org/10.3389/fpsyg.2013.00986>.

- Adler, R. P. (1977). *Research on the effects of television advertising on children: A review of the literature and recommendations for future research*. Washington, DC.
- Alfieri, L., Brooks, P. J., Aldrich, N. J., & Tenenbaum, H. R. (2011). Does discovery-based instruction enhance learning? *Journal of Educational Psychology*, 103(1), 1–18. <http://dx.doi.org/10.1037/a0021017>.
- Anderson, D. R. (1998). Educational television is not an oxymoron. *The ANNALS of the American Academy of Political and Social Science*, 557(1), 24–38. <http://dx.doi.org/10.1177/0002716298557000003>.
- Anderson, C. A., Berkowitz, L., Donnerstein, E., Huesmann, L. R., Johnson, J. D., Linz, D., ... Wartella, E. A. (2003). The influence of media violence on youth. *Psychological Science in the Public Interest*, 4(3), 81–110. <http://dx.doi.org/10.1111/j.1529-1006.2003.pspi.1433.x>.
- Anderson, D. R., Huston, A. C., Schmitt, K. L., Linebarger, D. L., Wright, J. C., & Larson, R. (2001). Early childhood television viewing and adolescent behavior: The recontact study. *Monographs of the Society for Research in Child Development*, 66(1), i–154.
- Ard, L. M., & Beverly, B. L. (2004). Preschool word learning during joint book reading: Effect of adult questions and comments. *Communication Disorders Quarterly*, 26(1), 17–28. <http://dx.doi.org/10.1177/15257401040260010101>.
- Ashton, E. (1983). Measures of play behavior: The influence of sex-role stereotyped children's books. *Sex Roles*, 9(1), 43–47. <http://dx.doi.org/10.1007/BF00303108>.
- Bandura, A., Ross, D., & Ross, S. A. (1963). Imitation of film-mediated aggressive models. *Journal of Abnormal and Social Psychology*, 66(1), 3–11. <http://dx.doi.org/10.1037/h0048687>.
- Barr, R. F., & Hayne, H. (1999). Developmental changes in imitation from television during infancy. *Child Development*, 70(5), 1067–1081. <http://dx.doi.org/10.1111/1467-8624.00079>.
- Berg-Cross, L., & Berg-Cross, G. (1978). Listening to stories may change children's social attitudes. *The Reading Teacher*, 31, 659–663.
- Bloom, P. (2010). The pleasures of imagination. *The Chronicle of Higher Education*. Retrieved from <<http://chronicle.com/article/The-Pleasures-of-Imagination/65678>>.
- Bonus, J. A., & Mares, M.-L. (2015). Learned and remembered but rejected: Preschoolers' reality judgments and transfer from Sesame Street. *Communication Research*. <http://dx.doi.org/10.1177/0093650215609980>. Advance online publication.
- Brabham, E., Boyd, P., & Edgington, W. D. (2000). Sorting it out: Elementary students' responses to fact and fiction in informational storybooks as read-alouds for science and social studies. *Reading Research and Instruction*, 39(4), 265–289. <http://dx.doi.org/10.1080/19388070009558326>.
- Brown, A. L., & Kane, M. J. (1988). Preschool children can learn to transfer: Learning to learn and learning from example. *Cognitive Psychology*, 20(4), 493–523. [http://dx.doi.org/10.1016/0010-0285\(88\)90014-X](http://dx.doi.org/10.1016/0010-0285(88)90014-X).
- Brown, A. L., Kane, M. J., & Echols, C. H. (1986). Young children's mental models determine analogical transfer across problems with a common goal structure. *Cognitive Development*, 1(2), 103–121. [http://dx.doi.org/10.1016/S0885-2014\(86\)80014-4](http://dx.doi.org/10.1016/S0885-2014(86)80014-4).
- Brown, A. L., Kane, M. J., & Long, C. (1989). Analogical transfer in young children: Analogies as tools for communication and exposition. *Applied Cognitive Psychology*, 3, 275–293. <http://dx.doi.org/10.1002/acp.2350030402>.
- Browning, E., & Hohenstein, J. (2013). The use of narrative to promote primary school children's understanding of evolution. *Education 3-13: International Journal of Primary, Elementary and Early Years Education*. <http://dx.doi.org/10.1080/03004279.2013.837943>.
- Byrd-Bredbenner, C., Grecni, A., & Quick, V. (2010). Effect of a television programme on nutrition cognitions and intended behaviours. *Nutrition & Dietetics*, 67(3), 143–149. <http://dx.doi.org/10.1111/j.1747-0080.2010.01446.x>.
- Calvert, S. L., & Huston, A. C. (1987). Television and children's gender schemata. *New Directions for Child and Adolescent Development*, 98(38), 75–88. <http://dx.doi.org/10.1002/cd.23219873807>.
- Calvert, S. L., & Kotler, J. A. (2003). Lessons from children's television: The impact of the Children's Television Act on children's learning. *Journal of Applied Developmental Psychology*, 24(3), 275–335. [http://dx.doi.org/10.1016/S0193-3973\(03\)00060-1](http://dx.doi.org/10.1016/S0193-3973(03)00060-1).
- Cameron, L., & Rutland, A. (2006). Extended contact through story reading in school: Reducing children's prejudice toward the disabled. *Journal of Social Issues*, 62(3), 469–488. <http://dx.doi.org/10.1111/j.1540-4560.2006.00469.x>.
- Cameron, L., Rutland, A., & Brown, R. (2007). Promoting children's positive intergroup attitudes towards stigmatized groups: Extended contact and multiple classification skills training. *International Journal of Behavioral Development*, 31(5), 454–466. <http://dx.doi.org/10.1177/0165025407081474>.
- Cameron, L., Rutland, A., Brown, R., & Douch, R. (2006). Changing children's intergroup attitudes toward refugees: Testing different models of extended contact. *Child Development*, 77(5), 1208–1219. <http://dx.doi.org/10.1111/j.1467-8624.2006.00929.x>.
- Cameron, L., Rutland, A., Hossain, R., & Petley, R. (2011). When and why does extended contact work? The role of high quality direct contact and group norms in the development of positive ethnic intergroup attitudes amongst children. *Group Processes & Intergroup Relations*, 14(2), 193–206. <http://dx.doi.org/10.1177/1368430210390535>.
- Carey, S. (1985). *Conceptual change in childhood*. Cambridge, MA: MIT Press.
- Carey, S. (2009). *The origin of concepts*. New York: Oxford University Press.
- Casey, B., Erkut, S., Ceder, I., & Young, J. M. (2008). Use of a storytelling context to improve girls' and boys' geometry skills in kindergarten. *Journal of Applied Developmental Psychology*, 29(1), 29–48. <http://dx.doi.org/10.1016/j.appdev.2007.10.005>.
- Casey, B., Kersh, J. E., & Young, J. M. (2004). Storytelling sagas: An effective medium for teaching early childhood mathematics. *Early Childhood Research Quarterly*, 19(1), 167–172. <http://dx.doi.org/10.1016/j.ecresq.2004.01.011>.
