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Early Learning through Language

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Two hallmarks of what it means to be human are language and culture. Nothing more distinguishes us from other creatures than our extraordinarily creative and flexible use of language. Hence, nothing is more important in the development of a young human than the acquisition and use of language. It is what enables one person to communicate with another and hence to benefit from the knowledge of others. Through language, information can be transferred from one generation to another, thereby making cultural knowledge possible. Related symbol systems based on language, such as writing, vastly facilitate the preservation and accumulation of knowledge—the "wisdom of the ages." Given the centrality of language in cognition and communication, it is not surprising that one of the largest domains of inquiry in developmental science has been language acquisition, from speech perception very early in infancy to the production of complex grammatical structures many years later.

In this chapter, we focus on language as a mechanism for the acquisition of information about the world. Infants' knowledge about the world is initially limited to what they learn from direct experience, and they do, of course, learn an enormous amount that way. For example, babies come to recognize familiar people and objects and to associate certain outcomes with particular people and objects. They learn, for example, which person in their environment is more likely to feed them and which is more likely to play with them.

Infants also form experience-based categories, learning, for example, that entities that move on their own have properties crucially different from those that do not and that self-propelling entities are of very special significance in their lives. They form these and other categories based simply on observing perceptual similarity among objects or from watching others use objects in some particular way.

Language takes infants beyond the necessity for personal observation as the basis for knowledge acquisition. From infancy onward, children learn the names of people, animals, and objects from hearing others refer to them. As this chapter discusses, infants use labels provided by others to form new categories of objects or animals that may share relatively little perceptual similarity. As toddlers, they begin to acquire factual information from what other people tell them about the world. Much of this learning occurs informally in mundane interactions in which a conversational partner talks about objects or events, although some involves didactic intent on the part of the partner. In modern societies, this early learning often occurs in the context of joint picture book interactions in which an infant and an older, more knowledgeable person share an attentional and conversational focus on pictures. Eventually, children become increasingly privy to the wisdom of the ages by learning to read on their own.

The acquisition of information about the world, of cultural knowledge in general, thus depends to a large extent on the development and use of both spoken and written language. Accordingly, it is important to study the processes involved in infants' and young children's exploitation of information communicated to them by other people. In this chapter, we examine some of the growing literature on symbol-based learning in the first years of life, both by language alone and by language in the context of joint picture book interactions. The work we review belongs to the developmental research tradition emphasizing the social aspects of knowledge acquisition (e.g., Bruner & Haste, 1987; Rogoff, 1990; Tomasello, 1999; Vygotsky, 1978).

In this chapter, we review somewhat disparate research relevant to learning via language in the first three years of life. Most of the studies are typically described in terms other than *learning*, but learning is nevertheless at the core of what they tell us about early development. Given the incongruent nature of the research reviewed, multiple kinds of methods for measuring language and its effects on learning and knowledge acquisition are highlighted.

TESTIMONY

Probably everyone reading this chapter knows that dolphins are not—contrary to their perceptual appearance, their close resemblance to sharks, and their sea-based existence—fish. How do we all have this belief? Because we were told by someone, sometime, either in person or in print, that even though dolphins look very much like fish, they are in fact mammals. Evidence supporting this assertion was presented—dolphins are warm-blooded, breathe air, and nurse their babies. We accepted the idea of dolphins as aquatic mammals, letting the testimony of others take precedence over our own observations.

The term *testimony* has long been used by philosophers with respect to the communication of information from one person to another (e.g., Coady, 1992; Reid, 1785/2002). As summarized by Harris (2002) and Harris and Koenig (2006),

the 18th-century philosopher Thomas Reid proposed that humans are innately prepared to process information about the world that comes directly through their own senses and verbal information that is provided by other people. Bertrand Russell (1912/1997) made a similar distinction between "knowledge by acquaintance" and "knowledge by description."

Our willingness to accept the testimony of other people is presumably based on what two other philosophers have pointed out. Grice (1975) noted that listeners generally assume that speakers will attempt to be truthful (notable exceptions include adult expectations about the "testimony" of politicians and advertisers). Another relevant assumption is what Putnam (1973) called the *division of linguistic labor.* We routinely use words without knowing the specific criteria for their proper application. We might, for instance, insist on a platinum wedding band over a silver one without having any idea what actually distinguishes the two precious metals. Such distinctions, Putnam argued, are based on the assumption that such criteria exist and that some people know what they are.

