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## Children's Sensitivity to the Knowledge Expressed in Pedagogical and Non-Pedagogical Contexts

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### Abstract

The present studies test two hypotheses: (1) that pedagogical contexts especially convey generic information (Csibra & Gergely, 2009), and (2) that young children are sensitive to this aspect of pedagogy. We examined generic language (e.g., “*Elephants* live in Africa”) in three studies, focusing on: informational versus narrative children’s books (Study 1), the language of 6-year-old children and adults assuming either a pedagogical (teacher) or non-pedagogical (friend) role (Study 2), and the language of 5-year-old children and adults speaking to either an ignorant alien (pedagogical context) or a peer (non-pedagogical context; Study 3). Results suggest that generics are more frequent in informational than narrative texts. Furthermore, both adults and young children provide more generic language in pedagogical contexts and when assuming a pedagogical role. Together, the studies demonstrate that pedagogical contexts are distinctive in conveying generic information, and that children are sensitive to this aspect of the language input. We suggest that generic knowledge is more useful in making predictions about the future, and thus more highly valued during instruction.

### Keywords

children; pedagogy; generics; language

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Children are prodigious learners, and much of what they learn comes from the testimony of other people (Gelman, 2009; Harris & Koenig, 2006). As Harris and Koenig note, children would have difficulty learning about history, science, or religion solely by means of solitary interactions with the world around them; they require information from knowledgeable others. Csibra and Gergely (2009) have proposed that humans have a universal tendency to share cultural knowledge and practices with children, a tendency they call “natural pedagogy.” They also argue that children are especially attuned to pedagogical contexts. Several recent studies confirm this view. For example, by preschool age children learn and imitate differently from pedagogical versus non-pedagogical contexts (Bonawitz, Shafto,

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Gweon, et al., 2011; Buchsbaum, Gopnik, Griffiths, & Shafto, 2011), and even infants attend and learn differently when viewing an action that is marked as pedagogical (e.g., involves eye contact, infant-directed speech, and contingent responsivity) versus not (Futo, Teglas, Csibra, & Gergely, 2010; Topal, Gergely, Miklosi, Erdohegyi, & Csibra, 2008; Yoon, Johnson, & Csibra, 2008). Furthermore, this tendency appears to be both species-general (i.e., teaching is arguably present in all human cultures) and species-specific (i.e., non-human animals do not appear to spontaneously engage in intentional instruction) (Csibra & Gergely, 2011).

One question that has received relatively little attention is whether pedagogical contexts (both natural pedagogical contexts of the sort studied by Csibra and Gergely as well as more formal pedagogical contexts of the sort encountered in classroom settings) are special and different from non-pedagogical contexts in the sorts of information they convey. There would appear to be few constraints on what parents or other adults *could* teach children. But is there anything systematic about the information that parents or other adults *do* teach children, as well as in the information that children expect to receive? In this regard, Csibra and Gergely (2009) propose an interesting hypothesis, that pedagogy may entail *generic* information: “the knowledge gained from [pedagogical demonstrations] is likely to be generic to the object kind ...\*\*\* [and] shared by the cultural community” (Csibra & Gergely, 2011). We refer to this as the *Generic Pedagogy Hypothesis*. For example, generic information about a hammer includes its status as a tool and that it is typically used to pound in nails. In contrast, non-generic information relates to a particular instance of the category, such as when the hammer was purchased and the color of its handle. On the Generic Pedagogy Hypothesis, a pedagogical demonstration of how to use a tool might imply that this is how tools of this type are supposed to be used (in general). In contrast, a non-pedagogical use of the tool may be more idiosyncratic and less likely to generalize to other tools of that type (e.g., just because one hammer is placed on a shelf does not imply that other hammers should be placed on that shelf). Generic information transcends individual experiences, and thus is useful for making predictions and acquiring culturally relevant values, norms, or conventions. For example, learning that hammers are for pounding, broccoli is good to eat, lions are dangerous, or police officers help people who are lost are all generic pieces of knowledge. It would thus be adaptive for parents to focus on generic knowledge when engaging in pedagogical practices.

A critical question that follows from the Generic Pedagogy Hypothesis is whether children *expect* pedagogical contexts to convey generic information. If children do so, this would have important implications for the kinds of inferences they draw in different contexts (pedagogical vs. non-pedagogical). Initial support for this expectation comes from a set of studies by Butler and Markman (2010), who found that 3- and 4-year-old children generalized information presented in a pedagogical demonstration more broadly than information presented accidentally. In their work, the distinction between pedagogical and non-pedagogical demonstrations was conveyed by means of gaze and deliberate action, rather than explicit linguistic cues. Upon viewing a pedagogical demonstration showing that a novel object (a “blicket”) could pick up paperclips, children more often inferred that other blickets could also pick up paperclips, as compared to their inferences after viewing an accidental demonstration of the same action. This finding suggests that, with a primarily non-linguistic demonstration, children expect information conveyed pedagogically to extend to other members of the category.

In the present research, we focused on the forms of *language* that are elicited in pedagogical and non-pedagogical contexts. Language is a powerful and ubiquitous means of conveying information to children. Generic knowledge is expressed in language with generic noun phrases, such as “birds” in the sentence “Birds fly” or “a bird” in the sentence “A bird has

hollow bones” (Gelman, 2003; Leslie, 2007, 2008; Pelletier, 2010; Prasada, 2000). “Birds fly” is generic, as it attributes something general to the broad category of birds. In contrast, “This bird is flying” or “These birds are flying” or “Some birds are flying” are non-generic, as they refer to particular individuals. All the world’s languages can express generic noun phrases, although the formal linguistic cues vary from language to language (Carlson & Pelletier, 1995). In the present set of studies, we asked whether the Generic Pedagogy Hypothesis extends to the kinds of language input that children receive in pedagogical versus non-pedagogical contexts. Furthermore, we asked whether children expect to receive different kinds of language in pedagogical vs. non-pedagogical contexts. If pedagogical contexts are more likely to express generic knowledge, then we would expect pedagogical contexts to include more generic language, particularly for generics that appear as the subject of the sentence. Subject-position generics (e.g., “*Elephants live in Africa*”) are especially relevant because they predicate a fact about the category, and thus most clearly convey conventional world knowledge. In contrast, when generics appear in object position (e.g., “I like *elephants*”), they do not predicate a fact about the category and instead are more likely to be informative about the speaker. Thus, we expected that subject-position generics would be particularly preferred in pedagogical versus non-pedagogical contexts.

We also expected that pedagogical contexts would result in less frequent expression of personal opinions and experiences (personal preferences, prior history, personal anecdotes), compared to non-pedagogical contexts. Whereas generic information is general and holds true across individuals and contexts, personal opinions and experiences are particular and need not extend beyond the individual to whom they apply. Thus, the inverse of the prediction that pedagogical contexts will result in more generics is that they will also result in less expression of personal information.