- Chen, Z. (1996). Children's analogical problem solving: The effects of superficial, structural, and procedural similarity. *Journal of Experimental Child Psychology*, 62(3), 410–431. <http://dx.doi.org/10.1006/jecp.1996.0037>.
- Chi, M. T. H. (2009). Active-constructive-interactive: A conceptual framework for differentiating learning activities. *Topics in Cognitive Science*, 1(1), 73–105. <http://dx.doi.org/10.1111/j.1756-8765.2008.01005.x>.
- Chiong, C., & DeLoache, J. S. (2012). Learning the ABC's: What kinds of picture books facilitate young children's learning? *Journal of Early Childhood Literacy*, 13(2), 225–241. <http://dx.doi.org/10.1177/1468798411430091>.
- Cobb, N. J., Stevens-Long, J., & Goldstein, S. (1982). The influence of televised models on toy preference in children. *Sex Roles*, 8, 1075–1080. <http://dx.doi.org/10.1007/BF00291001>.
- Cole, C. F., Arafat, C., Tidhar, C., Tafesh, W. Z., Fox, N. A., Killen, M., ... Yung, F. (2003). The educational impact of Rechov Sumsum/Shara'a Simsim: A Sesame Street television series to promote respect and understanding among children living in Israel, the West Bank, and Gaza. *International Journal of Behavioral Development*, 27(5), 409–422. <http://dx.doi.org/10.1080/01650250344000019>.
- Cordova, D. I., & Lepper, M. R. (1996). Intrinsic motivation and the process of learning: Beneficial effects of contextualization, personalization, and choice. *Journal of Educational Psychology*, 88(4), 715–730. <http://dx.doi.org/10.1037/0022-0663.88.4.715>.
- Corriveau, K. H., Kim, A. L., Schwalen, C. E., & Harris, P. L. (2009). Abraham Lincoln and Harry Potter: Children's differentiation between historical and fantasy characters. *Cognition*, 113(2), 213–225. <http://dx.doi.org/10.1016/j.cognition.2009.08.007>.
- Crawley, A. M., Anderson, D. R., Santomero, A., Wilder, A., Williams, M., Evans, M. K., & Bryant, J. (2002). Do children learn how to watch television? The impact of extensive experience with Blue's Clues on preschool children's television viewing behavior. *Journal of Communication*, 52(2), 264–280. <http://dx.doi.org/10.1093/joc/52.2.264>.
- Daehler, M. W., & Chen, Z. (1993). Protagonist, theme, and goal object: Effects of surface features on analogical transfer. *Cognitive Development*, 8, 211–229. [http://dx.doi.org/10.1016/0885-2014\(93\)90015-W](http://dx.doi.org/10.1016/0885-2014(93)90015-W).
- Daly, P., Salters, J., & Burns, C. (1998). Gender and task interaction: Instant and delayed recall of three story types. *Educational Review*, 50, 269–275. <http://dx.doi.org/10.1080/0013191980500306>.
- Davidson, E. S., Yasuna, A., & Tower, A. (1979). The effects of television cartoons on sex-role stereotyping in young girls. *Child Development*, 50(2), 597–600. <http://dx.doi.org/10.2307/1129444>.

- DeLoache, J. S., Chiong, C., Sherman, K., Islam, N., Vanderborgh, M., Troseth, G. L., ... O'Doherty, K. (2010). Do babies learn from baby media? *Psychological Science*, 21(11), 1570–1574. <http://dx.doi.org/10.1177/0956797610384145>.
- Dore, R. A. (2015). *Two sides of the coin: Examining the role of character-similarity and identification in the effects of a narrative on children's learning and bias* (Unpublished doctoral dissertation). Charlottesville, VA: University of Virginia.
- Dore, R. A., Smith, E. D., & Lillard, A. S. (2016). *Children adopt the traits of characters in fictional narratives* (submitted for publication).
- Dore, R. A., Jaswal, V. K., & Lillard, A. S. (2015). Real or not? Informativeness influences children's reality status judgments. *Cognitive Development*, 33, 28–39. <http://dx.doi.org/10.1016/j.cogdev.2014.08.004>.
- Drabman, R. S., & Thomas, M. H. (1974). Does media violence increase children's toleration of real-life aggression? *Developmental Psychology*, 10(3), 418–421. <http://dx.doi.org/10.1037/h0036439>.
- Elia, I., van den Heuvel-Panhuizen, M., & Georgiou, A. (2010). The role of pictures in picture books on children's cognitive engagement with mathematics. *European Early Childhood Education Research Journal*, 18(3), 275–297. <http://dx.doi.org/10.1080/1350293X.2010.500054>.
- Elley, W. B. (1989). Vocabulary acquisition from listening to stories. *Reading Research Quarterly*, 24(2), 174–187. <http://dx.doi.org/10.2307/747863>.
- Ewers, C. A., & Brownson, S. M. (1999). Kindergarteners' vocabulary acquisition as a function of active vs. passive storybook reading, prior vocabulary, and working memory. *Reading Psychology*, 20(1), 11–20. <http://dx.doi.org/10.1080/027027199278484>.
- Fazio, L. K., & Marsh, E. J. (2008). Older, not younger, children learn more false facts from stories. *Cognition*, 106(2), 1081–1089. <http://dx.doi.org/10.1016/j.cognition.2007.04.012>.
- Ferguson, C. J. (2015). Do angry birds make for angry children? A meta-analysis of video game influences on children's and adolescents' aggression, mental health, prosocial behavior, and academic performance. *Perspectives on Psychological Science*, 10(5), 646–666. <http://dx.doi.org/10.1177/1745691615592234>.
- Fisch, S. M. (2005). Children's learning from television. *Television*, 18, 10–14.
- Fisch, S. M., Truglio, R. T., & Cole, C. F. (1999). The impact of Sesame Street on preschool children: A review and synthesis of 30 years' research. *Media Psychology*, 1(2), 165–190. [http://dx.doi.org/10.1207/s1532785xmep0102\\_5](http://dx.doi.org/10.1207/s1532785xmep0102_5).
- Flavell, J. H. (1999). Children's knowledge about the mind. *Annual Review of Psychology*, 50(1), 21–45. <http://dx.doi.org/10.1146/annurev.psych.50.1.21>.
- Flerx, V. C., Fidler, D. S., & Rogers, R. W. (1976). Sex role stereotypes: Developmental aspects and early intervention. *Child Development*, 47(4), 998–1007. <http://dx.doi.org/10.2307/1128436>.
- Flevaris, L. M., & Schiff, J. R. (2014). Learning mathematics in two dimensions: A review and look ahead at teaching and learning early childhood mathematics with children's literature. *Frontiers in Psychology*, 5(459). <http://dx.doi.org/10.3389/fpsyg.2014.00459>.
- Frawley, T. J. (2008). Gender schema and prejudicial recall: How children misremember, fabricate, and distort gendered picture book information. *Journal of Research in Childhood Education*, 22, 291–303. <http://dx.doi.org/10.1080/02568540809594628>.