In the present review, we adopt a liberal approach to what counts as "testimony"—much more liberal than what Reid (1785/2002) had in mind and even somewhat more liberal than that taken by Harris and Koenig (2006). We consider testimony to involve any information that is communicated by one person to another via language, emphasizing the absolutely central role it plays in the early development of knowledge. We review research on infants' and very young children's exploitation of adults' naming of objects or events as evidence for what they should be called, as well as what category they belong to and what properties they share with certain other entities. We also consider children's acceptance or rejection of adult testimony, including their use of what they hear to update their current knowledge. Although most of the research we review has to do with direct linguistic communication from adults to children, we also consider information provided by adults in the very common situation of joint parent–infant picture book interactions.

EFFECTS OF ADULT LABELING

Object Individuation

Some evidence for a very early effect of language on infants' conceptual world comes from research on the effect of labeling on object individuation. In an initial study by Xu and Carey (1996), 10- and 12-month-old infants watched as a toy duck emerged from behind one side of a screen and then returned behind the screen. Then a ball emerged from and disappeared behind the other side of the screen. To test whether the infants interpreted what they saw as two individual objects, the screen was removed, revealing either both of the objects or only one.

The older infants looked longer when there was only one object, indicating that they had expected there to be two and thereby showing that they had interpreted the scene as involving two individual objects. In contrast, the younger infants generally looked longer when the screen removal revealed two objects, indicating that they did not share the older infants' interpretation of two different objects moving back and forth in the display event.

In a subsequent study with 9-month-olds, Xu (2002) showed the same display, but in the crucial condition the two objects were labeled with two distinctly different names (*duck* and *ball*) as they appeared from behind the screen. These infants looked longer when only one object was revealed on the test, just like the 12-month-olds in the previous study. Control conditions established that the result was due to naming—other types of sounds had no effect.

Recently, Xu, Cote, and Baker (2005) reported that 12-month-old infants could use the number of labels they heard to infer how many unseen objects were concealed in a container. As the children watched, an adult looked into the opening of an opaque box and said either two different labels (e.g., "Look, a wug" and "Look, a fep") three times each or only one label ("Look, a zav") six times. Then the experimenter removed one item from the box and pushed the now empty box forward to enable the child to reach in. The infants searched more persistently in the empty box after hearing two labels than one. Thus, these infants appear to have formed a representation of multiple unseen objects based on hearing multiple labels.

This series of studies provides strong evidence that in the first year of life, testimony in the form of simple labels for objects has profound effects on infants' interpretation of their experience. Infants have fundamentally different interpretations of objects and events depending on what language accompanies them.

Category Formation

Substantial evidence exists that hearing labels applied to objects can profoundly influence category formation by infants (Balaban & Waxman, 1997). For example, in research by Waxman and Markow (1995), 12-month-olds saw several perceptually disparate exemplars from the same superordinate category (e.g., animals). Half the children heard all the exemplars referred to with a single label; the other children heard no labels. When the children were later shown an exemplar from that category and an exemplar from a different superordinate category (e.g., vehicle), those in the label condition showed greater interest in the member of the new superordinate category, whereas those in the no-label condition did not. Thus, hearing someone apply the same word to several different objects led children to interpret them as the same kind of thing.

Inductive Inference

Not only does hearing objects labeled influence the formation of categories by infants and very young children, but labeling also influences reasoning on the basis of category membership—specifically, inductive inferences. In an early study on this topic, Gelman and Coley (1990) showed 2-1/2-year-old children a typical exemplar from a familiar category and reminded them of a familiar property it possessed. For example, they might be shown a picture of a dog and told that it barks. The children were then presented with four test pictures, including one typical and one atypical member of the same category (e.g., Labrador and Chihuahua) and a typical and atypical member of a different category (e.g., a white lamb and a dog-like lamb). Each picture was either labeled appropriately (*dog* or *lamb*) or not labeled, and the children were asked whether it barks. In the no-label condition, the children relied on appearance to answer, inferring that the dog-like lamb would bark. However, when the same pictures were labeled, the children responded on the basis of the category label, claiming that both of the dogs barked but denying that either of the lambs did.

Evidence that even younger children are influenced by shared labels when drawing inductive inferences about invisible properties comes from recent work by Welder and Graham (2001) and Graham, Kilbreath, and Welder (2004). In this research, infants learned that certain target objects produced a sound when manipulated in a particular way. For example, squeezing an object of a given shape would produce a squeak. They were then presented with test objects that varied in physical similarity to the target objects. The target and test objects either were given the same label or were offered no labels.

The basic findings of this research were that, in the absence of labels, the infants relied on physical similarity to draw inferences between objects. Having learned that squeezing an object of a given shape produced an interesting sound, they squeezed a similar-looking test object in an attempt to elicit the sound. However, when the target and test objects were given a common label, the infants generalized on the basis of the shared label. Thus, hearing an adult give the same name to perceptually different objects led the infants to conclude that the objects belonged to the same category and were therefore likely to share the same non-obvious property.