Although the Generic Pedagogy Hypothesis is theoretically motivated, other patterns of knowledge expression are also possible. One alternative hypothesis stands in direct opposition to the Generic Pedagogy Hypothesis: namely, that pedagogical contexts may result in the expression of more concrete or specific (and therefore less abstract or generic) information. It is well-documented that parents adjust their speech when speaking with children, using a number of syntactic modifications (Snow, 1972) and simplified vocabulary (Mervis & Mervis, 1982; Hayes & Ahrens, 1988). This tendency to “talk down” to children appears to reflect a goal of adjusting one’s speech to the child’s level and providing communication that is maximally relevant to the child’s perspective. Because pedagogical contexts are child-focused, they may likewise foster the kinds of speech that children find easiest to process. Given arguments that young children are especially attuned to information that is concrete and perceptually available as opposed to abstract or non-visible (Inhelder & Piaget, 1964; Smith, Jones, & Landau, 1996), and that young children attend to individual instances rather than categories (e.g., particular cats rather than cats in general; Fisher & Sloutsky, 2005), we might expect pedagogical talk to focus on concrete, immediately present topics and events (the so-called “here-and-now”), as well as expression of personal beliefs and preferences.

Finally, a third possibility is that generics are such a fundamental aspect of language that they will appear equally often in pedagogical and non-pedagogical contexts. Leslie (2007) has suggested that generics are a default mode of generalization, universally expressed (Carlson & Pelletier, 1995), and central to human cognition. Consistent with this view, parents in both the U.S. and China frequently produce generics when speaking with their children during book-reading or free-play sessions (Gelman, Coley, Rosengren, Hartman, & Pappas, 1998; Gelman & Tardif, 1998; Gelman, Taylor, & Nguyen, 2004). Furthermore, deaf children who have no exposure to sign language and thus, little exposure to formal pedagogical contexts nonetheless produce generic-like utterances in their home signs

(Goldin-Meadow, Gelman, & Mylander, 2005). Given this powerful human tendency to produce generics, the frequency of generics may be invariant across contexts.

The above discussion clearly indicates that it is not a foregone conclusion that generic knowledge, as marked by generic language, will be more prevalent in pedagogical versus non-pedagogical contexts. Accordingly, empirical evidence is needed to address the question of whether and how generics are expressed in pedagogical contexts and to distinguish among the three possibilities outlined above.

Turning to the hypothesis that children will expect pedagogical contexts to include more generic language, alternative results are also possible. Perhaps the biggest obstacle children face is in identifying pedagogical speech as a distinct linguistic register. Children up to age 5 have surprising difficulty understanding linguistic register, despite regularly experiencing different registers themselves. For example, when presented with a sample of infant-directed speech, children below age 5 are at chance in guessing that the speaker is addressing a baby (Wagner, Greene-Havas, & Gillespie, 2010). Four- and 5-year-old children appropriately expect that speech with teachers will be more formal than speech with a peer (for example, one is more likely to include polite words such as “please” when talking to a teacher; Wagner et al., 2010), but to our knowledge, no prior research has examined whether children expect that teachers will provide more generic language. A further potential difficulty is that the distinction between generic and specific language is subtle, involving slight rephrasing of what might at first sound like comparable information. For example, the sentences “Horses eat hay” and “These horses are eating hay” both convey important world knowledge that generalizes beyond a single horse, but only the former is generic. Children may focus more on content and thus not detect the (hypothesized) correspondence between pedagogy and genericity.

Nonetheless, several findings in the literature provide preliminary support for the proposal that pedagogical contexts might evoke generic language, and that children may show early sensitivity to this relation. Gelman and Tardif (1998) found that parents in both the U.S. and China produced more generics while looking through picture books with their children (often considered a pedagogical context) than when playing with toys. Similarly, Gelman, Chesnick, and Waxman (2005) found that both parents and children produced more generics when looking at pictures in a book (again, a pedagogical context) than when playing with objects – even when controlling for the content and perceptual attributes of the items. Furthermore, Cimpian and Markman (2008) found that children more often interpreted ambiguous utterances (e.g., “They have hair in their ears”) as generic when uttered by a teacher giving instructions (pedagogical context) than by a veterinarian making a diagnosis (which can be considered a non-pedagogical context, because the veterinarian was attempting to determine the health of an individual animal, rather than engage in teaching). Finally, Ware, Gelman, Kleinberg, Manczak, and Stilwell (2011) found that the frequency of generics in parent-child conversation varied as a function of the conversational partner. When parents and 4-year-old children were in conversation together, parents (who were presumably in a pedagogical mode) provided more generics than their children. However, when the same children were placed in a pedagogical context (teaching an ignorant puppet from another planet), and their parents were placed in a non-pedagogical context (informally chatting with an adult researcher), children produced significantly more generics than their parents.

Despite these provocative findings, the link between generic language and pedagogical contexts has never been directly examined. No prior study has manipulated the pedagogical context directly, keeping all other factors constant. In the present set of studies, we addressed three questions: (1) Are generics more frequent in traditionally pedagogical

contexts? (2) Do adults provide more generic language in pedagogical versus non-pedagogical contexts? (3) If adults provide more generic language in pedagogical contexts, do children have the same expectation? Study 1 examined the relative frequency of generics in children's books, contrasting books designed to teach versus books designed to entertain. Studies 2 and 3 examined generic language in conversations of adults and young children who were placed in both pedagogical and non-pedagogical contexts.

## Study 1

The goal of Study 1 was to examine the frequency of generics in books designed for young children. Books have enormous pedagogical potential. Book-reading is a common parent-child activity, and there is a growing use of trade books (as opposed to textbooks) in early school contexts, including science education (Ebbers, 2002). Books provide an important platform for teaching literacy and related language skills, including vocabulary, narrative structure, irony, and perspective-taking (Britto & Brooks-Gunn, 2001). They also teach (or are designed to teach) cultural values, moral and ethical principles, and polite behavior. Furthermore, books introduce children to people, concepts, and things that are not available in their everyday experience (e.g., exotic animals, the insides of machines, outer space, people from other cultures). In all of these respects, books provide an important medium through which adults can teach children and expose them to new ideas.

Although books in general have rich pedagogical potential, we make an additional distinction between informational (non-fiction) books (e.g., a factual book about zebras) and narrative (fiction) books (e.g., a story about a pig who wants to join the Pig Scouts). Informational books are distinctive in that their primary function is pedagogical. They are written with the goal of imparting information. In contrast, narrative books are primarily designed to entertain. This is certainly not an absolute distinction: informational books for children should be entertaining, so that parents will read them and children will listen; narrative books should provide some new content, so that children will find them of interest. Nonetheless, the distinction between informational (non-fiction) and narrative (fiction) books provides a useful platform for testing the hypothesis that pedagogical contexts convey generic information. Specifically, with this distinction as background, we hypothesized that generics would be found more often in informational texts than in narrative texts. To test this hypothesis, we examined a selection of books that were written in English and intended for children aged 4 to 9 and assessed whether the frequency of generic versus non-generic sentences varied as a function of the type of book (informational, narrative, and combination books).

## Sample Selection

The sample of children's books was selected from public libraries located in a large city in Western Canada. Our goal was to obtain a representative sample of trade books that were accessible to children aged 4 to 9. Trade books are intended for sale to the general public, as compared to textbooks that are tailored for educational contexts such as schools (Schroeder, McKeough, Graham, Stock, & Bisanz, 2009). To obtain the sample of books, research assistants (who were unaware of the purpose of the study) searched an online public library catalogue and consulted with a librarian who specialized in children's books regarding popular authors and topics. Based on their search and consultation, they selected an original sample of 125 books. From this sample, we then coded a semi-random selection of 75 books (with the goal of including roughly equal numbers of books that were narrative in focus, informational in focus, or a combination of the two—i.e., non-fiction set within a narrative context). Using reviews from bodies such as the New York Times Bestsellers' List, the American Library Association, and the Claremont Graduate School, as well as the

advertisements of booksellers (e.g., Amazon), we verified the intended age range for each book. A list of all the books included in the sample can be found in the Appendix.