- Friedrich, L. K., & Stein, A. H. (1973). Aggressive and prosocial television programs and the natural behavior of preschool children. *Monographs of the Society for Research in Child Development*, 38(4), 1–64. <http://dx.doi.org/10.2307/1165725>.
- Friedrich, L. K., & Stein, A. H. (1975). Prosocial television and young children: The effects of verbal labeling and role playing on learning and behavior. *Child Development*, 46(1), 27–38. <http://dx.doi.org/10.2307/1128830>.
- Ganea, P. A., Canfield, C. F., Simons-Ghafari, K., & Chou, T. (2014). Do cavies talk? The effect of anthropomorphic picture books on children's knowledge about animals. *Frontiers in Psychology*, 5(283). <http://dx.doi.org/10.3389/fpsyg.2014.00283>.
- Ganea, P. A., Ma, L., & DeLoache, J. S. (2011). Young children's learning and transfer of biological information from picture books to real animals. *Child Development*, 82(5), 1421–1433. <http://dx.doi.org/10.1111/j.1467-8624.2011.01612.x>.
- Ganea, P. A., Pickard, M. B., & DeLoache, J. S. (2008). Transfer between picture books and the real world by very young children. *Journal of Cognition and Development*, 9(1), 46–66. <http://dx.doi.org/10.1080/15248370701836592>.
- Geerdts, M. S. (2016). Un-real animals: Anthropomorphism and early learning about animals. *Child Development Perspectives*, 10(1), 10–14. <http://dx.doi.org/10.1111/cdep.12153>.
- Geerdts, M. S., Van de Walle, G. A., & LoBue, V. (2016). Learning about real animals from anthropomorphic media. *Imagination, Cognition and Personality*, 36(1), 5–26. <http://dx.doi.org/10.1177/0276236615611798>.
- Gentner, D. (1988). Metaphor as structure mapping: The relational shift. *Child Development*, 59, 47–59. <http://dx.doi.org/10.2307/1130388>.
- Gentner, D., & Toupin, C. (1986). Systematicity and surface similarity in the development of analogy. *Cognitive Science*, 10(3), 277–300. [http://dx.doi.org/10.1016/S0364-0213\(86\)80019-2](http://dx.doi.org/10.1016/S0364-0213(86)80019-2).
- Gerrig, R. J. (1993). *Experiencing narrative worlds: On the psychological activities of reading*. New Haven, CT: Yale University Press.
- Gerrig, R. J., & Prentice, D. A. (1991). The representation of fictional information. *Psychological Science*, 2(5), 336–340. <http://dx.doi.org/10.1111/j.1467-9280.1991.tb00162.x>.
- Gimmesstad, B. J., & DeChiara, E. (1982). Dramatic plays: A vehicle for prejudice reduction in the elementary school. *Journal of Educational Research*, 76(1), 45–49.
- Goldberg, M. E., & Gorn, G. J. (1979). Television's impact on preferences for non-white playmates: Canadian "Sesame Street" inserts. *Journal of Broadcasting*, 23(1), 27–32. <http://dx.doi.org/10.1080/08838157909363914>.
- Goldman, S. R., Reyes, M., & Varnhagen, C. K. (1984). Understanding fables in first and second languages. *NABE Journal*, 8(2), 35–66. <http://dx.doi.org/10.1080/08855072.1984.10668465>.
- Gorn, G. J., Goldberg, M. E., & Kanungo, R. N. (1976). The role of educational television in changing the intergroup attitudes of children. *Child Development*, 47(1), 277–280. <http://dx.doi.org/10.2307/1128313>.
- Green, V. A., Bigler, R., & Catherwood, D. (2004). The variability and flexibility of gender-typed toy play: A close look at children's behavioral responses to counterstereotypic models. *Sex Roles*, 51, 371–386. <http://dx.doi.org/10.1023/B:SER.0000049227.05170.a>.
- Green, M. C., & Brock, T. C. (2000). The role of transportation in the persuasiveness of public narratives. *Journal of Personality and Social Psychology*, 79(5), 701–721. <http://dx.doi.org/10.1037/0022-3514.79.5.701>.
- Green, M. C., & Brock, T. C. (2002). In the mind's eye: Transportation-imagery model of narrative persuasion. In M. C. Green, J. J. Strange, & T. C. Brock (Eds.), *Narrative impact: Social and cognitive foundations* (pp. 315–341). Mahwah, NJ: Lawrence Erlbaum Associates.
- Green, M. (2010). How and what can we learn from fiction? In G. L. Hagberg & W. Jost (Eds.), *A companion to the philosophy of literature* (pp. 350–366). Malden, MA: Wiley-Blackwell.
- Greenberg, B. S. (1972). Children's reactions to TV blacks. *Journalism Quarterly*, 49, 5–14.
- Harris, P. L. (2000). *The work of the imagination*. Oxford: Blackwell.
- Harris, P. L., Brown, E., Marriott, C., Whittall, S., & Harmer, S. (1991). Monsters, ghosts and witches: Testing the limits of the fantasy-reality distinction in young children. *British Journal of Developmental Psychology*, 9(1), 105–123. <http://dx.doi.org/10.1111/j.2044-835X.1991.tb00865.x>.
- Harris, P. L., Pasquini, E. S., Duke, S., Asscher, J. J., & Pons, F. (2006). Germs and angels: The role of testimony in young children's ontology. *Developmental Science*, 9(1), 76–96. <http://dx.doi.org/10.1111/j.1467-7687.2005.00465.x>.
- Hayne, H., Herbert, J., & Simcock, G. (2003). Imitation from television by 24- and 30-month-olds. *Developmental Science*, 6(3), 254–261. <http://dx.doi.org/10.1111/1467-7687.00281>.
- Hearold, S. (1986). A synthesis of 1043 effects of television on social behavior. In G. Comstock (Ed.), *Public communication and behavior* (pp. 65–133). New York, NY: Academic Press.
- Henderson, L., Devine, K., Weighall, A., & Gaskell, G. (2015). When the daffodil flew to the intergalactic zoo: Off-line consolidation is critical for word learning from stories. *Developmental Psychology*, 51(3), 406–417. <http://dx.doi.org/10.1037/a0038786>.
- Herrmann, P., Waxman, S. R., & Medin, D. L. (2010). Anthropocentrism is not the first step in children's reasoning about the natural world. *Proceedings of the National Academy of Sciences*, 107(22), 9979–9984. <http://dx.doi.org/10.1073/pnas.1004440107>.

- Holyoak, K. J., Junn, E. N., & Billman, D. O. (1984). Development of analogical problem-solving skill. *Child Development*, 55(6), 2042–2055. <http://dx.doi.org/10.2307/1129778>.
- Hong, H. (1996). Effects of mathematics learning through children's literature on math achievement and dispositional outcomes. *Early Childhood Research Quarterly*, 11(4), 477–494. [http://dx.doi.org/10.1016/S0885-2006\(96\)90018-6](http://dx.doi.org/10.1016/S0885-2006(96)90018-6).