Acceptance/Rejection of Testimony

The research reviewed so far reveals that infants and very young children are influenced by simple testimony in the form of object labels provided by an adult. A parallel line of research on adult testimony and young children concerns what factors influence children to accept or reject what someone else tells them. Preschool children have been shown to be influenced by several factors, including

the reliability of the past behavior of the individual offering information. They tend to accept testimony from someone who has been consistently right in the past in preference to one who has frequently provided wrong information (Koenig, Clément, & Harris, 2004; Koenig & Harris, 2005).

Very young children sometimes react skeptically to adult testimony, as shown by the report by Koenig and Echols (2003) that most 16-month-olds spontaneously attempted to correct an adult who referred to a very familiar object with the name of a different familiar object (objecting, for example, to the speaker calling a shoe a *ball*). In addition, Graham et al. (2004, Experiment 3) found that when 13-month-olds heard an adult refer to two very similar-looking objects with different labels, they nevertheless treated the objects as members of the same category. Apparently, the perceptual similarity of the two objects was salient enough to the infants that they ignored the fact that the adult had called them by different names.

Other research demonstrates that very young children can be swayed by adult testimony, even when it conflicts with their own knowledge. In research by Jaswal and Markman (2007), 24-month-olds watched an experimenter use small props to act out an activity associated with each of two familiar categories (e.g., a cat drinking milk and a dog chewing bones). They were then shown a hybrid prop that looked more like a member of one category than the other (e.g., a cat that had some dog features) and asked to show which activity it would engage in (e.g., drinking milk or eating bones). The hybrid was either not labeled at all or labeled with the counterintuitive label (e.g., the cat-like animal was referred to as "this dog").

The children behaved differently depending on whether the hybrid object was labeled or not. In the no-label condition, they generally acted out the activity associated with what the prop most looked like (e.g., if it looked more like a cat, they enacted drinking milk). In the label condition, they more often acted out the behavior associated with the category assigned to the prop by the experimenter.

This result shows that, based on what an adult tells them, very young children can be induced to recategorize an object from one known category to another. In using the adult's label to draw an inference about the test objects, the children discounted their own perceptual experience.

Research by Ma and Ganea (2008) provides an example of young children acceding to the adult testimony in one circumstance and rejecting the same testimony in another. In the initial study, 3-year-old children were induced to disregard their own experience of an event in deference to an adult's testimony. The children watched through a window as an experimenter hid a toy in one of three differently colored containers (box, bucket, bowl). Immediately afterward, the experimenter came into the room in which the child waited and announced that she had put the toy in a different container. For example, if the child had observed the toy being hidden in the box, she now heard that it was in the bucket.

The experimenter then invited the child to find the hidden toy. The majority (65%) of the 3-year-old children complied with the adult's testimony: Instead of searching in the container in which they had actually seen the toy being hidden, they based their search on the experimenter's false testimony. A different result occurred, however, if children were first given an opportunity to find a hidden toy in a searching game involving the same three containers. Having had experience searching successfully where they had seen the experimenter hide the toy, they ignored her false testimony. In this case, only 17% of the children searched where the experimenter told them the toy was hidden. Thus, the children's personal experience in the situation led them to rely on their own firsthand observation in preference to the false testimony offered by the adult.

Summary

From a very early age, infants and young children are influenced by various forms of testimony provided by adults, from simple labels for objects, events, and categories. Adult testimony can, in some conditions, influence children to ignore their own knowledge in deference to what they are told. It will be interesting to learn from future research more about the circumstances that make young children more and less susceptible to what they are told by others.

LEARNING FROM REFERENCES TO ABSENT OBJECTS

With infants, the object of parental discourse is typically present when it is referred to. However, the enormous power of language as a source of new knowledge derives from the fact that we can learn new information about entities that are not currently accessible. The first step in this crucial ability is being able to comprehend another person's reference to an absent object.

Comprehension of Reference to Absent Objects

Naturalistic observations conducted in the homes of infants (Huttenlocher, 1974; Lewis, 1936; Sachs, 1983) have established that the ability to understand another person's reference to something not in the environment is present as early as 13 months of age (Huttenlocher, 1974; Lewis, 1936). Thus, when an infant hears his or her father refer to *Mommy* or to *Prince*, the dog next door, the infant's mental representation of the corresponding familiar person or pet is activated.

Recent laboratory studies have furthered our understanding of the early development of the comprehension of absent reference. In particular, several studies have shown that this ability is not all-or-none; whether an infant responds to hearing an absent entity referred to depends on contextual factors. For example, Saylor (2004) established that children as young as 12 months of age are capable

of responding to the mention of an absent entity when there is some reminder available of its existence. (Shimpi, 2005 has reported a similar result for slightly older children.)