## Coding

**Genre**—Each book was coded into one of three genres: informational, narrative, and combination (from Goldman & Bisanz, 2002; Schroeder et al., 2009). Informational books ( $N=24$ ) presented material in a factual manner without a narrative as a background (e.g., a book about zebras). Narrative books ( $N=30$ ) primarily conveyed a story. This category included books where the primary goal was to entertain (e.g., a story about a guinea pig who wants join the Pig Scouts). Finally, combination books ( $N=21$ ) combined a narrative structure with some informational content (e.g., a story about space vehicles that explains facets of space vehicles and includes a narrative about cat astronauts). It important to note that the classification of books as informational, narrative, or combination was conducted independently of whether the text included generic sentences. Thus, it was certainly possible for informational books to focus on individuals rather than generic kinds. For example, the following non-generic text was typical of one informational book about baby animal names: “I am a baby mouse. Tell me, what is my name; Cozy, rosy mouse snuggling in the loft, you are called a pinky because you’re pink and soft!” Similarly, it was certainly possible for narrative books to include generic sentences. For example, a book about a young boy searching for dragons with his grandfather included generic sentences such as, “Dragons always leave footprints”; “And dragons always live on mountain tops.”

**Topic**—We identified the general topic of each book as one of three categories: animals ( $N=43$ ; 57.3%), vehicles ( $N=19$ ; 25.3%), and other ( $N=13$ ; 17.3%).

**Generic/Non-generic**—We first identified which sentences to code, as some (e.g., imperatives, sentence fragments, picture captions, lists) did not contain enough information to be classified as generic or non-generic and so were not coded further. Codeable sentences were then coded as generic or non-generic. Generic sentences included subject-position references to a kind in general (e.g., “*Zebras* spend most of their day eating”; “*Guinea pigs* are experts at digging”). All other coded sentences were considered non-generic (e.g., “As the sun comes up over the plains of Africa, *a family of zebras* stands and stretches”; “*Willy* really wanted to play the trumpet”). For each book, we calculated the proportion of generics/non-generics relative to total coded sentences.

**Interobserver reliability**—To assess reliability, two independent coders separately coded 15 of the 75 books (20%). For genre, agreement was 100%, kappa = 1.0; for sentences coded, agreement was 100%, kappa = 1.0; for generic/non-generic, agreement was 96%, kappa = .88. All of the kappas for this coding are “near-perfect” (.81 and above) according to the guidelines established by Landis and Koch (1977). All disagreements were resolved by discussion.

## Results and Discussion

To assess whether generics appeared more frequently in pedagogical contexts, we compared the proportion of coded sentences that were generic, across the three types of books, using a one-way ANOVA with book type as a between-subjects factor. As expected, there was a main effect of book type,  $F(2, 72) = 14.02$ ,  $p < .001$ ,  $\eta^2 = .28$ . (All  $\eta^2$  results that we report use the partial  $\eta^2$  formula ( $SS_{\text{effect}}/(SS_{\text{effect}} + SS_{\text{error}})$ ). Tabachnick & Fidell (1989) suggest that partial  $\eta^2$  is an appropriate alternate computation of  $\eta^2$ .) Pairwise comparisons using Tukey’s HSD indicated that informational texts contained significantly more generics ( $M = .29$ ,  $SD = .19$ ) than narrative texts ( $M = .04$ ,  $SD = .08$ ),  $p < .001$ . Combination texts also contained significantly more generics ( $M = .16$ ,  $SD = .23$ ) than

narrative texts,  $p < .03$ . Finally, there was a non-significant tendency for informational texts to contain more generics than combination texts,  $p = .058$

Next, we used a 3 (genre)  $\times$  2 (topic) ANOVA to examine whether these results were consistent across different book topics. In this analysis, we include only those books that were classified as animal ( $N=43$ ) or vehicle books ( $N=19$ ), as they comprised the majority of the coded books (83%). Results indicate that the proportion of generic utterances varied only across book genre,  $F(2, 56) = 14.58$ ,  $p < .001$ ,  $\eta^2 = .34$ , with informational books ( $M = .32$ ,  $SD = .21$ ) containing significantly more generics than both the narrative books ( $M = .03$ ,  $SD = .07$ ;  $p < .001$ ) and the combination books ( $M = .14$ ,  $SD = .19$ ;  $p < .01$ ). The combination books contained more generics than the narrative books,  $p < .05$ . There was no main effect nor interaction involving topic ( $ps > .30$ ).

The results of this text analysis demonstrate that generics are more prevalent in books that could be viewed as teaching tools--those that are intended primarily to convey information. In contrast, with narrative books, a genre for which the primary goal is to entertain the reader, generics accounted for a significantly smaller percentage of the total sentences. Books that combine narrative and informational elements fell in the middle. These results support the Generic Pedagogy Hypothesis within the context of written books that were carefully designed to provide information to young children.

Although the data support the Generic Pedagogy Hypothesis, it is important to consider whether pedagogy and genericity are, in principle, independent factors, or whether instead the distinction of interest (generic vs. individuating) is implied by the coding of books as informational versus narrative. If the informational/narrative contrast necessitates a generic/individuating contrast, then the findings would be tautological. Thus, the question becomes two-fold: (a) in order to create a narrative, must one focus exclusively on individuals, and (b) in order to impart instruction, must one provide generic language?

The link between pedagogy and generics that was obtained in this study is a novel empirical finding, neither a foregone conclusion nor dictated by the study design. First, as noted in the method section above, classification of the books as informational vs. narrative was conducted independent of the analysis of the language as generic vs. specific. Second, generics appeared in the narrative books, and non-generics appeared in the informational books (indeed, most of the sentences in both types of books were non-generic). Third, Pappas (2006) details a variety of non-generic strategies for providing information to children in informational books, including: descriptions of attributes (e.g., "He is a furry, small animal with a long bushy tail"), historical vignettes (e.g., "Here is a true story about some seeds that grew after a *very very* long time"), and experimental ideas (e.g., "Get two thermometers. On a cold day when the wind is blowing, bury one thermometer in the snow..."). Fourth, a variety of educational approaches are inquiry-based, problem-based, play-based, or constructivist, with the philosophy that children learn best by discovering patterns and principles on the basis of experience with *particular* objects and events (Hmelo-Silver, 2004; Kuhn & Pease, 2008; Martlew, Stephen, & Ellis, 2011; Samarapungavan, Patrick, & Mantzicopoulos, 2011). In these educational approaches, the teacher's role is to facilitate learning through open-ended questioning, rather than simply delivering knowledge. These approaches would again reinforce the notion that pedagogy, learning, and instruction need not imply generic language.