- Hopkins, E. J., & Lillard, A. S. (2016). *The effect of specific fantasy elements on children's learning from storybooks* (submitted for publication).
- Hopkins, E. J., Dore, R. A., & Lillard, A. S. (2015). Do children learn from pretense? *Journal of Experimental Child Psychology*, 130, 1–18. <http://dx.doi.org/10.1016/j.jecp.2014.09.004>.
- Horst, J. S., Parsons, K. L., & Bryan, N. M. (2011). Get the story straight: Contextual repetition promotes word learning from storybooks. *Frontiers in Psychology*, 2, 17. <http://dx.doi.org/10.3389/fpsyg.2011.00017>.
- Houston-Price, C., Howe, J. A., & Lintern, N. J. (2014). Once upon a time, there was a fabulous funambulist: What children learn about the "high-level" vocabulary they encounter while listening to stories. *Frontiers in Psychology*, 5(75). <http://dx.doi.org/10.3389/fpsyg.2014.00075>.
- Huesmann, L. R., Moise-Titus, J., Podolski, C.-L., & Eron, L. D. (2003). Longitudinal relations between children's exposure to TV violence and their aggressive and violent behavior in young adulthood: 1977–1992. *Developmental Psychology*, 39(2), 201–221. <http://dx.doi.org/10.1037/0012-1649.39.2.201>.
- Huston, A. C. (1985). The development of sex typing: Themes from recent research. *Developmental Review*, 5(1), 1–17. [http://dx.doi.org/10.1016/0273-2297\(85\)90028-0](http://dx.doi.org/10.1016/0273-2297(85)90028-0).
- Jennings, S. A. (1975). Effects of sex typing in children's stories on preference and recall. *Child Development*, 46, 220–223. <http://dx.doi.org/10.2307/1128852>.
- Jennings, C. M., Jennings, J. E., Richey, J., & Dixon-Krauss, L. (1992). Increasing interest and achievement in mathematics through children's literature. *Early Childhood Research Quarterly*, 7(2), 263–276. [http://dx.doi.org/10.1016/0885-2006\(92\)90008-M](http://dx.doi.org/10.1016/0885-2006(92)90008-M).
- Johnson, J. G., Cohen, P., Smailes, E. M., Kasen, S., & Brook, J. S. (2002). Television viewing and aggressive behavior during adolescence and adulthood. *Science*, 295(5564), 2468–2471. <http://dx.doi.org/10.1126/science.1062929>.
- Johnson, D. F., & Goldman, S. R. (1987). Children's recognition and use of rules of moral conduct in stories. *The American Journal of Psychology*, 100(2), 205–224. <http://dx.doi.org/10.2307/1422404>.
- Johnston, J., & Ettema, J. S. (1982). *Positive images: Breaking stereotypes with children's television*. Beverley Hills, CA: Sage Publications.
- Justice, L. M., Meier, J., & Walpole, S. (2005). Learning new words from storybooks. *Language Speech and Hearing Services in Schools*, 36(1), 17–32. [http://dx.doi.org/10.1044/0161-1461\(2005\)003](http://dx.doi.org/10.1044/0161-1461(2005)003).
- Katz, P. A., & Walsh, P. V. (1991). Modification of children's gender-stereotyped behavior. *Child Development*, 62, 338–351. <http://dx.doi.org/10.1111/j.1467-8624.1991.tb01535.x>.
- Keates, J., Graham, S. A., & Ganea, P. A. (2014). Infants transfer nonobvious properties from pictures to real-world objects. *Journal of Experimental Child Psychology*, 125, 35–47. <http://dx.doi.org/10.1016/j.jecp.2014.02.003>.
- Keil, F. C. (1992). *Concepts, kinds, and cognitive development*. Cambridge, MA: MIT Press.
- Kelemen, D., Emmons, N. A., Seston Schillaci, R., & Ganea, P. A. (2014). Young children can be taught basic natural selection using a picture-storybook intervention. *Psychological Science*, 25(4), 893–902. <http://dx.doi.org/10.1177/0956797613516009>.
- Khu, M., Graham, S. A., & Ganea, P. A. (2014). Learning from picture books: Infants' use of naming information. *Frontiers in Psychology*, 5(144). <http://dx.doi.org/10.3389/fpsyg.2014.00144>.
- Kirsh, S. J. (2006). Cartoon violence and aggression in youth. *Aggression and Violent Behavior*, 11, 547–557. <http://dx.doi.org/10.1016/j.avb.2005.10.002>.
- Koblinsky, S. G., Cruse, D. F., & Sugawara, A. I. (1978). Sex role stereotypes and children's memory for story content. *Child Development*, 49(2), 452–458.
- Krcmar, M. (2014). Can infants and toddlers learn words from repeat exposure to an infant directed DVD? *Journal of Broadcasting & Electronic Media*, 58(2), 196–214. <http://dx.doi.org/10.1080/08838151.2014.906429>.
- Krcmar, M., Grela, B., & Lin, K. (2007). Can toddlers learn vocabulary from television? An experimental approach. *Media Psychology*, 10, 41–63. <http://dx.doi.org/10.1080/15213260701300931>.
- Kropp, J. J., & Halverson, C. F. (1983). Preschool children's preferences and recall for stereotyped versus nonstereotyped stories. *Sex Roles*, 9, 261–272. <http://dx.doi.org/10.1007/BF00289628>.
- Kunkel, D. (2001). Children and television advertising. In D. G. Singer & J. L. Singer (Eds.), *Handbook of children and the media* (pp. 375–393). Thousand Oaks, CA: Sage Publications.
- Lauricella, A. R., Gola, A. A. H., & Calvert, S. L. (2011). Toddlers' learning from socially meaningful video characters. *Media Psychology*, 14(2), 216–232. <http://dx.doi.org/10.1080/15213269.2011.573465>.
- Leal, D. J. (1993). A comparison of third grade children's listening comprehension of scientific information using an information book and an informational storybook. *Annual meeting of the national reading conference, Charleston, SC*.
- Legare, C. H., Lane, J. D., & Evans, E. M. (2013). Anthropomorphizing science: How does it affect the development of evolutionary concepts? *Merrill-Palmer Quarterly*, 59(2), 168–197. <http://dx.doi.org/10.1353/mpq.2013.0009>.
- Lehr, S. (1988). The child's developing sense of theme as a response to literature. *Reading Research Quarterly*, 23(3), 337–357. <http://dx.doi.org/10.2307/748046>.
- Leslie, A. M. (1987). Pretense and representation: The origins of "theory of mind". *Psychological Review*, 94(4), 412–426. <http://dx.doi.org/10.1037/0033-295X.94.4.412>.
- Li, H., Boguszewski, K., & Lillard, A. S. (2015). The effect of anthropomorphic media on children's knowledge of trains. *Poster presented at the biennial meeting of the society for research in child development, Philadelphia, PA*.
- Liben, L. S., & Bigler, R. (2002). The developmental course of gender differentiation: Conceptualizing, measuring, and evaluating constructs and pathways. *Monographs of the Society for Research in Child Development*, 67(2). <http://dx.doi.org/10.1111/1540-5834.t01-1-00188>.