Two recent studies provide further evidence of context effects. Saylor and Baldwin (2004) showed that infants as young as 15 months of age responded to hearing a reference to a highly familiar and valued person—the parent who had not accompanied them to a laboratory. However, 12-month-olds did not respond to hearing *Daddy*. In contrast, Ganea and Saylor (2006) showed that when the parent (or a sibling) of the participant had recently been present in the lab, hearing him or her referred to led even 13-month-olds to respond. Two factors may have contributed to the response of the young children in the latter study: The absent individual had been associated with the environment, and only 2 minutes had passed between the departure and when the child heard him or her referred to.

Ganea (2005) recently provided systematic evidence delineating the importance of contextual factors in early comprehension of absent reference. She taught 13- and 14-month-old infants a proper name—*Max*—for a novel stuffed animal, and the toy was then put out of sight. When the infants subsequently heard Max referred to, most of them (86%) did something to re-establish contact (either visual or physical) with the toy. Some simply looked to where the invisible toy was (concealed in a basket beside a nearby couch), sometimes also pointing toward it. Some children actually got up and went over to re-establish contact with the toy. Thus, by 13 months of age, hearing the newly learned name of an out-of-view object can bring the object to mind. Two subsequent studies revealed strong context effects: 13-month-olds reacted less often to the name of the absent object when the toy was slightly less accessible and when a delay had taken place since when they had last seen it.

These recent studies have established that at the beginning of their second year, infants take a crucial step toward mastery of one of the core features of language: the use of words to communicate beyond the here and now. However, whether they respond overtly to hearing an absent object referred to depends on the complex interaction of multiple representational and contextual factors (Ganea, 2005).

This developmental step inaugurates an enormous expansion in the extent to which an infant can share a focus of attention with another person. Eventually, the child can learn from adult testimony about entities that are not currently present and even ones the child has never directly experienced.

Updating Representations

The emergence early in the second year of life of the comprehension of references to absent objects sets the stage for the development of the vital ability to acquire

new information about nonpresent entities and events. Often, when someone communicates information to us about a person (e.g., place, object, situation), the topic of the message is absent. We accommodate such information by updating our mental representation of the person with the recently received information. Thus, if we are told that our spouse had a fender bender with the family car, we update our representation of the car, regretfully incorporating the damage information into our mental representation of the car. (We may also update our representation of our spouse's driving skill.)

Young children hear information on a daily basis that could produce updating: "Mommy's getting her hair cut." "The cookies are done now." When are they capable of revising their existing mental representation of an object or situation based on what someone tells them has happened?

We are not aware of any existing research on this topic. Accordingly, Ganea, Shutts, Spelke, and DeLoache (2007) examined infants' ability to incorporate new information into their mental representation of a currently absent object. Our specific question concerned the modification of an existing mental representation of an absent object, based solely on hearing that something has happened to it.

To examine this topic, we first taught infants a proper name for a stuffed animal. Then—with the toy out of sight in another room—the infant was informed that the toy had undergone a change in state. What we wanted to know was whether the infants' mental representation of the toy would be modified to accommodate the change that they had been told about but had not witnessed. In this study, 19- and 22-month-old infants were initially shown three stuffed animals—for example, two identical frogs and one pig. One of the frogs was then put on a shelf, and the children learned a proper name—*Lucy*—for the remaining one. (As before, a proper name was taught so the toy could later be referred to in its absence.) The child and experimenter played for a while with Lucy and the pig (which was never given a name). Then the toys were left behind as the experimenter and child went to the adjoining room to read an unrelated picture book.

As they were engaged in the reading interaction, an assistant entered, carrying a bucket of water, and announced, "I'm going to go in the other room and wash the table." She went into the room in which the toys were located, closing the door behind her. About two minutes later, she returned and exclaimed in an agitated voice, "I'm so sorry—I spilled water on Lucy. Lucy's all wet!" Then the experimenter and child returned to the first room to "see Lucy."

Upon entering, the child saw the three toys on the table. One of the two frogs was sopping wet, as was the nameless pig. The child was asked to indicate which toy was Lucy. Our reasoning was that if the infants identified the thoroughly drenched frog as Lucy, it would indicate that hearing "Lucy's all wet" had (1) activated their mental representation of Lucy (a frog) and (2) (of primary importance

for this study) led to the incorporation into that representation of what they heard had befallen Lucy. Thus, the young participants in this study were asked to use information about an unseen event involving an absent object to identify the object. Successful identification would provide evidence that the infants had updated their mental representation of the absent entity.

