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2 An examination of factors that affect young children's learning and transfer from picturebooks

Patricia A. Ganea and Caitlin F. Canfield

Introduction

Children are surrounded by symbols from early in life, and within a few years they must master a variety of educational symbols, including letters, numbers, mathematical symbols, maps, and in some cases musical notation and computer icons. Extensive research points to the importance of beginning to acquire this knowledge in preschool and early elementary school. For example, children who learn letters and their relations to sounds at a young age perform substantially better in later reading, not only in early elementary school but also through high school and perhaps beyond (Foulin 2005; Hulme *et al.* 2012; Levin *et al.* 2006; Stevenson and Newman 1986).

Symbol-mediated experience vastly expands children's horizons by enabling them to learn from a variety of sources and, most importantly, to acquire information beyond the here and now. A common assumption among parents and educators is that symbolic artifacts can be used to *maximize* learning. Pictures, videos, maps, and other symbolic objects are routinely used at home and in preschools to expose young children to new information. Given the widespread practice of using symbolic artifacts to teach children new information, it is important to consider what factors may influence the processes involved in early learning of symbol-mediated information.

One factor that constrains children's learning from symbolic artifacts is their understanding of the symbol-referent relation (DeLoache and Burns 1994). Symbols have a dual nature: they are both objects in and of themselves and at the same time representations of something else (DeLoache 1995, 2002). To acquire information from symbols, children first need to appreciate their representational nature, the fact that they refer to something else. For example, for children to learn and extrapolate new information from a picturebook, they first need to appreciate that information about the objects and events in the book is relevant to the real world. Similarly, to acquire information from video, children first need to understand that video images can represent real events. A good deal of developmental research has shown that understanding the nature of symbol-referent relations can be a difficult task for young children (Callaghan 2000; DeLoache 2002; Harris *et al.* 1997; Liben and Downs 1989; Tomasello

et al. 1999; Troseth and DeLoache 1998). For example, children around the age of 2 have difficulty using objects symbolically if those objects have other conventional uses, because it is difficult for them to represent both the object's symbolic use and its conventional use (Tomasello *et al.* 1999). It has also been shown that highly salient and interesting objects can be more difficult for children to understand and use as representations of something else (DeLoache 1995, 2002). The more children's attention is focused on the object itself, the less likely they are to appreciate the symbolic relation between the object and its referent.

The dual representation requirements for pictures are reduced because pictures are generally less salient as objects in themselves. This should make it easier for children to use them as sources of information about the world compared to other symbolic objects (i.e. scale models) (DeLoache 2002). Nevertheless, although pictures may be less salient as objects in themselves, they have many physical characteristics (different types of images, sizes, colors, textures) that can influence the extent to which children use them symbolically. Thus, a second factor that can play a significant role in children's learning from symbols involves the physical characteristics of the symbol. Picturebooks form a unique symbolic medium, in that the things they represent can vary from real-world objects, to imaginary entities, and even to other symbols, such as letters and numbers. This added layer of representational complexity should make considerations about the characteristics of the symbolic medium even more important. For example, encouraging children to play with books that have tabs to pull out letters might not help them learn the abstract symbolic content depicted in the book, such as letters or numbers. Symbols that are too interesting in themselves as objects may not function as good teaching tools with young children.

In this chapter, we present research examining young children's learning from their interactions with picturebooks. In particular, we will summarize research showing that some characteristics of picturebooks may facilitate learning better than others. We will begin with a summary of research examining children's understanding of the symbolic nature of pictures.

Learning from picturebooks

American toddlers and young preschoolers spend hours engaged in joint picturebook reading with parents and others (Rideout *et al.* 2003). There is substantial evidence supporting the general benefits of picturebook reading (DeBaryshe 1993; Sénéchal and Cornell 1993; Sénéchal and LeFevre 2001; Teale and Sulzby 1986; Whitehurst *et al.* 1994; Whitehurst and Lonigan 1998). For example, children who spend more time in picturebook interactions as preschoolers and young toddlers know more about reading when they go to school. Shared book reading contributes to children's knowledge about print, from their initial insight into the difference between words versus pictures (Bialystok 1995; Sulzby 1985) to actually learning to read (Adams 1990; Mason 1980). Furthermore, book-reading interventions with educationally at-risk

children have also shown that picturebook reading can lead to an increase in children's concept of print and expressive vocabulary (Whitehurst *et al.* 1994), as well as in their participation in the picturebook interaction (Crain-Thoreson and Dale 1999; McNeill and Fowler 1999).