A critical question raised by these data is whether conversational speech would show similar patterns. The Generic Pedagogy Hypothesis would predict comparable patterns in everyday, spontaneous speech as in written books. However, conversational speech is much less formal than written speech, does not involve the same degree of foresight and planning, and

is not backed by as extensive a knowledge base. (Someone writing a book about horses, for example, has the luxury of consulting reference sources and crafting maximally informative sentences.) Furthermore, the pedagogical goals of oral communication may be less clearly established than the pedagogical goals of an informational book. To some extent, then, a non-fiction book is an idealization of what pedagogical input might look like if the speaker were fully informed and had no constraints on planning or revision. It would thus be of interest to see whether these patterns would extend to the potentially messier modality of oral communication. Another open question is whether children would be sensitive to these patterns in their own productive speech. If children expect pedagogical contexts to convey generic information, then when assuming a pedagogical role (e.g., pretending to be a teacher, or providing instruction to another), they should be more likely to produce generic language. We address these issues in Study 2. We hypothesized that, because the phenomenon of greater generic usage in pedagogical contexts is established in stimuli that are meaningful for children and that children are exposed to, these patterns may contribute to children's own expectations of pedagogical contexts.

## Study 2

Study 2 was designed to test whether pedagogical contexts differ from non-pedagogical contexts in the kinds of speech they elicit from children and adults. The key manipulation was to vary the speech context, by asking participants to assume different conversational roles. There were two contexts: pedagogical (in which the participant pretended to be a teacher talking to his/her class) and non-pedagogical (in which the participant pretended to be a preschooler talking to his/her friend). We predicted that the pedagogical context would lead to a higher rate of generics and a lower rate of personal information, relative to the non-pedagogical context. If adults show these patterns, it would indicate the distinctive nature of pedagogical contexts to which children are exposed. If children show these patterns, it would indicate that they both are sensitive to and share these expectations. We tested 6-year-old children because they are in the early years of formal education, and it is of interest to see if assumptions regarding pedagogical contexts hold within this population of children, who have first-hand experience with the language of teachers.

## Method

**Participants**—Participants included 33 children (24 girls, 9 boys; range 6.02 - 7.23; mean age 6.57) and 48 college students (23 female, 25 male; range 17 - 21; mean age 18.64). Eight additional children were tested but not included in the final sample: one was unable to complete the task, three did not understand the task, two did not produce enough speech, and two encountered equipment malfunction. Two additional adults were dropped due to equipment malfunction. Children were recruited from communities in and around a midwestern U.S. university town; 82% were White. Adults were undergraduates at a large university in the same town, and participated for course credit; 75% were White.

**Materials**—The materials included two books of realistic colored drawings, each including 4 animals and 4 foods (thus, 8 pictures per book; see Table 1 for full list of items). There was one picture per page, and the pages were arranged in two different random orders, with each participant seeing one of the two orders. Additionally, we used 2 female puppets (teacher and child, differing appropriately in clothing and hairstyle) and 2 male puppets (teacher and child, differing appropriately in clothing and hairstyle).

**Procedure**—Children were first given a warm-up task during which they learned that they would be playing a pretend game, and were encouraged to pretend to be an airplane and a baby. In the primary task, they then were asked to pretend to be a teacher of a kindergarten



class (pedagogical block), or a preschooler talking to his/her best friend (non-pedagogical block). Pictures of teachers or preschoolers were shown to the child to help convey the relevant role. Children were given an appropriate puppet (teacher or child, same sex as child) to use to pretend. They were given the book of pictures to discuss. Before each picture, the child was prompted (either “Pretend you’re a teacher; what would you say about this picture?” or “Pretend you’re a preschooler; what would you say about this picture?”). If the participant did not say at least two things about the picture, they were prompted with “Go ahead and say a little more” or “What more can you tell me?” Blocks were presented in counterbalanced order.

A 5-minute distractor task was used between blocks (Lego play for children; word search for adults). Adults received the same task as children, except that they did not receive a warm-up and did not receive the puppets, and “preschooler” was specified as “3-year-old”.

**Transcribing and coding**—All sessions were transcribed verbatim and checked by a second coder. All on-task utterances were identified and coded as either generic or non-generic. As in Study 1, generic sentences included subject-position references to a category in general. Sample child utterances that were coded as generic include: “Penguins are great swimmers”; “A banana is white on the inside and yellow on the outside.” Sample child utterances that were coded as non-generic include: “This is an elephant”; “I think it is four days old.” On-task utterances were also coded as either containing or not containing personal information (i.e., expressing an opinion, reference to a friend or family member, or personal anecdote). Coding of utterances as generic vs. non-generic was independent of coding as containing personal information vs. not. Thus, a non-generic utterance might also include personal information. Sample child utterances that were coded as personal include: “I watched a penguin show in school”; “I want to eat it.”

For purposes of determining interrater reliability, a second coder coded a subset of the transcripts. Agreement and kappas are as follows: on-task coding:  $N=81$ , agreement = 96%, kappas = .85; generic coding:  $N=81$ , agreement = 94%, kappas = .84; subject/object generic coding:  $N=19$ , agreement = 94%, kappas = .88; personal coding:  $N=19$ , agreement = 98%, kappas = .93. All of the kappas for this coding fall within near-perfect (.81 and above) levels (Landis & Koch, 1977). Disagreements were resolved by discussion.

## Results

**Generic responses**—For each participant, we calculated a score separately for each context (pedagogical vs. non-pedagogical), indicating the proportion of intelligible utterances that included a generic. Thus, scores could range from 0 to 1. We conducted a 2 (age group: children, adults)  $\times$  2 (order: pedagogical context first vs. second)  $\times$  2 (context: pedagogical vs. non-pedagogical) ANOVA. Age group and order were between-subjects variables; context was a within-subjects variable. These data are presented in Figure 1.

As predicted, participants produced a higher rate of generics in the pedagogical than the non-pedagogical context ( $M_s = .14$  and  $.09$ ),  $F(1,77) = 10.13$ ,  $p = .002$ ,  $\eta^2 = .12$ . There were no significant effects of age or block order. A separate analysis of pedagogical context within each age group indicated a higher rate of generics for the pedagogical than non-pedagogical contexts for both 6-year-olds and adults,  $p_s < .05$ .

**Personal responses**—We conducted a 2 (age group: children, adults)  $\times$  2 (order: pedagogical context first vs. second)  $\times$  2 (context: pedagogical vs. non-pedagogical) ANOVA on the proportion of on-task utterances that were personal responses (see Figure 2). As predicted, participants provided personal information more frequently in the non-pedagogical context than the pedagogical context ( $M_s = .22$  vs.  $.04$  of on-task utterances),

$F(1,77) = 59.76, p < .001, \eta^2 = .44$ . This effect was stronger among adults than children,  $F(1,77) = 11.01, p = .001, \eta^2 = .12$ , but the contextual effect was significant within each age group examined separately,  $p < .01$ . There was also an age group  $\times$  block order interaction,  $F(1,77) = 22.30, p < .001, \eta^2 = .22$ , and a context  $\times$  age group  $\times$  block order interaction,  $F(1,77) = 11.14, p = .001, \eta^2 = .13$ . The 3-way interaction revealed that, for adults, personal information was more frequent for the non-pedagogical than the pedagogical context in both block orders (pedagogical context first or second),  $p < .001$ . In contrast, for children, this pattern held up only for the order in which the pedagogical context came second,  $p = .001$ . When the pedagogical context came first, children rarely provided personal information in either context, suggesting that the effect of the pedagogical context on suppressing personal responses “carried over” into the second (non-pedagogical) block.