The majority (80%) of the 22-month-old children selected the correct toy (the wet frog) as Lucy (a rate significantly above chance). Thus, this age group showed evidence of being able to take in new information about an absent event or object and to incorporate that information into their existing representation of the object.

The 19-month-olds, however, did not perform above chance. They did remember the object–name relation, as shown by the fact that they always selected one of the two frogs, ignoring the pig, as being Lucy. Nevertheless, they did not use the information they had heard about the toy in its absence to identify which frog was Lucy.

To see if the younger children might be more successful if the task were simplified, a new group of 19-month-olds was given the same experience, but the test involved only the two identical animals—one wet and one dry. Even with this less demanding task, however, the children's selection of the correct toy was not above chance.

An additional study confirmed that the poor performance of the 19-month-olds was not due to a simple failure to understand what the experimenter said to them. A new group of 19-month-olds heard the same information about the spilling accident, but the two animals were in view when they heard it. The children were shown the two identical animals—one wet and one dry—and the experimenter told them that she had spilled water on Lucy. ("Look what happened! I spilled water all over Lucy.") The children were then asked to indicate which of the toys was Lucy. Thus, the need to update a representation of an absent object was eliminated. All that was needed to respond correctly was to understand what the experimenter said about the toys and to update their representation of a present object. The majority of these 19-month-olds (70%) selected the correct toy.

This result indicates that in the previous studies, the 19-month-old children's failure to use the information about the out-of-view toy was not due to difficulty understanding the experimenter's description of the spilling event. Rather, their poor performance can be attributed to difficulty incorporating new information into their existing representation of an absent toy.

The results of this series of studies suggest that the ability for updating an existing representation of an absent object may emerge quite rapidly in the second half of the second year (that is, between 19 and 22 months). However, it is also possible that 19-month-olds are capable of updating but that the manifestation of this ability depends on a complex interaction of representational and contextual factors

(as is true for the comprehension of references to absent objects in general; Ganea, 2005). They might be capable of updating their representation of an absent object under less challenging conditions than those examined so far.

Future studies will be directed to further exploration of this emergent ability. One question concerns the extent to which prior experience might affect infants' ability to update a representation of an absent object. We suspect that updating may occur more readily for an object for which the infant already has a strong memory representation (Munakata, 2001; Munakata, McClelland, Johnson, & Siegler, 1997). Support for this prediction comes from evidence that young infants are more likely to search for a familiar hidden object than for a novel one (Shinskey & Munakata, 2005). Thus, 19-month-olds who failed to incorporate new information about a change to a recently encountered object in the initial study might succeed with a highly familiar one.

Temporal factors might also matter, with updating more likely for objects, whether familiar or new, that infants have recently interacted with than ones they have not seen for some time. The type of transformation might make a difference. For example, our intuition is that a change in the location of an object ("I moved Lucy to the couch.") should be easier to update than a change in the object itself.

It is also conceivable that some of the results predicted herein might actually turn out to be the opposite. Rather than updating being more likely for stronger mental representations of absent objects, it seems possible that updating might occur more readily for weaker representations. This is clearly a question for future research.

Summary

The emergence of the ability to comprehend references to absent objects early in the second year of life paves the way for the development of the ability to update mental representations based solely on the testimony of others.

LEARNING THROUGH PICTURE BOOK INTERACTIONS

A common opportunity that very young children have for learning indirectly comes in the form of joint picture book reading interactions with their parents, teachers, and older siblings. Such interactions are very frequent in American homes: Most children below the age of 3 are read to several times a week—the majority of them on a daily basis (Rideout, Vandewater, & Wartella, 2003). One reason that this type of interaction is so common is the fact that American parents generally think that books and reading are important for their young children's development (Gelman, Coley, Rosengren, Hartman, & Pappas, 1998; Rideout et al., 2003).

Parent-Infant Picture Book Reading

There is substantial evidence supporting these parents' general assumption—that is, evidence pointing to general benefits from early picture book experience. The most extensively documented benefit is enhanced vocabulary development. The amount of time that preschool children spend in picture book interactions with their parents is correlated with the size of their vocabulary (DeBaryshe, 1993; Fletcher & Reese, 2005; Karass & Braungart-Rieker, 2005; Sénéchal & Cornell, 1993; Whitehurst et al., 1994). Indeed, in one study, the best single predictor of receptive language in preschool children was the age at which their parents had started reading to them (DeBaryshe, 1993).