- Lillard, A. S. (2001). Pretend play as Twin Earth: A social-cognitive analysis. *Developmental Review*, 21(4), 495–531. <http://dx.doi.org/10.1006/drev.2001.0532>.
- Lillard, A. S., Pinkham, A. M., & Smith, E. D. (2010). Pretend play and cognitive development. In U. Goswami (Ed.), *Handbook of cognitive development* (pp. 285–311). London: Blackwell.
- Linebarger, D. L. (2005). Infants' and toddlers' television viewing and language outcomes. *American Behavioral Scientist*, 48(5), 624–645. <http://dx.doi.org/10.1177/0002764204271505>.
- Linebarger, D. L., & Vaala, S. E. (2010). Screen media and language development in infants and toddlers: An ecological perspective. *Developmental Review*, 30(2), 176–202. <http://dx.doi.org/10.1016/j.dr.2010.03.006>.
- Mar, R. A., & Oatley, K. (2008). The function of fiction is the abstraction and simulation of social experience. *Perspectives on Psychological Science*, 3(3), 173–192. <http://dx.doi.org/10.1111/j.1745-6924.2008.00073.x>.
- Mares, M. L., & Acosta, E. E. (2008). Be kind to three-legged dogs: Children's literal interpretations of tv's moral lessons. *Media Psychology*, 11(3), 377–399. <http://dx.doi.org/10.1080/15213260802204355>.
- Mares, M. L., & Acosta, E. E. (2010). Teaching inclusiveness via TV narratives in the US. *Journal of Children and Media*, 4(3), 231–247. <http://dx.doi.org/10.1080/17482798.2010.486127>.
- Mares, M. L., & Pan, Z. (2013). Effects of Sesame Street: A meta-analysis of children's learning in 15 countries. *Journal of Applied Developmental Psychology*, 34(3), 140–151. <http://dx.doi.org/10.1016/j.appdev.2013.01.001>.
- Mares, M. L., & Sivakumar, G. (2014). "Vámonos means go, but that's made up for the show": Reality confusions and learning from educational TV. *Developmental Psychology*, 50(11), 2498–2511. <http://dx.doi.org/10.1037/a0038041>.
- Mares, M. L., Sivakumar, G., & Stephenson, L. (2015). From meta to micro: Examining the effectiveness of educational tv. *American Behavioral Scientist*, 59(14), 1822–1846.

- Mares, M. L., & Woodard, E. H. (2005). Positive effects of television on children's social interactions: A meta-analysis. *Media Psychology*, 7(3), 301–322. [http://dx.doi.org/10.1207/S1532785XMEP0703\\_4](http://dx.doi.org/10.1207/S1532785XMEP0703_4).
- Marsh, E. J., & Fazio, L. K. (2006). Learning errors from fiction: Difficulties in reducing reliance on fictional stories. *Memory & Cognition*, 34(5), 1140–1149. <http://dx.doi.org/10.3758/BF03193260>.
- Marsh, E. J., Meade, M. L., & Roediger, H. L. (2003). Learning facts from fiction. *Journal of Memory and Language*, 49, 519–536. [http://dx.doi.org/10.1016/S0749-596X\(03\)00092-5](http://dx.doi.org/10.1016/S0749-596X(03)00092-5).
- Mayer, D. A. (1995). How can we best use children's literature in teaching science concepts? *Science and Children*, 32(6), 16–19.
- McArthur, L. Z., & Eisen, S. V. (1976). Achievements of male and female storybook characters as determinants of achievement behavior by boys and girls. *Journal of Personality and Social Psychology*, 33, 467–473. <http://dx.doi.org/10.1037/0022-3514.33.4.467>.
- McLeod, A. N., & McDade, H. L. (2010). Preschoolers' incidental learning of novel words during storybook reading. *Communication Disorders Quarterly*, 32(4), 256–266. <http://dx.doi.org/10.1177/1525740109354777>.
- Meltzoff, A. N. (1988). Imitation of televised models by infants. *Child Development*, 59(5), 1221–1229. <http://dx.doi.org/10.2307/1130485>.
- Mitnick, L. L., & McGinnies, E. (1958). Influencing ethnocentrism in small discussion groups through a film communication. *Journal of Abnormal and Social Psychology*, 56(1), 82–90. <http://dx.doi.org/10.1037/H0045323>.
- Morison, P., & Gardner, H. (1978). Dragons and dinosaurs: The child's capacity to differentiate fantasy from reality. *Child Development*, 49(3), 642. <http://dx.doi.org/10.2307/1128231>.
- Nagy, W. E., Anderson, R. C., & Herman, P. A. (1987). Learning word meanings from context during normal reading. *American Educational Research Journal*, 24(2), 237–270. <http://dx.doi.org/10.3102/00028312024002237>.
- Narvaez, D. (2001). Moral text comprehension: Implications for education and research. *Journal of Moral Education*, 30(1), 43–54. <http://dx.doi.org/10.1080/03057240120033802>.
- Narvaez, D. (2002). Does reading moral stories build character? *Educational Psychology Review*, 14(2), 155–171. <http://dx.doi.org/10.1023/A:1014674621501>.
- Narvaez, D., Bentley, J., Gleason, T., & Samuels, J. (1998). Moral theme comprehension in third graders, fifth graders, and college students. *Reading Psychology*, 19(2), 217–241. <http://dx.doi.org/10.1080/0270271980190203>.
- Narvaez, D., Gleason, T., Mitchell, C., & Bentley, J. (1999). Moral theme comprehension in children. *Journal of Educational Psychology*, 91(3), 477–487. <http://dx.doi.org/10.1037/0022-0663.91.3.477>.
- Nhundu, T. J. (2007). Mitigating gender-typed occupational preferences of Zimbabwean primary school children: The use of biographical sketches and portrayals of female role models. *Sex Roles*. <http://dx.doi.org/10.1007/s11199-007-9204-6>.
- O'Connor, R. D. (1969). Modification of social withdrawal through symbolic modeling. *Journal of Applied Behavior Analysis*, 2(1), 15–22. <http://dx.doi.org/10.1901/jaba.1969.2-15>.
- O'Connor, R. D. (1972). Relative efficacy of modeling, shaping, and the combined procedures for modification of social withdrawal. *Journal of Abnormal Psychology*, 79(3), 327–334. <http://dx.doi.org/10.1037/h0033226>.
- O'Neill, D. K., & Shultis, R. M. (2007). The emergence of the ability to track a character's mental perspective in narrative. *Developmental Psychology*, 43(4), 1032–1037. <http://dx.doi.org/10.1037/0012-1649.43.4.1032>.
- Oatley, K. (1999). Why fiction may be twice as true as fact: Fiction as cognitive and emotional simulation. *Review of General Psychology*, 3, 101–117. <http://dx.doi.org/10.1037/1089-2680.3.2.101>.
- Paik, H., & Comstock, G. (1994). The effects of television violence on antisocial behavior: A meta-analysis. *Communication Research*. <http://dx.doi.org/10.1177/009365094021004004>.