## Discussion

In Study 2, participants were asked to assume either a pedagogical role (pretending to be a teacher speaking to his/her class) or a non-pedagogical role (pretending to be a preschooler speaking to his/her friend). Otherwise, the two contexts were identical, involving identical sets of books and an experimenter who provided no conversational cues other than scripted prompts. The experiment thus provided a sparse and challenging conversational context in which participants were required to generate language with minimal scaffolding. Despite the difficult demands of the task, both adults and children displayed sensitivity to the context, consistent with the Generic Pedagogy Hypothesis. When pretending to be a teacher, both adults and 6-year-old children produced more generics. They displayed a bias to treat pedagogical contexts as ones focused on information that generalizes beyond a particular or personal context and is broadly relevant to the category in question.

In addition to finding that pedagogical contexts elicit generics, we found that pedagogical contexts reduced the amount of personal information that was expressed, for children and adults. Personal information can be thought of as the opposite of generic information, in that it applies to particular individuals (e.g., personal likes and dislikes, personal vignettes, information about family, friends, or neighbors). Thus, pedagogical contexts are distinctive not only in boosting category-wide information but also in suppressing individual-specific information.

Together, the results of Study 2 support the Generic Pedagogy Hypothesis in children of early elementary-school age. An open question is whether younger children would also show these effects. Study 3 was designed to address this issue.

## Study 3

The goal of Study 3 was to obtain converging evidence regarding the Generic Pedagogy Hypothesis with younger children. In Study 2, 6-year-olds, who already had an average of 1-2 years of formal schooling, displayed adult-like expectations concerning the language of teachers versus peers. Of interest is whether preschool children hold similar expectations. In order to examine younger children, we aimed to provide a less demanding task. Study 2 was challenging, as it required children to assume different linguistic registers; this is a metacognitively demanding task that is difficult for preschool children to achieve (Wagner, Greene-Havas, & Gillespie, 2010). Thus in Study 3, rather than requiring participants to take on the role of someone other than themselves, they were simply asked to imagine speaking to different conversational partners. Prior research indicates that even 4-year-olds vary their speech depending on whether they are talking to someone older or younger than themselves (e.g., Shatz & Gelman, 1973). In the pedagogical condition, pedagogical goals were highlighted by asking participants to teach an alien puppet who knows very little. In the

control condition, participants were asked to talk to a peer, thus highlighting social goals. We predicted that both adults and children would be sensitive to these cues, providing more generics in the pedagogical than the non-pedagogical context. Conversely, we predicted that both adults and children would provide more personal information in the non-pedagogical than the pedagogical context.

## Method

**Participants**—Participants included 33 preschool children (12 girls, 21 boys; range 4.53 - 5.46; mean age 5.00) and 32 college students (15 female, 17 male; range 18.53 - 21.28; mean age 19.34). Three additional children were not included in the final sample: one was unable to complete the task, and two provided only off-task comments. Children were recruited from communities in and around a midwestern U.S. university town; 82% were White. Adults were undergraduates at a large university in the same town and participated for course credit; 87.5% were White.

**Materials**—The same books of pictures were included as in Study 2. However, in order to provide more items, we added in a set of people items (see Table 1). Thus, each book had 12 pictures instead of 8. Additional materials included framed photos of: two “alien” puppets, two young children (one boy, one girl), and two young adults (one male, one female). Each photo included one individual. We were concerned that using puppets could blur the distinction between peers and aliens, and therefore included photos in order to provide a detailed visual contrast between the aliens and the peers.

**Procedure**—Each participant received both a pedagogical and a non-pedagogical context. Participants were randomly assigned to receive either the pedagogical context first or the non-pedagogical context first. Within each context, the researcher first introduced a framed photograph of the character to whom the participant would be speaking. In the pedagogical context, this was an alien puppet named Zorg; in the non-pedagogical context, this was a peer of the same sex and roughly the same age, named either Zack (male peer) or Zoe (female peer). For example, a male 5-year-old saw the photo of the male child, a female undergraduate saw the photo of the female young adult, and so forth.

In the pedagogical condition, children were told that Zorg was from another planet that is very far away and very different from here. The researcher explained that Zorg doesn't know anything about our world, and that Zorg wanted the child to teach him/her about the things in the book. The researcher then explained that Zorg wasn't going to talk right now but just wanted to listen. A comprehension question was asked to ensure that children understood what Zorg wanted (“What does she want you to do?”), and feedback was provided (if correct: “Right, she wants you to teach her”; if incorrect: “Actually, she wants you to teach her. OK?”), followed by re-asking the comprehension question). Then the child was asked to teach Zorg about the things in the book. The researcher turned the book pages, one-by-one, and gave the child an opportunity to talk to Zorg about each picture. If prompts were needed, children were told, “Zorg doesn't know anything about this. Can you help teach her?”, then, “Zorg wants to learn more. Can you say a little more?”, and finally, “Can you say anything else?” On every third page, before turning the page, the researcher gave a mandatory prompt, saying, “Remember, Zorg doesn't know anything about this. Let's turn the page and teach Zorg some more.” The prompts were designed to be neutral with respect to eliciting generic versus specific responses.

In the non-pedagogical condition, children heard the peer described as being from the participant's state, and as “a kid just like you” who is “very friendly and loves to talk to new friends.” The researcher explained that Zack or Zoe wanted them to talk to him [her] about

the things in the book. The researcher then explained that Zack/Zoe wasn't going to talk right now but just wanted to listen. A comprehension question was asked to ensure that children understood what Zack or Zoe wanted ("What does she want you to do?"), and feedback was provided (if correct: "Right, she wants you to talk to her"; if incorrect: "Actually, she wants you to talk to her. OK?"), followed by re-asking the comprehension question). Then the child was asked to talk to Zack/Zoe about the things in the book, with the researcher turning the pages of the book, one-by-one. If prompts were needed, children were told, "Zack/Zoe wants to talk about this. Can you talk with him/her?", then, "Zack/Zoe wants to hear more. Can you say a little more?", and finally, "Can you say anything else?" On every third page, before turning the page, the researcher reminded the child: "Remember, Zack/Zoe wants you to talk about this. Let's turn the page and talk to Zack/Zoe some more." The prompts were designed to be neutral with respect to eliciting generic versus specific responses. The order of blocks (pedagogical vs. non-pedagogical) was counterbalanced across participants, as was the assignment of picture-book to condition.

Children received a 5-minute distractor task between blocks in which they played with Legos. At the end of the entire session, children received a manipulation check, in which they saw pictures of both characters (Zack/Zoe and Zorg), and were asked to point to: (1) the one who did not know anything about our world and wanted the child to teach him/her about the things in the book, and (2) the one who loved to talk to new friends and wanted the child to talk to him/her about the things in the book.

Adults received the same procedure, except that they were asked to imagine that they were talking to the character, and the distractor task involved working on word searches. Also, no comprehension questions or manipulation check questions were included.