Another important question that has recently been systematically examined has to do with *content* information young children take away from these interactions. What do children actually learn about the real world from picturebooks? If they were to hear about a novel kind of animal – a zebra, for example – from a picturebook, would they recognize the real animal when seeing one for the first time? More importantly, would they apply to the real animal what they had learned from the book?

Parents and educators assume that very young children extend what they learn from picturebooks to the real world, but this assumption deserves to be systematically examined. In the research reported here, we present a review of young children's learning and generalization of information from picturebooks to real entities. Pictures are symbols that commonly represent entities that can be encountered in the "real world", and recent studies have shown that children as young as 18 months of age understand that a label given to a picture refers to a real object, rather than to only the picture itself (Ganea *et al.* 2009; Preissler and Carey 2004). This means that if a child hears the word "ball" during shared book reading in relation to the book, the child understands that the word refers to both the real object and the depiction of the object in the book. This indicates that the child has achieved an understanding of the referential nature of pictures; she or he realizes that the picture, as a symbol, is related to a real-world referent, and is not solely an artifact in itself (DeLoache *et al.* 1999). This also indicates that the child understands that words refer to conceptual categories that include more than the singular referent with which they are associated at the time of labeling (Gelman and Waxman 2009). In the case of hearing a word in relation to a picture, the child realizes that the word can also refer to a three-dimensional instantiation of the depicted object.

Although children's understanding of the referential relation between a picture and its referent seems to be in place early in their second year of life, their ability to extrapolate information from symbolic depictions to their real counterparts can be disrupted (Ganea *et al.* 2009). Below, we examine what features of picturebooks affect how likely young children are to apply information from the picturebook to the real world. Dimensions on which the pictures in children's books vary include (1) their level of realism; (2) the nature of their relation to their referent (i.e. whether real or fantasy entities are depicted); and (3) the presence of "manipulative" elements (features such as flaps and levers that children can manipulate to interact physically with the book).

We will focus on two general kinds of information that children presumably are exposed to in picturebooks. One involves general information about the world, such as names for objects, properties of objects, and conceptual information. The second involves more abstract information, such as information about letters and numbers. The general goal of the research reviewed here was to

identify features of picturebooks that improve or impede the extent and accuracy of young children's learning and generalization from them.

Pictorial realism

The pictures in children's books can vary enormously in how realistic they are, ranging from highly realistic color photographs to simplified and schematic drawings to highly distorted and less realistic cartoons. In a study looking at young children's learning from picturebooks we examined whether young children would *learn* equally well from these different types of pictures. What we were mostly interested in was the extent to which pictorial realism would affect how well children *generalize* information to the real world.

To answer these questions, we taught 15- and 18-month-old children a novel name for a novel object in a naturalistic picturebook interaction. We then assessed how well they extended the label to the real object, as well as how well they generalized the label to a novel exemplar of the object (Ganea *et al.* 2008). Three kinds of books varying in pictorial realism were used in the study. Each book was made up of either highly realistic color photographs, realistic color drawings, or colored cartoons of the objects. The same six familiar objects were depicted once in each book, and the same two novel objects were depicted four times. During a naturalistic picturebook reading interaction, the experimenter drew the child's attention to each picture and talked about each depicted object. She briefly described and labeled one of the novel objects with a novel name ("Look, this is a blicket. See, a blicket. It's shiny and goes round and round. Yeah, that's a blicket."). She also described the other novel object, but she never named it ("Look at this! Wow, this is white and has two strings. Yeah, look at this!").

Three tests were administered. The first sought to determine whether the children actually learned the label. For this test, we showed them the pictures of the two novel objects and asked them to "show the blicket". Both the 18- and the 15-month-olds overwhelmingly chose correctly, indicating they had learned the novel label from the brief picturebook interaction. Thus, the children remembered the novel object that was labeled during the picturebook interaction. This indicates that children as young as 15 months can learn new information from picturebooks. There was no difference in performance as a function of the three types of pictures.