- Parker, L. E., & Lepper, M. R. (1992). Effects of fantasy contexts on children's learning and motivation: Making learning more fun. *Journal of Personality and Social Psychology*, 62(4), 625–633. <http://dx.doi.org/10.1037/0022-3514.62.4.625>.
- Penno, J. F., Wilkinson, I. A. G., & Moore, D. W. (2002). Vocabulary acquisition from teacher explanation and repeated listening to stories: Do they overcome the Matthew effect? *Journal of Educational Psychology*, 94(1), 23–33. <http://dx.doi.org/10.1037/0022-0663.94.1.23>.
- Persson, A., & Musher-Eizenman, D. R. (2003). The impact of a prejudice-prevention television program on young children's ideas about race. *Early Childhood Research Quarterly*, 18(4), 530–546. <http://dx.doi.org/10.1016/j.ecresq.2003.09.010>.
- Pingree, S. (1978). The effects of nonsexist television commercials and perceptions of reality on children's attitudes about women. *Psychology of Women Quarterly*, 2(3), 262–277. <http://dx.doi.org/10.1111/j.1471-6402.1978.tb00507.x>.
- Pinkham, A. M., Kaeyer, T., & Neuman, S. B. (2014). Taxonomies support preschoolers' knowledge acquisition from storybooks. *Child Development Research*. <http://dx.doi.org/10.1155/2014/386762>.
- Potts, G. R., St. John, M. F., & Kirson, D. (1989). Incorporating new information into existing world knowledge. *Cognitive Psychology*, 21(3), 303–333. [http://dx.doi.org/10.1016/0010-0285\(89\)90011-X](http://dx.doi.org/10.1016/0010-0285(89)90011-X).
- Rao, N., Moely, B. E., & Lockman, J. J. (1987). Increasing social participation in preschool social isolates. *Journal of Clinical Child Psychology*, 16(3), 178–183. [http://dx.doi.org/10.1207/s15374424jccp1603\\_1](http://dx.doi.org/10.1207/s15374424jccp1603_1).
- Rapp, D. N., Hinze, S. R., Slaten, D. G., & Horton, W. S. (2014). Amazing stories: Acquiring and avoiding inaccurate information from fiction. *Discourse Processes*, 51, 50–74. <http://dx.doi.org/10.1080/0163853X.2013.855048>. June 2015.
- Rattermann, M. J., & Gentner, D. (1998). More evidence for a relational shift in the development of analogy: Children's performance on a causal-mapping task. *Cognitive Development*, 13(4), 453–478. [http://dx.doi.org/10.1016/S0885-2014\(98\)90003-X](http://dx.doi.org/10.1016/S0885-2014(98)90003-X).
- Rice, D. C. (2002). Using trade books in teaching elementary science: Facts and fallacies. *The Reading Teacher*, 55(6), 552–565.
- Rice, M. L., Huston, A. C., Truglio, R. T., & Wright, J. C. (1990). Words from "Sesame Street": Learning vocabulary while viewing. *Developmental Psychology*, 26(3), 421–428. <http://dx.doi.org/10.1037/0012-1649.26.3.421>.
- Rice, M. L., & Woodsma, L. (1988). Lessons from television: Children's word learning when viewing. *Child Development*, 59(2), 420. <http://dx.doi.org/10.2307/1130321>.
- Richert, R. A., & Schlesinger, M. A. (2016). The role of fantasy-reality distinctions in preschoolers' learning from educational video. *Infant and Child Development*. <http://dx.doi.org/10.1002/icd.2009>. Advance online publication
- Richert, R. A., & Schlesinger, M. A. (2016). *Selective trust and children's learning from fantasy characters* (in preparation).
- Richert, R. A., Shawber, A. B., Hoffman, R. E., & Taylor, M. (2009). Learning from fantasy and real characters in preschool and kindergarten. *Journal of Cognition and Development*, 10(1–2), 41–66. <http://dx.doi.org/10.1080/15248370902966594>.
- Richert, R. A., & Smith, E. I. (2011). Preschoolers' quantifying of fantasy stories. *Child Development*, 82(4), 1106–1119. <http://dx.doi.org/10.1111/j.1467-8624.2011.01603.x>.
- Rideout, V. J. (2013). *Zero to eight: Children's media use in America*. *Common Sense Media*.
- Rideout, V. J., Foehr, U. G., & Roberts, D. F. (2010). *Media in the lives of 8- to 18-year-olds*. Menlo Park, CA: Henry J. Kaiser Family Foundation
- Robb, M. B., Richert, R. A., & Wartella, E. A. (2009). Just a talking book? Word learning from watching baby videos. *British Journal of Developmental Psychology*, 27(1), 27–45. <http://dx.doi.org/10.1348/026151008X320156>.
- Robbins, C., & Ehri, L. C. (1994). Reading storybooks to kindergartners helps them learn new vocabulary words. *Journal of Educational Psychology*, 86(1), 54–64. <http://dx.doi.org/10.1037/0022-0663.86.1.54>.
- Roseberry, S., Hirsh-Pasek, K., Parish-Morris, J., & Golinkoff, R. M. (2009). Live action: Can young children learn verbs from video? *Child Development*, 80(5), 1360–1375. <http://dx.doi.org/10.1111/j.1467-8624.2009.01338.x>.
- Rosenkoetter, L. I. (1999). The television situation comedy and children's prosocial behavior. *Journal of Applied Social Psychology*, 29(5), 979–993. <http://dx.doi.org/10.1111/j.1559-1816.1999.tb00135.x>.

- Ruble, D. N., Balaban, T., & Cooper, J. (1981). Gender constancy and the effects of sex-typed televised toy commercials. *Child Development*, 52, 667–673. <http://dx.doi.org/10.2307/1129188>.
- Rushton, J. P. (1975). Generosity in children: Immediate and long-term effects of modeling, preaching, and moral judgment. *Journal of Personality and Social Psychology*, 31(3), 459–466. <http://dx.doi.org/10.1037/h0076466>.
- Rushton, J. P., & Owen, D. (1975). Immediate and delayed effects of TV modelling and preaching on children's generosity. *British Journal of Social and Clinical Psychology*, 14(3), 309–310. <http://dx.doi.org/10.1111/j.2044-8260.1975.tb00183.x>.
- Rushton, J. P., & Teachman, G. (1978). The effects of positive reinforcement, attributions, and punishment on model induced altruism in children. *Personality and Social Psychology Bulletin*, 4(2), 322–325. <http://dx.doi.org/10.1177/014616727800400232>.
- Salomon, G. (1984). Television is "easy" and print is "tough": The differential investment of mental effort in learning as a function of perceptions and attributions. *Journal of Educational Psychology*, 76(4), 647–658. <http://dx.doi.org/10.1037/0022-0663.76.4.647>.
- Scarborough, H. S., & Dobrich, W. (1994). On the efficacy of reading to preschoolers. *Developmental Review*, 14(3), 245–302. <http://dx.doi.org/10.1006/drev.1994.1010>.