**Transcribing and coding**—Transcribing and coding were conducted as in Study 2. Generic sentences included subject-position references to a kind in general. Sample child utterances that were coded as generic include: "So policemen go in the car when there's danger of bad guys"; "Broccoli is a vegetable"; "Elephants live in Africa." Sample child utterances that were coded as non-generic include: "That's a mallard duck"; "And right here is his little feather." Sample child utterances that were coded as personal include: "I ate one [carrot] today"; "And there's a pirate ship at the playground at my grandma and grandpa's"; "And I love them [kitties]"; "My mom is allergic to cats."

Agreement and kappas (with *N*s indicating the number of transcripts that were coded for reliability) are as follows: on-task coding: *N*=57, agreement = 97%, kappas = .86; generic coding: *N*=65, agreement = 90.5%, kappas = .69; generic subject/object coding: *N*=8, agreement = 97%, kappas = .87; personal coding: *N*=61, agreement = 99%, kappas = .91. All of the kappas for this coding are at least "substantial" (.61 to .80), and three of the four are "near-perfect" (.81 and above), according to the guidelines established by Landis and Koch (1977). All disagreements were resolved by discussion.

## Results

**Manipulation check**—We had data on the manipulation check from 29 of the 33 children. (One child did not receive the question due to experimenter error, and three children's responses could not be accessed due to equipment malfunction.) 93% of the children (27/29) answered both manipulation check questions correctly (significantly greater than chance level performance of .25,  $p < .001$  by binomial test). No children were excluded on this basis. However, the manipulation check demonstrates that children were appropriately sensitive to the different instructions in the two conditions.

**Generic responses**—For each participant, we calculated a score separately for each context (pedagogical vs. non-pedagogical), indicating the proportion of on-task utterances that included a generic. Thus, scores could range from 0 to 1. We conducted a 2 (age group: children, adults)  $\times$  2 (context: pedagogical vs. non-pedagogical)  $\times$  2 (block order: pedagogical context first vs. second) ANOVA. Age group and block order were between-subjects variables; context was a within-subjects variable. These data are presented in Figure 3.

As predicted, generics were more frequent in the pedagogical context (.25 of on-task utterances) than in the non-pedagogical context (.16 of on-task utterances),  $F(1,61) = 32.39$ ,  $p < .001$ ,  $\eta^2 = .35$ . However, this main effect interacted with both age group ( $F(1,61) = 22.68$ ,  $p < .001$ ,  $\eta^2 = .27$ ) and block order ( $F(1,61) = 13.12$ ,  $p = .001$ ,  $\eta^2 = .18$ ). We therefore examined the effects of context within each age group and block order separately. These analyses indicate that adults showed higher rates of generics in pedagogical than non-pedagogical contexts, for both block orders,  $ps < .01$ , although the context effect was stronger when the non-pedagogical context appeared first. For children, if we focus only on their responses in the block they received first, there was no difference in the rates of generics between those who received the pedagogical context first vs. those who received the non-pedagogical context first. However, there were different patterns across blocks as a function of block order. When the non-pedagogical context appeared first, children showed the predicted pattern, producing higher rates of generics in the pedagogical than the non-pedagogical context,  $p < .05$ . However, when the pedagogical context appeared first, children showed no change from block 1 to block 2—that is, they remained consistent in their production of generics across blocks.

**Personal responses**—We tallied the proportion of on-task utterances that included a personal reference, separately for each participant and context (see Figure 4). Scores could range from 0 to 1. We conducted a 2 (age group: children, adults)  $\times$  2 (context: pedagogical vs. non-pedagogical)  $\times$  2 (block order: pedagogical context first vs. second) ANOVA. As predicted, pedagogical contexts elicited fewer personal responses than non-pedagogical contexts (.03 and .10 of on-task utterances, respectively),  $F(1,61) = 12.52$ ,  $p = .001$ ,  $\eta^2 = .17$ . However, this effect was carried exclusively by the adults, as revealed in an age group  $\times$  pedagogy interaction,  $F(1,61) = 8.63$ ,  $p = .005$ ,  $\eta^2 = .12$ . It appears that personal responses were consistently high for children, regardless of context, whereas for adults, the pedagogical condition suppressed personal responses. Thus, children and adults produced equivalent numbers of personal responses in the non-pedagogical condition, but in the pedagogical condition, children produced significantly more personal responses than adults,  $p = .012$ . There were no significant effects involving block order.

## Discussion

In Study 3, we extended our study of the Generic Pedagogy Hypothesis to younger children (5-year-olds), using a task that did not require participants to pretend to take on a role of someone other than themselves. Instead, we primed a pedagogical context by asking participants to teach an unknowledgeable alien about things it knew nothing about, and primed a non-pedagogical context by asking participants to speak to a (hypothetical) peer. Adults consistently produced more generic language (e.g., “And *fruits* are good for you”) in the pedagogical context than the non-pedagogical context, mirroring the text analyses of Study 1 and the conversational data from Study 2. In contrast to adults, 5-year-old children produced a relatively high proportion of generics in both wording conditions, leading them to produce more generics than adults in the non-pedagogical context.

However, there were also strong order effects. When we examined the data separately by block order, we found that children as well as adults showed the predicted pedagogy effect when the non-pedagogical condition came first. In contrast, the pedagogy effect was weaker (for adults) or non-existent (for children) when the pedagogical condition came first. Apparently, once a pedagogical context has been introduced, it is difficult for speakers to relinquish it. This was precisely the same order effect found by Hollander, Gelman, and Raman (2008), in which children persisted in a generic interpretation if the generic block was presented first. The replication of this order effect, with a different sample of participants and different task, suggests that generic interpretations may have a persistence that continues even when the initial language cue has been removed. In the current study, adults seem to have been better able to suppress this effect than children.

As in Study 2, pedagogical contexts reduced the amount of personal information that adults expressed. Interestingly, however, children did not show this suppression effect, and in fact produced more personal information in pedagogical contexts than did adults. Thus, there appears to be developmental change in the meaning of pedagogical contexts. For children as young as 5 years of age, pedagogical contexts elicit generics; for 6-year-olds and adults, they not only elicit generics but also suppress personal information.

Although generally children showed sensitivity to the pedagogical/non-pedagogical contrast in this study, it is also important to consider that procedural aspects of the task may have reduced their sensitivity. For example, perhaps children would have performed better if they had had an opportunity to interact with real protagonists, rather than talking to framed photos of the protagonists. In light of the challenging task, it is all the more notable that young children adjusted their speech according to the pedagogical status of the individual in the photo. However, it would also be interesting in future research to examine children's language modifications in conversations with actual protagonists.

## General Discussion

We started with two questions: what kind of information is conveyed in pedagogical contexts, and are children sensitive to such patterns? Although pedagogical contexts are widely varying and unconstrained, and undoubtedly contain a wealth of information of all sorts, we found consistent evidence that pedagogical contexts are distinctive in conveying generic information: in texts geared toward children, and in parental speech to children. Hence, there is convergence across written and spoken language in terms of how generics link to pedagogy.