Our primary interest concerned the next test, in which we showed children the two novel objects in real life. We wanted to find out whether they would extend the label they had learned from the picturebook to the real object. The 18-month-olds extended the label to the real object in all three picture conditions. For the 15-month-olds, only the children who had interacted with the realistic books (ones with photographs or drawings) extended the label to the real referent. The 15-month-olds in the cartoon condition failed to extend what they had learned from the book to the real object.

Further, we wanted to see whether the children would generalize the label to a new instance of the object differing by a single feature from the object that they had seen depicted. When shown novel exemplars from the same category of objects (same kind of object but differently colored), the 18-month-olds who had seen the photographs or realistic drawings generalized the label to the new exemplar, but those who had seen cartoons did not. The 15-month-olds generally failed to generalize the label they had learned from the picturebooks to the novel exemplar of the target object, regardless of which kind of pictures they learned the name from.

This study establishes that picturebook interactions can be an effective means of teaching new information to very young children. Both the 15- and 18-month-olds in this study readily learned a novel name for an unfamiliar object from a very brief picturebook interaction. This research supports the basic assumption made by parents and educators alike that very young children do learn from picturebook interactions (van Kleeck 2003). It is important to note that in this study the objects were depicted alone on the page and that the background was blank. Books for young children come in a variety of arrangements and it would be important to examine whether children learn equally well from other types of early books that show objects grouped together on a page or against more detailed backgrounds, or showing objects from the same or a different category. Kümmerling-Meibauer and Meibauer (2011) provide an insightful analysis of the structure of books for children between 0 and 3 years of age that could be used as a guideline in experimentally testing what types of early books facilitate conceptual development in young children during shared picturebook reading.

The research discussed also reveals the importance of physical similarity between symbol and referent for young children's exploitation of the relation between them. Generalization of the novel name from the picture to the referent occurred more reliably from more realistic photographs and drawings than from less realistic cartoons. The importance of using more iconic pictures to teach children new information has also been illustrated in other studies with toddlers. Simcock and DeLoache (2006) found that 18- to 30-month-old toddlers can better imitate a sequence of actions with novel objects if it is portrayed in books with realistic photographs than if it is portrayed in books with line drawings. Thus, the pictorial realism effect does not seem to be limited to learning a particular type of content, but rather the nature of pictures can have a general influence on children's ability to take away information from the pages of a book. In terms of practical implications, this research tells us that if we want children to apply the information they learn from picturebooks to the real world, we need to consider the nature of the pictures in the book. The results presented here indicate that picturebooks with realistic pictures provide better support for generalizing information from the pictures to the real world.

Recent studies with younger infants show that even at 13 months of age, infants have the ability to transfer information across symbolic media. Keates *et al.* (2014) presented 13-, 15-, and 18-month-olds with picturebooks that showed and described an adult interacting with a target object that displayed a non-obvious property (i.e. the object lit up when touched). The adult was also

shown interacting with a nontarget object, one that did not have a nonobvious property. When presented with the real referents and new exemplars of real referents (the same objects in a different color), children in all age groups transferred the nonobvious property to the target object – that is, they attempted the specific action that was depicted in the book to trigger the non-visible property of the object. This study indicates that young children not only can learn properties of objects from a pictorial representation of the object, but also can generalize that information to the general category of real objects.

The above studies indicate that children's referential understanding of pictures emerges early in life and that, despite some limitations in transfer from pictures to the real world, children understand that a basic function of pictures is to refer to something other than themselves. An important issue to consider is whether children's ability to generalize information they encounter in picturebooks to real objects is dependent on exposure to symbolic media early on in life. Experience with representational media can vary widely across cultures and it is important to examine whether children growing in different cultural settings would display a similar pattern of learning and generalization from picturebooks. Recent findings from a study conducted with children from a rural village in Tanzania who had no prior exposure to pictures indicates that lack of exposure and interaction with symbolic media may lead to significant delays in learning and generalization from picturebooks (Walker *et al.* 2013; see also Callaghan *et al.* 2012). In this study, children who had no prior pictorial experience were not able to generalize a label for a novel object from a photograph to the real world until nearly a year after this skill develops in children with rich picture-symbol exposure.