Another demonstrated gain from joint picture book reading is enhanced literacy skills and knowledge. Young children with substantial early book-reading experience enter school knowing more about the nature of books and how they are used than do children with less experience of this sort (Adams, 1990; Bialystok, 1995; Bus, van Ijzendoorn, & Pellegrini, 1995; Justice & Ezell, 2000; Mason, 1980; Sénéchal & LeFevre, 2001; Sulzby, 1985; Teale & Sulzby, 1986; Whitehurst & Lonigan, 1998). Furthermore, picture book reading has served as the basis for effective intervention programs with educationally at-risk young children (e.g., Lonigan & Whitehurst, 1998; Whitehurst et al., 1994; Whitehurst & Lonigan, 1998).

In a recent review of research on picture book reading with young children, Fletcher and Reese (2005) emphasized that three components of such interactions need to be considered: (1) the characteristics and behavior of the parent; (2) the nature of the book; and (3) the characteristics and behavior of the child. Relatively little attention has been paid to children's books and how they affect the nature of the interaction—a relative neglect the research described later in this section is designed to address.

Parent Behavior

A general feature of joint picture book interactions with very young children is that their parents expose them to novel words and concepts that rarely occur in parent–child conversations (DeTemple & Snow, 2003). Specifically, parents' speech to their children is more responsive and complex, and they label objects more often during joint reading than during joint play (Hoff-Ginsberg, 1991; Lewis & Gregory, 1987; Ninio & Bruner, 1978; Sorsby & Martlew, 1991).

A Vygotskian perspective underlies a substantial proportion of the research on early book interactions (e.g., Snow & Goldfield, 1982; Sulzby & Teale, 1987; van Kleeck, 2003), emphasizing the role of parents in scaffolding their child's participation in the book-reading interaction and thereby maximizing the benefit the child derives from it. Parents report that they modify their behavior based on

their knowledge of their child's linguistic and cognitive abilities (DeLoache & DeMendoza, 1987; Martin, 1998; Martin & Reutzel, 1999), and parental input does indeed differ substantially as a function of the age of the child.

In book-reading interactions with children under 18 months, parents tend to devote a fair amount of time and effort to directing their child's attention (DeLoache & DeMendoza, 1987). They typically deviate from whatever text a book may contain in favor of simply labeling and commenting about the pictures in it: "That's a frog. Oh look, a bear." They rarely relate the depicted items to real ones, even if real objects of the same category are visible nearby (DeLoache & DeMendoza, 1987). Indeed, early picture book "reading" is essentially a labeling activity for parents and their young children (Fletcher & Reese, 2005).

With young children above 18 months, parents seek somewhat more active participation. They ask their child questions related to the book and often scaffold extended conversations about the pictures and stories (Goodsitt, Raitan, & Perlmutter, 1988; Martin, 1998; Murphy, 1978; Ninio, 1983; Sénéchal, Cornell, & Broda, 1995; van Kleeck, 2003; Wheeler, 1983). With older children, parents provide additional information in book-related interactions, often by drawing their child's attention to categorical relationships among depicted items (Gelman et al., 1998) or by orienting their child to the organizational theme of a book (Szechter & Liben, 2004).

Books

The nature of joint picture book interactions is also related to characteristics of the book itself. Picture books for young children typically fall into three categories: (1) alphabet or number/counting books, which tend to have relatively simple picture books with little or no text; (2) narrative books in which a story line accompanies the pictures; and (3) expository books with text and pictures designed to convey information (Fletcher & Reese, 2005). Simple alphabet and number/counting books are the most frequent choices for younger children (Sulzby & Teale, 1987).

The nature of the book has an impact on the parent–child interaction, as shown by the finding that very young children participate more actively in picture book interactions with simple books with a single picture per page than more complex books with multiple pictures per page (DeMendoza, 1995). In another study, 9- to 27-month-old children and their parents talked more when interacting with simpler, text-free books (Sénéchal et al., 1995).

Further evidence of the impact of the nature of books on parent–child interaction comes from a recent laboratory study in which mothers of 30- to 36-month-olds were asked to read different alphabet books with their child (Chiong & DeLoache, 2006). One of the books was a very simple, old-fashioned book with one picture per letter (*A* is for *apple*). The other was a *manipulative* book—that is,

a book with features that invite children to interact physically with it (e.g., flaps to be lifted, levers to pull, textures to feel).

The type of book affected the manner in which the mothers interacted with their children. They focused more on the educationally relevant information—the letters—with the plain book, pointing to them and labeling them more often than they did with the manipulative book. The children vocalized about the letters and pictures more often with the plain book. In contrast, the children physically interacted with the manipulative book more often than with the plain book, mainly by focusing on the manipulative elements. Thus, the plain book encouraged attention to the educationally relevant material, whereas the manipulative book engaged the children in exploring the educationally irrelevant manipulative features. The behavior of both the mothers and the children suggest that learning would be fostered better by the plain book than the manipulative one. These results reveal that the type of book can alter the nature of book-reading interactions with respect to both the parent and child.