Both adults and children are sensitive to this aspect of the language input, both when taking on a teacher role (Study 2) and when talking to those less knowledgeable than themselves (Study 3). The findings with adults suggest that children may be especially exposed to generic input, to the extent that parents view their role as a pedagogical one (see also Gelman et al., 1998; Gelman, Taylor, & Nguyen, 2004). The findings with children suggest that children are sensitive to cues in the input. Altogether, these results support Csibra and Gergely's (2009) natural pedagogy theory, and contradict the alternative hypothesis that adult input would be focused primarily on concrete instances and the "here-and-now". These patterns are established in children 5 and 7 years of age. In the future, it would be interesting to discover if younger children also hold these same expectations.

In addition to demonstrating that pedagogical contexts elicit more talk about generic information, we also found that pedagogical contexts elicit less talk about personal information. These findings appear conceptually inverse to one another: generic information focuses outward on properties that generalize to the broader category and have conventional

relevance to a broad range of speakers, whereas personal information focuses inward on properties that are specific to an individual and have limited relevance to the speaker and close friends or family. Both findings hold together under the Generic Pedagogy Hypothesis.

A striking result from Study 3 was that block order led to different patterns of results: when a pedagogical context was presented first, speakers produced many generics and maintained that high rate of generics even into the next block. Five-year-old children had more trouble than adults inhibiting the frequency of generics in the non-pedagogical block, and thus less ability to switch. This pattern is consistent with research demonstrating that younger children have less developed inhibitory control than older children (Kochanska, Murray, Jacques, Koenig, & Vandegest, 1996). In contrast, when the non-pedagogical context was presented first, children and adults started out with fewer generics, which increased when they got to the pedagogical block. These findings mirror those of Hollander et al. (2008), who found that children had no difficulty switching from a specific interpretation to a generic interpretation, but did have difficulty with the reverse switch order. This finding suggests that, in addition to any inhibitory control deficits in children, generic contexts may be more conceptually persistent for both children and adults. It may be more difficult to “break away” from a generic than a specific context.

One implication of the finding that adults produced more generic language in pedagogical versus non-pedagogical contexts, is that the relatively high rate of generics found previously in parental speech to children (e.g., Gelman, Coley, Rosengren, Hartman, & Pappas, 1998) may reflect parents implicitly adopting a pedagogical role. The adults in these studies were not parents themselves, so it remains an open question whether parents and non-parent adults employ similar speech patterns. Although the classic pedagogical context is that of a parent instructing a child, there may be no important differences between parent-child pedagogical contexts and other pedagogical contexts, such as a non-parent adult teaching a child, or even a non-parent adult teaching another adult (e.g., see Snow, 1972, Experiment 3, for similar patterns across the two groups). It would be interesting to see the extent to which the patterns revealed in the present studies are part of a more general assumption of adults (both parents and non-parents) across different cultural groups and settings, versus the extent to which it reflects culture-specific expectations concerning the purpose of parent-child interactions, and the extent to which the parental role is a pedagogical one. Although natural pedagogy has been argued to be universal (Csibra & Gergely, 2009), there is also cross-cultural variation in the explicitness and frequency of overt pedagogical practices (Henrich, 2004; Whiten, Horner, & Marshall-Pescini, 2003), with more direct and formal teaching in Western societies than traditional societies. Thus, it would be interesting to examine when and how children’s sensitivity to pedagogy emerges in cultures for which adult pedagogical practices vary.

In the present studies, the pedagogical contexts were designed to be “neutral”, in that the instructions provided no hint regarding the kind of language that should be provided. The choice of how to talk like a teacher (Study 2) or present information to an alien (Study 3) was left up to the participant. Moreover, the control context of talking to an imagined peer or friend was identical to the pedagogical contexts in every respect except for the relevant dimension of pedagogy. For example, the picture cues that prompted participants’ speech were the same across conditions. In future research, it would be interesting to discover the extent to which speakers might vary their language as a function of contextual cues. For example, if speakers were confronted with a specific problem that needed to be fixed (e.g., a faulty hammer with a loose handle) or an atypical instance (e.g., a cat without a tail), would those in a pedagogical context continue to provide more generic language than those in a social context (e.g., “Hammers should have tight handles”; “Usually cats have tails”), or would the language shift away from a generic default? This question awaits further research.

As we consider the broader implications of these findings, we reflect on what the term “pedagogy” denotes. Csibra and Gergely (2009) talk about pedagogy in a highly inclusive way, to include any child-directed communication, including even those subtle cues such as making eye contact with the child. In contrast, we defined pedagogy more stringently: only as contexts in which the speaker has the goal of imparting information to others. Furthermore, we explicitly examined linguistic contexts, whereas prior studies of pedagogy have often examined non-linguistic contexts. We suspect there may be a continuum: the most explicitly pedagogical context involves direct instruction to a conversational partner who has relatively little information (which was our focus in the present studies). However, perhaps speech that is explicitly child-directed is more pedagogical than speech that does not have the child as focus (e.g., conversation with an adult), even without an explicitly pedagogical goal. It would be interesting to discover if similar differences would be found in a contrast between speech that is child-directed but not explicitly pedagogical (in our sense) and speech that is non-child-directed. It would also be interesting to discover the extent to which children interpret information as generic, across various types of contexts (child-directed vs. not; linguistic vs. not).

More generally, the discussion above raises the question of whether the patterns we have obtained here are reflective of natural pedagogy in the sense proposed by Csibra and Gergely, or whether they reflect children’s experiences with formal educational settings (which are a specialized kind of pedagogical context). That is, we cannot determine from the current evidence whether children naturally possess a broad expectation that pedagogy corresponds to genericity, or instead if children have detected patterns in the teaching styles that they have observed in their own schooling and formed expectations on the basis of those experiences. If the latter is the case, one puzzle is how children discerned a pattern of generic input when their own classroom experiences are likely to be quite varied. Children experience ample instruction that is non-generic (the day’s weather; stories from history; state capitals; names of planets; how to plant a pumpkin seed; where to place one’s lunchbox). It would thus be striking if children privilege generic language as particularly relevant. In any case, an important question for future research is the extent to which the patterns obtained in this study would or would not generalize to unschooled populations. Either result would be interesting, though the implications for theories of natural pedagogy would differ.

Finally, it is useful to consider the broader question of why there is a link between pedagogy and genericity. We suggest that the information that will be most useful to the child learner is that which is general, conventional, and extends over time and contexts: Apples are edible; mushrooms can be poisonous; snakes are dangerous. This sort of information has great adaptive significance. Although this same information can be implied by means of non-generic language (e.g., This apple is edible; this mushroom is poisonous; this snake is dangerous), only the generic explicitly conveys that the information extends to future situations. Furthermore, pedagogical communication might be best geared toward information that one cannot simply discover on one’s own. For example, there may be no need for you to tell me that this particular dog wags its tail when it is happy, because I can figure that out myself. However, it is more difficult for me to infer that dogs (in general) wag their tails when they are happy, because the scope of this property requires more experience. It is precisely this kind of information that is best learned by interactions with others – namely, in pedagogical contexts. We do not mean to imply that only generic information is useful. Specific information is also extremely useful. For example, knowing that the neighbor’s dog is vicious, or that this peach is rotten are useful and potentially life-saving pieces of information. Undoubtedly there are contexts in which a teacher would focus on specific information. However, all things being equal, generic information will be more broadly applicable (by definition) and thus most effective.