Fantasy pictures and language

A common feature of pictorial depictions in children's books is their fantastical nature. Infants and young children are exposed to a variety of pictures that depict reality in a distorted, fantastical way. For example, animals in children's books are commonly depicted wearing clothes and are portrayed and described as engaging in human-like activities (e.g. pigs building houses, bunnies going to school, dogs driving cars). Even inanimate entities, such as trains, cars, and lamps, are anthropomorphized: they are often depicted with faces and emotions, and are endowed with the ability to talk, laugh, and think. To what extent do picturebooks illustrating and describing nonhuman creatures and physical artifacts as intentional beings affect what children take away from pictures and apply to the real world? In other words, do young children assume that what is depicted in fantasy picturebooks applies to reality?

Previous research has shown that pictures can have a strong effect on children's beliefs about reality. Research with older children has shown that 6-year-olds believe in illogical transformations depicted in pictures even when they contradict events that they themselves had observed in the real world (O'Connor *et al.* 1981). We expect this effect to be even stronger for younger

children who have limited knowledge about the nature of the relation between pictures and the referents they depict. Is children's ability to learn and transfer new information from picturebooks to the real world affected by the fantastical nature of pictures in books and by the type of language used to describe actual events in the world?

Ganea *et al.* (2011) varied the type of language used in picturebooks to teach preschool children about color camouflage in animals. In this study, children were read a story about color camouflage in frogs; half of the children were read picturebooks with realistic pictures and language, while the other half were read books with realistic pictures and intentional language. In this latter condition, the language used to describe the animals was anthropomorphized (the animals had names and they were described in intentional terms). After hearing the story, children were able to apply the concept of color camouflage when asked about photographs of a novel animal (butterflies), regardless of the type of book they saw. For example, when asked to indicate which of two depicted animals would be more likely to fall prey to a predatory bird, 3- and 4-year-old children correctly selected the animal whose color did not match the background. By 4 years of age, they were also able to provide appropriate factual explanations and transfer their new knowledge to live animals (Ganea *et al.* 2011). The 4-year-olds justified their choice by explicitly referring to information encountered in the book about color camouflage. For example, when asked to choose a safe place for a live animal to live in, they considered whether the color of the animal matched the test displays.

Although this study seems to indicate that the type of illustrations and language used in picturebooks makes little difference in children's learning, this is not entirely the case. Anthropomorphized picturebooks elicit a different, but equally important, limitation in children's learning. When tested on fantastical elements of books in addition to factual information, 4- and 5-year-olds (but not 3-year-olds) are more likely to also transfer fantastical, anthropomorphic characteristics to real animals when they have been exposed to anthropomorphic stories than when they have been exposed to realistic stories (Ganea *et al.* 2014). Thus, although features such as the illustrations and type of language do not prevent learning in young children, when they portray the world in an unrealistic manner they may play into children's natural anthropomorphic tendencies and, in doing so, may impart incorrect knowledge.

Ganea and colleagues (2014) looked at what picturebook elements most influence children's learning of facts about novel animals. They tested children from three age groups: 3-, 4-, and 5-year-olds. In the first study, an experimenter read three picture storybooks that contained realistic illustrations and either realistic or anthropomorphic language to each child. Each book imparted factual information about a different novel animal. After each book was read, the experimenter left the room to "find the next book", and a second experimenter showed the child a photograph of the animal and asked them questions about the animal in the photograph. The second experimenter emphasized that she was asking about the real animal, saying, "Look! I have a picture of a real

cavy! Can you help me answer some questions about this real cavy? Do cavies eat grass?" and continuing on with additional questions. The questions included factual questions from the books, factual questions that were not in the books, and anthropomorphic questions. Children in both conditions were asked the same questions.

The results of this study, Study 1, indicated that, as in previous studies, children did learn from the picturebooks, regardless of whether they heard realistic or anthropomorphic language. Although children performed at chance levels in answering the factual questions that were not found in the books, children in all three age groups were significantly above chance in correctly answering the factual questions from the books. Thus, children in both book conditions learned new facts from the books. However, both 4- and 5-year-olds were more likely to answer anthropomorphic questions incorrectly, attributing human-like characteristics to the animals, if they heard the anthropomorphic stories. Three-year-olds attributed anthropomorphic characteristics to animals regardless of story type.