Infant Behavior

From simply pointing and vocalizing in response to parental prompts, children become increasingly attentive to books and become increasingly active participants in picture book reading interactions over the first three years (Sénéchal et al., 1995). In addition, they take more responsibility for directing the interaction. One way they do so is by demanding that the same books be read over and over again. Although parents often despair when cajoled into reading, for example, *Machine in Space* for what seems like the millionth time, there is evidence that repeated reading of children's favorite books is associated with more active participation in the interactions (Goodsitt et al., 1988; Morrow, 1988; Phillips & McNaughton, 1990; Sulzby & Teale, 1987) and enhanced vocabulary acquisition (Ninio, 1983; Sénéchal, 1997; Snow & Goldfield, 1983).

Research on Learning from Picture Book Interactions

Given the extensive amount of time that American parents and their children spend in joint picture book interactions, an opportunity clearly exists for substantial learning to take place. However, there has been virtually no research on what children learn from picture book reading other than vocabulary words and literacy concepts. We have recently inaugurated a program of research examining the process of learning information through picture book interactions and assessing the extent to which infants and very young children extend what they learn from these interactions to the real world.

Suppose a toddler learns from a picture book interaction about an unfamiliar animal—a dolphin, for example. In addition to learning that the depicted animal

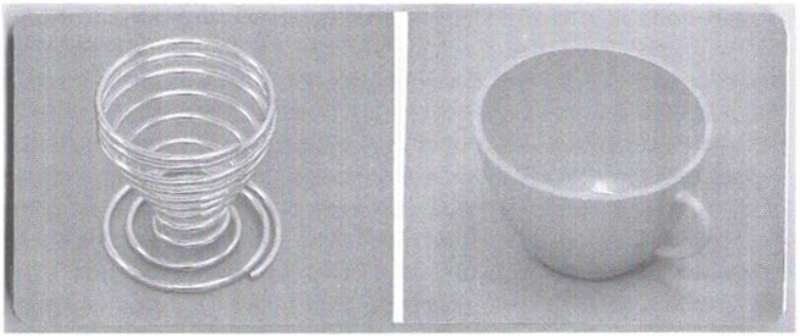
is called a *dolphin*, the child learns that it lives in the sea, gives birth to babies, and sometimes performs tricks for children to enjoy. Now suppose that this child visits an aquarium a week later and sees a dolphin. Does the child know that the animal is called a *dolphin* and anticipate seeing it do a trick? In our initial study (Ganea, Bloom-Picard, & DeLoache, 2006), we examined 15- and 18-month-olds' learning of a novel name from a brief picture book interaction with an adult. Our first question was whether these very young children would extend the name learned for a depicted object from the book to the real object. The second question was whether they would generalize the newly learned label to a new instance of the object.

The third question was whether the nature of the pictures in the books would influence children's learning and generalization from them. To address it, we prepared simple books that contained color photographs, realistic drawings, or cartoons (Figure 8.1). Each book included pictures of several familiar objects (toy dog, ball, cup) and two novel objects. In a very natural picture book reading interaction, the experimenter and child looked through the book together. In the process, the experimenter labeled one of the novel objects several times—"Look, this is a *blicket*." The children were then tested to see if they (1) had learned the novel name for the novel depicted object, (2) would extend the name to the real object, and (3) would generalize the name to a novel exemplar.

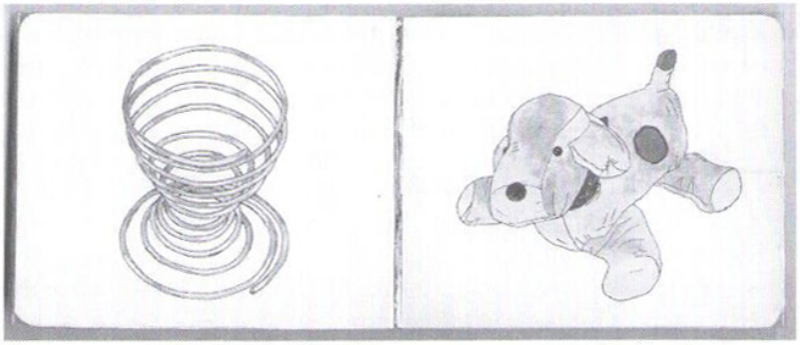
The results indicated that both age groups learned the novel name from the brief picture book interaction, in that they correctly selected which of two pictures (of the novel objects in the picture book) was a *blicket*. Moreover, they correctly extended the name to the real novel object. When presented with the two novel objects that had been depicted in the book and asked which was the *blicket*, they chose correctly. The 18-month-olds, but not the 15-month-olds, also generalized the name to another new instance of the object (a differently colored exemplar). Thus, these very young children did apply a name that they learned from a picture book interaction to the real world, although the 18-month-olds did so to a greater extent than the 15-month-olds.