- Schiro, M. (1997). *Integrating children's literature and mathematics in the classroom: Children as meaning makers, problem solvers, and literary critics*. New York: Teachers College Press.
- Schlesinger, M. A., Flynn, R. M., & Richert, R. A. (2016). U.S. preschoolers' trust and learning from media characters. *Journal of Children and Media*, 10(3), 321–340. <http://dx.doi.org/10.1080/17482798.2016.1162184>.
- Scott, K. P., & Feldman-Summers, S. (1979). Children's reactions to textbook stories in which females are portrayed in traditionally male roles. *Journal of Educational Psychology*, 71, 396–402. <http://dx.doi.org/10.1037/0022-0663.71.3.396>.
- Sell, M. A., Ray, G. E., & Lovelace, L. (1995). Preschool children's comprehensions of a "Sesame Street" video tape: The effects of repeated viewing and previewing instructions. *Educational Technology Research and Development*, 43(3), 49–60. <http://dx.doi.org/10.1007/BF02300455>.
- Sénéchal, M. (1997). The differential effect of storybook reading on preschoolers' acquisition of expressive and receptive vocabulary. *Journal of Child Language*, 24, 123–138. <http://dx.doi.org/10.1017/S0305000996003005>.
- Sénéchal, M., & Cornell, E. H. (1993). Vocabulary acquisition through shared reading experience. *Reading Research Quarterly*, 28(4), 360–374. <http://dx.doi.org/10.2307/747933>.
- Sénéchal, M., LeFevre, J.-A., Hudson, E., & Lawson, E. P. (1996). Knowledge of storybooks as a predictor of young children's vocabulary. *Journal of Educational Psychology*, 88(3), 520–536. <http://dx.doi.org/10.1037/0022-0663.88.3.520>.
- Sénéchal, M., Thomas, E., & Monker, J.-A. (1995). Individual differences in 4-year-old children's acquisition of vocabulary during storybook reading. *Journal of Educational Psychology*, 87(2), 218–229. <http://dx.doi.org/10.1037/0022-0663.87.2.218>.
- Sharon, T., & Woolley, J. D. (2004). Do monsters dream? Young children's understanding of the fantasy/reality distinction. *British Journal of Developmental Psychology*, 22(2), 293–310. <http://dx.doi.org/10.1348/026151004323044627>.
- Shtulman, A., Neal, C., & Lindquist, G. (2016). Children's ability to learn evolutionary explanations for biological adaptation. *Early Education and Development*, 27(8), 1222–1236. <http://dx.doi.org/10.1080/10409289.2016.1154418>.
- Signorielli, N. (1990). Children, television, and gender roles: Messages and impact. *Journal of Adolescent Health Care*, 11(1), 50–58. [http://dx.doi.org/10.1016/0197-0070\(90\)90129-P](http://dx.doi.org/10.1016/0197-0070(90)90129-P).
- Simcock, G., Garrity, K., & Barr, R. F. (2011). The effect of narrative cues on infants' imitation from television and picture books. *Child Development*, 82(5), 1607–1619. <http://dx.doi.org/10.1111/j.1467-8624.2011.01636.x>.
- Skolnick, D., & Bloom, P. (2006). What does Batman think about SpongeBob? Children's understanding of the fantasy/fantasy distinction. *Cognition*, 101(1), B9–B18. <http://dx.doi.org/10.1016/j.cognition.2005.10.001>.
- Skoumpourdi, C., & Mpakopoulou, I. (2011). The prints: A picture book for pre-formal geometry. *Early Childhood Education Journal*, 39(3), 197–206. <http://dx.doi.org/10.1007/s10643-011-0454-0>.
- Smith, E. D. (2014). *Is eating healthy bearable? Examining children's transfer of health-related concepts from a storybook* (Unpublished doctoral dissertation). Charlottesville, VA: University of Virginia.
- Smith, E. D., Richey, E., & Lillard, A. S. (2016). *Bobo revisited: A cohort change in children's response to aggressive displays* (submitted for publication).
- Sprafkin, J. N., Liebert, R. M., & Poulos, R. W. (1975). Effects of a prosocial televised example on children's helping. *Journal of Experimental Child Psychology*, 20(1), 119–126. [http://dx.doi.org/10.1016/0022-0965\(75\)90031-4](http://dx.doi.org/10.1016/0022-0965(75)90031-4).
- Stahl, A. E., & Feigenson, L. (2015). Observing the unexpected enhances infants' learning and exploration. *Science*, 348(6230), 91–94. <http://dx.doi.org/10.1126/science.aaa3799>.
- Strouse, G. A., O'Doherty, K., & Troseth, G. L. (2013). Effective co-viewing: Preschoolers' learning from video after a dialogic questioning intervention. *Developmental Psychology*, 49(12), 2368–2382. <http://dx.doi.org/10.1037/a0032463>.
- Sutherland, S. L., & Friedman, O. (2012). Preschoolers acquire general knowledge by sharing in pretense. *Child Development*, 83(3), 1064–1071. <http://dx.doi.org/10.1111/j.1467-8624.2012.01748.x>.
- Sutherland, S. L., & Friedman, O. (2013). Just pretending can be really learning: Children use pretend play as a source for acquiring generic knowledge. *Developmental Psychology*, 49(9), 1660–1668. <http://dx.doi.org/10.1037/a0030788>.
- Tare, M., Chiong, C., Ganea, P. A., & DeLoache, J. S. (2010). Less is more: How manipulative features affect children's learning from picture books. *Journal of Applied Developmental Psychology*, 31(5), 395–400. <http://dx.doi.org/10.1016/j.appdev.2010.06.005>.
- Teachman, G., & Orme, M. (1981). Effects of aggressive and prosocial film material on altruistic behavior of children. *Psychological Reports*, 48(3), 699–702. <http://dx.doi.org/10.2466/pr0.1981.48.3.699>.
- Trepanier-Street, M., & Romatowski, J. A. (1999). The influence of children's literature on gender role perceptions: A reexamination. *Early Childhood Education Journal*, 26, 155–159. <http://dx.doi.org/10.1023/A:1022977317864>.
- Vaden, V. C., & Woolley, J. D. (2011). Does God make it real? Children's belief in religious stories from the Judeo-Christian tradition. *Child Development*, 82(4), 1120–1135. <http://dx.doi.org/10.1111/j.1467-8624.2011.01589.x>.
- Valkenburg, P. M., & Cantor, J. (2000). Children's likes and dislikes in entertainment programs. In D. Zillmann & P. Vorderer (Eds.), *Media entertainment: The psychology of its appeal* (pp. 135–152). Hillsdale, NJ: Erlbaum.
- van den Heuvel-Panhuizen, M., & van den Boogaard, S. (2008). Picture books as an impetus for kindergartners' mathematical thinking. *Mathematical Thinking and Learning*, 10(4), 341–373. <http://dx.doi.org/10.1080/10986060802425539>.