To determine whether illustrations, in addition to language, play a role in children's learning, Study 2 used the same procedure as Study 1, but with half the children hearing picturebooks with realistic language and anthropomorphic illustrations, and the other half of the children hearing books with both anthropomorphic language and illustrations. The results of this study expanded on those found in Study 1, indicating that illustrations also play a role in children's learning: children had difficulty transferring the new facts from the story to the real world if the picturebook they read contained *both* anthropomorphic illustrations and anthropomorphic language.

Taken together, these studies show that the types of books young children are exposed to affect their conception of reality. The children who had heard anthropomorphic language were more likely to say that animals in the real world can have human-like characteristics than were children who were exposed to the realistic books. Thus, just as realistic pictures allow infants to generalize labels to novel objects, realistic picturebooks enable preschool children to accurately incorporate the factual information they are exposed to in the books into their conceptions of the real world.

Fantastical illustrations and language may also affect children's ability to transfer more complex information to the real world. In another study, after hearing a story about a child who used a tool to obtain a toy that was out of reach, 4-year-old children were able to apply that solution when faced with a similar problem and provided with the necessary equipment (Richert *et al.* 2009). However, children were more likely to do so when the story from which they learned the solution was realistic. This is true when problem solutions are demonstrated in a simple framework, as well as when they are embedded in a more complex story context, as would be typical of commercial children's books (Richert and Smith 2011).

Further, Walker *et al.* (2014) have demonstrated that children learn and transfer causal information better when the information is presented in a story context "close" to the real world – that is, one more similar to reality – than in a context that is more dissimilar to the real world. For instance, children were more likely to link a cause and effect (e.g. sneezing from smelling a certain flower) for an experimenter's behavior if they first heard about the causal relation in a story about a boy who participated in realistic activities (e.g. having a picnic) than after hearing about a boy who had a more fantastical experience (e.g. conversing with a tree).

Collectively, these studies indicate that young children are capable of learning new information about the world from picturebooks, but that this learning works best when children are exposed to realistic stories and images. Children may disregard content information when it is portrayed in a format that they cannot directly relate to their own experience – that is, in a "far" fantastical context.

Manipulative books

Several books that are currently popular for young children fall in the category of "manipulative" books. These are books that invite children to physically interact with them, through elements such as flaps to lift, dials to turn, textures to feel, tabs to pull, and so on. Also included in this category are "pop-up" books incorporating pseudo-three-dimensional elements. Although such elements may make a book interesting and engaging to young children, they may not be advantageous for learning. The extraneous manipulative elements may actually distract children from the relevant content material. Instead of focusing on learning new information from the book, children may focus only on lifting the flaps and pulling the tabs. To the extent that the manipulative elements engage children, they may also distract children, and thus might undermine the teaching purpose of these books.

To examine the effect of manipulative features on how well children learn from books, Chiong and DeLoache (2012) taught 30- to 36-month-olds alphabet letters using one of three alphabet books. One commercial book, *My ABC Book* (Izawa 1971; plain book), was chosen because of its simplicity, and the other book, *First Concepts ABC* (Graham and Pinnington 2002; manipulative book), was chosen because of its complexity. Specifically, the plain book showed letters that were consistent in size, color, and position. Each letter was paired with one picture (i.e. A for apple). In contrast, the manipulative book incorporated manipulative features such as flaps to lift, shiny materials to touch, and tabs to pull, and it contained a great deal of variation in displaying other elements on the page. For instance, it had letters that varied in size, color, and position, and each letter was paired with as many as three different pictures (i.e. T for twin, tire, and truck). The third book was a two-dimensional copy of the manipulative book, obtained by scanning the manipulative book. Thus, this book contained most of the visual elements of the manipulative book, minus its manipulative features.

Children were first tested on their prior letter knowledge. Then, in a naturalistic picturebook interaction, the experimenter taught children four novel letters. Children were then given a letter identification task in which all

four target letters were shown and they were asked, "Can you show me the letter ____?"

The results showed that children who interacted with the plain book and the 2D book version performed significantly above chance level on the letter identification task, whereas the children in the manipulative book condition did not. Also, the children who interacted with the plain book recognized significantly more letters than the children who interacted with the manipulative book. These results suggest that young children learn better from books that present information in a simple format. The results further suggest that manipulative elements can distract young children from the relevant material and thereby hinder their learning.