The results also revealed an effect for iconicity—the degree to which the pictures in the book looked like the real objects. Both age groups performed better when they had learned from the books with photographs and realistic drawings. This difference was especially pronounced for extension to a novel exemplar. Thus, the nature of the pictures in books for very young children affects the extent to which children apply the information they learn from the book to the real world.

A similar effect of iconicity appeared in a study of children's learning of actions from picture books (Simcock & DeLoache, 2006). The 18- and 30-month-old children in this research learned to imitate with novel objects a sequence of actions that was depicted in a book. Their subsequent imitation performance was better if the action sequence had been depicted with realistic photographs



(b) Drawings



(c) Cartoons

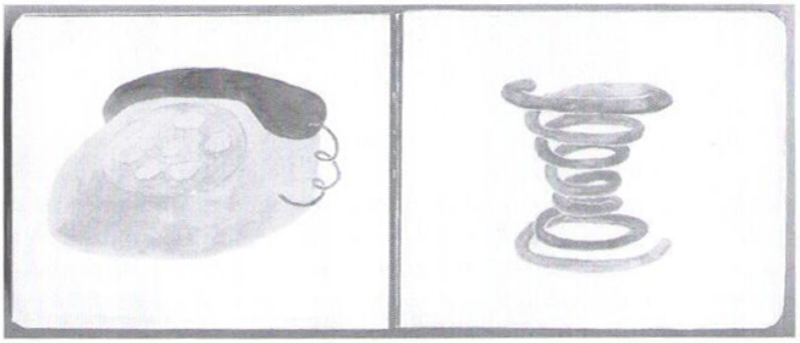


Figure 8.1 Sample pictures from the books of one of the novel objects and three of the familiar objects used in Ganea, Bloom-Pickard, & DeLoache (2008).

than with line drawings. Thus, the degree to which the pictures in a picture book resemble their real-world referents strongly affects whether children extend what they learn beyond the pages of a book.

A related finding concerns young children's interpretation of fantasy in books for very young children. Many of the books designed for very young children (perhaps the majority) are composed of cartoons depicting animals and inanimate objects engaged in human activities. Human motivation, emotion, and cognition are also attributed to these entities. Dogs drive cars, seals cook dinner, trains try very hard to make it up very steep hills, and all feel happy or sad depending on whether they succeed. This format is common even in books designed to teach young children information about the world.

Does the common use of cartoons in books for very young children matter? According to a study by Ganea, Richert, Bean, and DeLoache (2006), 2- and 3-year-old children are influenced by them. After being read to from fantasy cartoon books in their preschool classroom, the children were asked a series of questions about whether they thought, for example, cats can draw pictures or dogs can cook. Children who had recently experienced the fantasy cartoons were significantly more likely to attribute human powers to animals than was a control group that had not recently been exposed to fantasy books.

This series of studies on young children and picture books has important educational implications. For teaching young children new information about the world, books with more realistic pictures are better. In addition, fantasy (cartoon) formats may confuse children when the goal is to teach them accurate information. If a parent or teacher simply wants to amuse a child and have a positive interaction, the nature of the pictures in the book is not particularly important (other than that they be appealing to the child). However, if one wants children to learn and apply something beyond the pages of a picture book, it would be better to select a book with realistic pictures over one with cartoons. Unfortunately, cartoon books make up a substantial proportion of the books available for very young children.

Summary

Research on parent–child picture book interactions indicates that this extremely important activity has many important effects. In addition to earlier demonstrations of enhanced vocabulary acquisition and literacy knowledge, recent studies provide evidence of very young children learning specific content. The nature of the book with which the child interacts makes a difference in children's interpretation of the information in the book as well as in the extent to which they transfer what they learn from the pages of the book to the real world.

CONCLUSION

In the first years of life, children not only learn language but they also learn through language. The testimony of other people exerts a powerful influence on their knowledge and interpretation of the world. In the first year of life, hearing adults label objects and events leads infants not only to learn the names of things but also to form categories and to draw inductive inferences based on those categories. In their second year, infants become capable of learning new information simply by being told about objects that are not physically present—a momentous step that dramatically magnifies their opportunities for further learning. Very early picture book interactions introduce infants and young children to an especially powerful way of acquiring information.

The availability of testimony and the ability to comprehend it are fundamental to what it means to be human. The concept of the "wisdom of the ages" is meaningful only in the context of the uniquely human capacity for learning about the world from indirect experience.

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