- van den Heuvel-Panhuizen, M., van den Boogaard, S., & Doig, B. (2009). Picture books stimulate the learning of mathematics. *Australian Journal of Early Childhood*, 34(3), 30–39.
- Vandewater, E. A., Barr, R. F., Park, S. E., & Lee, S.-J. (2010). A US study of transfer of learning from video to books in toddlers. *Journal of Children and Media*, 4(4), 451–467. <http://dx.doi.org/10.1080/17482798.2010.510013>.
- Vezzali, L., Stahl, S., Giovannini, D., Capozza, D., & Trifletti, E. (2015). The greatest magic of Harry Potter: Reducing prejudice. *Journal of Applied Social Psychology*, 45, 105–121. <http://dx.doi.org/10.1111/jasp.12279>.
- Walker, C. M., Gopnik, A., & Ganea, P. A. (2015). Learning to learn from stories: Children's developing sensitivity to the causal structure of fictional worlds. *Child Development*, 86(1), 310–318. <http://dx.doi.org/10.1111/cdev.12287>.
- Walsh, B. A., & Blewitt, P. (2006). The effect of questioning style during storybook reading on novel vocabulary acquisition of preschoolers. *Early Childhood Education Journal*, 33(4), 273–278. <http://dx.doi.org/10.1007/s10643-005-0052-0>.
- Wartella, E. (1984). Cognitive and affective factors of TV advertising's influence on children. *Western Journal of Speech Communication*, 48(2), 171–183. <http://dx.doi.org/10.1080/10570318409374152>.
- Wartella, E., & Hunter, L. S. (1983). Children and the formats of television advertising. In K. G. Saur (Ed.), *Children and the formal features of television* (pp. 307–322). Munich.

- Waxman, S. R., Herrmann, P., Woodring, J., & Medin, D. L. (2014). Humans (really) are animals: Picture-book reading influences 5-year-old urban children's construal of the relation between humans and non-human animals. *Frontiers in Psychology*, 5(172), 1–8. <http://dx.doi.org/10.3389/fpsyg.2014.00172>.
- Weisberg, D. S. (2014). The development of imaginative cognition. *Royal Institute of Philosophy Supplement*, 75, 85–103. <http://dx.doi.org/10.1017/S1358246114000289>.
- Weisberg, D. S., & Hopkins, E. J. (2016). *How do children make inferences about events in fictional worlds?* (submitted for publication).
- Weisberg, D. S., & Goodstein, J. (2009). What belongs in a fictional world? *Journal of Cognition and Culture*, 9(1), 69–78. <http://dx.doi.org/10.1163/156853709X414647>.
- Weisberg, D. S., & Gopnik, A. (2013). Pretense, counterfactuals, and Bayesian causal models: Why what is not real really matters. *Cognitive Science*, 37(7), 1368–1381. <http://dx.doi.org/10.1111/cogs.12069>.
- Weisberg, D. S., Hirsh-Pasek, K., Golinkoff, R. M., Kittredge, A. K., & Klahr, D. (2016). Guided play: Principles and practices. *Current Directions in Psychological Science*, 25(3), 177–182. <http://dx.doi.org/10.1177/09637214166645512>.
- Weisberg, D. S., Hirsh-Pasek, K., Golinkoff, R. M., & McCandliss, B. D. (2014). Mise en place: Setting the stage for thought and action. *Trends in Cognitive Sciences*, 18(6), 276–278. <http://dx.doi.org/10.1016/j.tics.2014.02.012>.
- Weisberg, D. S., Ilgaz, H., Hirsh-Pasek, K., Golinkoff, R. M., Dickinson, D. K., & Nicolopoulou, A. (2015). Shovels and swords: How realistic and fantastical themes affect children's word learning. *Cognitive Development*, 35, 1–14. <http://dx.doi.org/10.1016/j.cogdev.2014.11.001>.
- Weisberg, D. S. (2013). Distinguishing imagination from reality. In M. Taylor (Ed.), *The Oxford handbook of the development of imagination* (pp. 75–93). New York: Oxford University Press.
- Welchman-Tischler, R. (1992). *How to use children's literature to teach mathematics*. Reston, VA: National Council of Teachers of Mathematics.
- Wellman, H. M., & Estes, D. (1986). Early understanding of mental entities: A reexamination of childhood realism. *Child Development*, 57(4), 910–923. <http://dx.doi.org/10.2307/1130367>.
- Wellman, H. M. (2011). Developing a theory of mind. In U. Goswami (Ed.), *The Wiley-Blackwell handbook of childhood cognitive development* (2nd ed., pp. 258–284). Malden, MA: Blackwell Publishing.
- Wilkinson, K. S., & Houston-Price, C. (2012). Once upon a time, there was a pulchritudinous princess: The role of word definitions and multiple story contexts in children's learning of difficult vocabulary. *Applied Psycholinguistics*, 34(03), 591–613. <http://dx.doi.org/10.1017/S0142716411000889>.
- Williams, S. E., & Horst, J. S. (2014). Goodnight book: Sleep consolidation improves word learning via storybooks. *Frontiers in Psychology*, 5. <http://dx.doi.org/10.3389/fpsyg.2014.00184>.
- Wood, W., Wong, F. Y., & Chachere, J. G. (1991). Effects of media violence on viewers' aggression in unconstrained social interaction. *Psychological Bulletin*, 109(3), 371–383. <http://dx.doi.org/10.1037/0033-2909.109.3.371>.
- Woolley, J. D., & Cox, V. (2007). Development of beliefs about storybook reality. *Developmental Science*, 10(5), 681–693. <http://dx.doi.org/10.1111/j.1467-7687.2007.00612.x>.
- Woolley, J. D., Ma, L., & Lopez-Mobilia, G. (2011). Development of the use of conversational cues to assess reality status. *Journal of Cognition and Development*, 12(4), 537–555. <http://dx.doi.org/10.1080/15248372.2011.554929>.
- Woolley, J. D., & Van Reet, J. (2006). Effects of context on judgments concerning the reality status of novel entities. *Child Development*, 77(6), 1778–1793. <http://dx.doi.org/10.1111/j.1467-8624.2006.00973.x>.
- Woolley, J. D., & Wellman, H. M. (1990). Young children's understanding of realities, nonrealities, and appearances. *Child Development*, 61(4), 946–961. <http://dx.doi.org/10.2307/1130867>.
- Young, B. (1990). *Television advertising and children*. Oxford: Clarendon Press.
- Young, B. (2003). Does food advertising influence children's food choices? A critical review of some of the recent literature. *International Journal of Advertising*, 22(4), 441–459. <http://dx.doi.org/10.1080/02650487.2003.11072862>.
- Young-Loveridge, J. M. (2004). Effects on early numeracy of a program using number books and games. *Early Childhood Research Quarterly*, 19(1), 82–98. <http://dx.doi.org/10.1016/j.ecresq.2004.01.001>.
- Ziegler, F., Mitchell, P., & Currie, G. (2005). How does narrative cue children's perspective taking? *Developmental Psychology*, 41(1), 115–123. <http://dx.doi.org/10.1037/0012-1649.41.1.115>.