A similar negative effect of manipulative features on children's learning has been found for the learning of facts and labels about real animals from picturebooks. Preschool-aged children were better able to recall facts about real animals from picturebooks that did not contain manipulative features (Tare *et al.* 2010). These findings suggest that manipulative elements in books draw the child's attention *away* from the information to be learned. The elements in the manipulative book that were used in these studies did not directly involve the letter (e.g. the flap to lift or shiny texture to feel was next to or around the letter) or the fact to be learned. Would manipulative elements designed to draw children's attention to the to-be-learned information enhance learning?

For example, teachers in Montessori preschools use sandpaper letters to teach the alphabet, having children trace the letters with a finger. In this case, the manipulative element (e.g. the sandpaper) is incorporated into the letter itself. Here, the manipulative feature is intended to draw the child's attention to the letter, thus possibly facilitating learning (Lillard 2005).

To test this possibility, Chiong and DeLoache (2012) conducted a second study in which 30- to 36-month-olds interacted with an alphabet book containing either sandpaper letters or regular printed letters. The alphabet books were very simple; each contained large alphabet letters accompanied by one picture. Half the children in each book condition were asked to point to the target letters, and the other half were asked to trace the target letters with their finger. Following the book reading, the children were given a letter identification task. Children in the sandpaper book condition performed significantly above chance levels on this task. However, the results showed no significant difference in performance between the children who interacted with the plain versus the sandpaper book, or between the children who traced versus pointed to the letters. Thus, the sandpaper book did not seem to hinder children's learning. Furthermore, although the children who traced with the sandpaper book did not learn significantly more letters than the children in the other groups, they were the only group to perform above chance on the letter identification task. This suggests that a manipulative element that draws children's attention to the relevant, to-be-learned information might actually facilitate learning.

The above findings suggest that manipulative features that highlight the information to be learned through symbolic media can have a positive impact

on children's learning. Recent touch-screen technology provides the opportunity for researchers and educators to consider a wide variety of interactive features (sounds, movements, contingent events) by which to present educational material to young children. It is important that we investigate what types of features offer the best support for children's learning. A recent study using electronic books shows that books in which the animations and interactive elements served to highlight target words increased children's understanding of those words after repeated exposure, even when no adult aided in the children's book interactions (Smeets and Bus 2014).

Together, these studies have important implications for the design of children's books for educational purposes. Books for young children should be interesting and engaging, but should not incorporate features that distract children from the information provided.

Parent interaction style

Another topic that deserves more attention is how different types of books affect the manner in which parents read books with their children. Children's learning from books is influenced by the type of interaction they have with their parents in picturebook reading interactions (Blewitt, this volume, Chapter 6; Rohlfing *et al.*, this volume, Chapter 5; Sénéchal *et al.* 1995). How does the presence of manipulative features affect parent–child picturebook interactions?

Chiong (2008) asked mothers of 30- to 36-month-olds to read three different alphabet books with their child. Of the three books, one was chosen for its simplicity, and the other two for their manipulative features. Two of the books, plain and manipulative, were the same as the ones described earlier (Chiong and Deloache 2012). The third book (embedded) displayed highly complex letters embedded within pictures. For example, the "O" was the body of an ostrich, and the "H" was part of a house where the sides of the house were the sides of the letter. The mothers were asked to read all three books as they naturally would at home, in a counterbalanced order.

The analyses involved measures of vocalizations and the manner in which both the mothers and the children interacted with the different aspects of the books (letter, picture, manipulative elements, etc.). The type of book influenced how mothers read the books to their children. For instance, when mothers interacted with the plain book, they were more likely to point to the letters and pictures, and they also labeled the letters more than when they interacted with the manipulative or the embedded books. Thus, mothers tended to focus more on the relevant information with the plain book than with the other two books. The analyses involving children's behaviors showed a similar pattern of results, in that they vocalized most often about the letters and pictures with the plain book. Children interacted the most with the manipulative book, as they either pointed to its extraneous elements or lifted the flaps in the book. Thus, again, the type of book can alter the aspects of the book that the child is focusing on.

This study suggests that books that contain extraneous features can change the nature of shared book reading and may lead both young children and their parents away from the main information of the book. As was shown in the study described here, parents tend to draw less attention to the relevant information in the book and the children tend to focus on interacting physically with the book. This combination can lead to a diminished focus on learning.

Improving preschoolers' learning from picturebooks

Although children's learning from picturebooks during the preschool years seems tenuous, they do, nevertheless, absorb a great deal of information through book reading. This is true both in controlled settings, in which researchers have created or selected picturebooks that include simple stories and involve specific features, as in many of the studies discussed above, and in typical parent–child reading interactions with commercially available picturebooks that may contain more complex storylines and use various physical and story elements that may make learning more difficult. How do children overcome their limitations? How are they able to apply concepts learned in a distracting and fantastical framework to their own real-world experiences? It turns out that there are several ways we can address the limitations stated above and aid children's learning, and that many of these things are naturally involved in many picturebook interactions.

Parental input

Children's learning and transfer of information from picturebooks can be aided by parental input during book-reading episodes, especially when parents provide information outside of the text. For instance, children learn better from picturebooks when they are asked questions during reading interactions (Blewitt *et al.* 2009; Blewitt, this volume, Chapter 6), and when a parent or other reader points to relevant pictures and adds brief explanations (Brett *et al.* 1996; Sénéchal *et al.* 1995). One specific way in which parental talk can enable children to understand that story elements relate to a "kind" or richly structured category is through the use of generics.

Generic noun phrases refer to kinds in an abstract sense, drawing attention to characteristics of a whole category rather than the individuals that are part of that category (e.g. "Birds fly"). By 4 years of age, children grasp the nature of generic noun phrases and are able to make generalizations about categories from these statements (Hollander *et al.* 2002). Thus, when parents use generics during picturebook interactions, children can interpret these statements as conveying general knowledge about the world. This may enable transfer of knowledge in young children, because it indicates that the generic information is true not just of the picturebook character but of all animals, people, or artifacts in that category. Both mothers and children are more likely to use generics and refer to categories when talking about symbolic representations of objects, such as pictures, than when interacting with objects themselves (Gelman *et al.* 2005). This may be especially true of the representations found in picturebooks. In one study of maternal speech during picturebook reading, 92 percent of mothers produced at least one generic noun phrase (Pappas and Gelman 1998). Interestingly, while mothers' nongeneric phrases tended to closely match the pictures they looked at – for instance, using a singular noun when only one animal was present on the page – their generic phrases seemed independent of the page, and were almost always plural in form. Gelman and others have suggested that these "errors" actually indicate that such generic noun phrases refer to an abstract whole category, and not to a specific instance or to an instance present in the current environment (ibid.).

Context

In addition to the types of input that parents provide, the types of picturebook interactions that children experience can enhance their learning. Preschool children often hear picturebooks read in a variety of contexts: preschool teachers may read books to an entire class, children may participate in story-reading groups at their local libraries, and they may have one-on-one interactions with parents and others in which a picturebook is read with no other distractions. Such one-on-one interactions seem to aid learning and transfer of knowledge. Children are better able to apply to the real world knowledge and problem solutions embedded in fantastical stories when they hear the stories one-on-one (Richert and Smith 2011).

The context in which information is learned and later on retrieved can affect young children's successful acquisition of knowledge in other ways as well. Children tend to perform best when the context in which they have to use the knowledge in question is similar to the context in which they learned the information. Context is especially important in very young children (Rovee-Collier and Dufault 1991), and contextual cues – created by both limiting and varying the learning context – may enable young preschoolers to generalize what they have learned to new situations or category members (Goldenberg and Sandhofer 2013). This context can include the physical environment, as children do better when tested in the room where they had read the picturebook, but also the similarity between the pictorial depictions and their real-world counterparts. For instance, toddlers are more likely to generalize and transfer information from highly iconic images (photographs) that share more features with the real-world referents than from less iconic images (cartoons) (Ganea *et al.* 2008).

Finally, one of the best ways to improve children's learning from picturebooks is through repetition. In younger toddlers, repetition enhances imitation of novel actions (Simcock and DeLoache 2008) and word learning (Horst, this volume, Chapter 9; Schafer 2005). Hearing the same story multiple times even aids learning in 3-year-olds. Cornell and colleagues (1988) found that both testing and rereading help children at this age remember story events, and they

argue that both of these effects stem from additional learning, rather than the prevention of forgetting. Repetition of the same story also enhances preschool children's recall and retention of new words. Even when children hear and see a new word–object association the same number of times in different reading contexts (i.e. reading three different books that feature the same word–object pairing), they do not perform as well as they do after repetition (i.e. hearing the same story three times) when tested on those new words (Horst *et al.* 2011; Horst, this volume, Chapter 9). Thus, it seems that, of all contextual aids, repeated presentation may serve to enable children's learning and transfer of information best.

Throughout the preschool years, children can learn a variety of information from picturebooks. They can learn basic facts and concepts, as well as more complex ideas, such as causal information and theories. What is more, at this age children can take this information and apply it to the real world – both to the specific animals and events they have learned about, and to novel instances that they have never encountered before. Although this learning is evident even when stories do not accurately depict the world, it is stronger when the child is learning from realistic contexts, and can get thrown off track by too much distraction, either within the story, as when the book portrays a world too far from reality, or in the physical structure of the book itself, as is the case with manipulative features. However, the good news is that we can facilitate and enhance children's learning, and even help them to learn in contexts in which it is usually more difficult.

Conclusions

The goal of this chapter has been to argue that in order to use picturebooks effectively to teach children, we need to consider what children know of the nature of the symbols, and what kinds of symbols to use and how. As research illustrates, children sometimes fail to acquire information from the picturebooks to which they get exposed. For example, children interacting with a book that has many manipulative features may not be focusing on the information to be learned but rather on how the book can be used as a toy.

Picturebooks can be useful in teaching young children, but we carefully need to consider how their physical characteristics may influence what children take away from them. As illustrated by the research reviewed here, by the end of their second year children can already acquire new information about the world from picturebooks. They can learn novel words, novel properties for objects, and novel actions. They can also learn abstract information, such as information about letters. However, certain kinds of picturebooks better facilitate their learning and generalization from books. We have shown, for instance, that children learn and generalize better from books that have more realistic pictures, such as photographs and realistic drawings, than from less realistic books containing cartoons. We have also shown that children learn letters better from books that are simple than from books that have a lot of exciting physical features. Finally,

we have shown that children transfer information from a story context to the real world when the story context resembles the real world to a large extent.

We – parents and educators – need to facilitate children's learning of symbol-mediated information by making the symbol–referent relation explicit through increased resemblance between the picturebook and the real world, and by encouraging children to focus on the symbolic content.

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3 What the child can learn from simple descriptive picturebooks

An inquiry into *Lastwagen/Trucks* by Paul Stickland

Jörg Meibauer

Introduction

Simple descriptive books for children between the ages of 2 and 3 are definitely not the focus of picturebook research, let alone the focus of literary studies. For instance, there is no article on descriptive books in the recent *Oxford Handbook of Children's Literature* (Mickenberg and Vallone 2011). This is in sharp contrast to the huge interest these books may arouse in children. It is also in contrast to the important historical contribution that descriptive books have made to children's literature in general. Arguably, *Orbis sensualium Pictus* (The Visible World, 1658) by Johannes Amos Comenius is one of the first works of children's literature (Fassbind-Eigenheer and Fassbind-Eigenheer 2002). Why do most adult scholars – with the notable exception of researchers engaged in the children's literature–education interface – neglect the study of these books? The reasons are obvious. From their point of view, these books do not contain an interesting story, the pictures merely represent everyday objects, and the apparent joy they may trigger is a superficial and somewhat trivial phenomenon not worth pursuing. But these attitudes are only prejudices. At least from the point of view of a cognitive theory of picturebooks, this view seems completely misguided (see Kümmerling-Meibauer and Meibauer 2013).

In their excellent review of *Nonfiction Literature for Children*, Kiefer and Wilson (2011) point out that there is a lack of sophisticated research into nonfiction literature: not only do we find much conceptual confusion, but there is also a lack of serious analysis of single nonfiction texts. I would like to add that embedding into theories of literary development is nearly nonexistent, because nonfiction literature is typically separated from fiction literature and thus excluded from in-depth research.

In Kümmerling-Meibauer and Meibauer (2005, 2011), we argue that early-concept books – that is, wordless books for the very young that show only pictures of everyday objects – are very important when it comes to the understanding of early literacy. And the same is true with respect to simple descriptive books like the one I am about to analyze in more detail. The main distinction between early-concept books and simple descriptive books, then, is that only the latter contain text.[1]