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## Appendix

### Appendix:

Books included in Study 1

### Appendix

Books included in Study 1

| Book Title   | Author   | Publication Year |
|--|--|------------------|
| <b>Narrative Books</b>   |  |                  |
| A humpback whale tale  | Justin Spelvin                                 | 2006             |
| A very curious bear  | Tony Mitton                                    | 2009             |
| A visitor for bear   | Bonny Becker                                   | 2008             |
| Astro bunnies  | Christine Loomis                               | 2001             |
| Can't sleep  | Chris Raschka                                  | 1995             |
| Clifford and the grouchy neighbors                                 | Norman Bridwell                                | 1980             |
| Clifford takes a trip  | Norman Bridwell                                | 2006             |
| Do like a duck does  | Judy Hindley                                   | 2002             |
| Duck in the truck  | Jez Alborough                                  | 2000             |
| Duck! Rabbit!  | Amy Krouse Rosenthal and Tom Lichtenheld       | 2009             |
| Dumpy and the big storm  | Julie Andrews Edwards and Emma Walton Hamilton | 2002             |
| Dumpy and the firefighters   | Julie Andrews Edwards and Emma Walton Hamilton | 2005             |
| Grizzly dad  | Joanna Harrison                                | 2008             |
| Help me, Mr. Mutt!   | Janet Stevens and Susan Stevens Crummel        | 2008             |
| If you give a moose a muffin                                       | Laura Joffe Numeroff                           | 1991             |
| Library lion   | Michelle Knudsen                               | 2006             |
| Little elephant's clever trick                                     | Jillian Harker                                 | 2006             |
| Lord of the forest   | Caroline Pitcher                               | 2006             |
| Me and my dad!   | Alison Ritchie                                 | 2007             |
| My truck is stuck!   | Kevin Lewis and Daniel Kirk                    | 2002             |
| Nobody laughs at a lion  | Paul Bright                                    | 2005             |
| Rainbow fish and the big blue whale                                | Marcus Pfister                                 | 1998             |
| Rainbow fish and the sea monster's cave                            | Marcus Pfister                                 | 2001             |
| The little engine that could                                       | Watty Piper                                    | 1978             |
| The little mouse, the red ripe strawberry, and the big hungry bear | Don and Audrey Wood                            | 1998             |
| The little red sled  | Tisha Hamilton                                 | 2005             |

| <b>Book Title</b>                     | <b>Author</b>                 | <b>Publication Year</b> |
|---------------------------------------|-------------------------------|-------------------------|
| <b>Narrative Books</b>                |                               |                         |
| The runaway bunny                     | Margaret Wise Brown           | 1991                    |
| Thomas and the castle                 | Rev. W. Awdry                 | 2004                    |
| Where does the moon go?               | Sidney Rosen                  | 1992                    |
| Where's the dragon?                   | Jason Hook                    | 2004                    |
| <b>Combination Books</b>              |                               |                         |
| A kangaroo joey                       | Joan Hewett                   | 2002                    |
| Brilliant bees                        | Linda Glaser                  | 2003                    |
| Chameleon, chameleon                  | Joy Cowley                    | 2005                    |
| Chirping crickets                     | Melvin Berger                 | 1998                    |
| Dandelions: Stars in the grass        | Mia Posada                    | 2000                    |
| Diego's egg quest                     | Cynthia Stierle               | 2007                    |
| Dinosaur babies                       | Kathleen Weider Zoefield      | 1999                    |
| Me and my place in space              | Joan Sweeny                   | 1998                    |
| My freight train                      | Michael Rex                   | 2002                    |
| Road builders                         | B.G. Hennessy                 | 1996                    |
| Robots slither                        | Ryan Ann Hunter               | 2004                    |
| Sea horse: the shyest fish in the sea | Chris Butterworth             | 2006                    |
| Space vehicles                        | Anne Rockwell and David Brian | 1994                    |
| Super submarines                      | Tony Mitten and Ant Parker    | 2006                    |
| The big dipper                        | Franklyn Branley              | 2001                    |
| The noisy airplane ride               | Mike Downs                    | 2004                    |
| This car                              | Paul Collicut                 | 2002                    |
| Tip tip dig dig                       | Emma Garcia                   | 2007                    |
| Trucks roll                           | George Ella Lyon              | 2007                    |
| Turtle crossing                       | Rick Chrustowski              | 2006                    |
| Wheels at work in the city            | Don Kilby                     | 2004                    |
| <b>Informational Books</b>            |                               |                         |
| Birds                                 | Sarah Matthews                | 1998                    |
| Busy, buzzy bees                      | Alan Fowler                   | 1996                    |
| Can you catch a falling star          | Sidney Rosen                  | 1995                    |
| Carrots                               | Inez Snyder                   | 2004                    |
| Cats                                  | Sarah Matthews                | 1998                    |
| Dinosaur bones                        | Bob Barner                    | 2001                    |
| Earthquakes                           | Ellen J. Prager               | 2007                    |
| Emergency vehicles                    | Seymour Simon                 | 2006                    |
| Fire engines                          | E.S. Budd                     | 1999                    |
| From pumpkin to seed                  | Jan Kottke                    | 2000                    |
| Machines at work: fire trucks         | Caroline Bingham              | 2000                    |

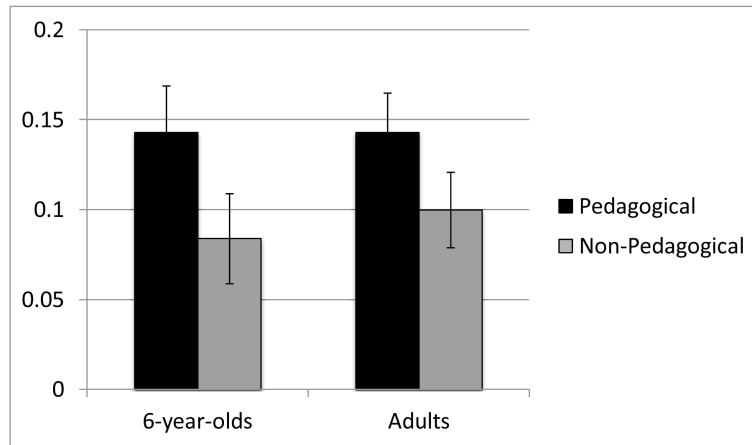
| Book Title                       | Author                  | Publication Year |
|----------------------------------|-------------------------|------------------|
| <b>Narrative Books</b>           |                         |                  |
| Monkeys are a lot like us        | Allan Fowler            | 2001             |
| Motorcycles                      | Dee Ready               | 1997             |
| Owls                             | Adele D. Richardson     | 2002             |
| A pinky is a baby mouse          | Pam Munoz Ryan          | 1997             |
| Planes                           | Fiona Patchett          | 2003             |
| Rocks                            | Alice Flanagan          | 2005             |
| Surprising sharks                | Nicola Davies           | 2005             |
| The ladybird                     | Sarah Matthews          | 2009             |
| Venus                            | Amy Margaret            | 2000             |
| Where do babies come from        | Angela Royston          | 2001             |
| Why did the dinosaurs disappear? | Melvin and Gilda Berger | 1995             |
| Wiggling worms at work           | Wendy Pfeffer           | 2005             |
| Wild ones: zebras                | Jill Anderson           | 2005             |

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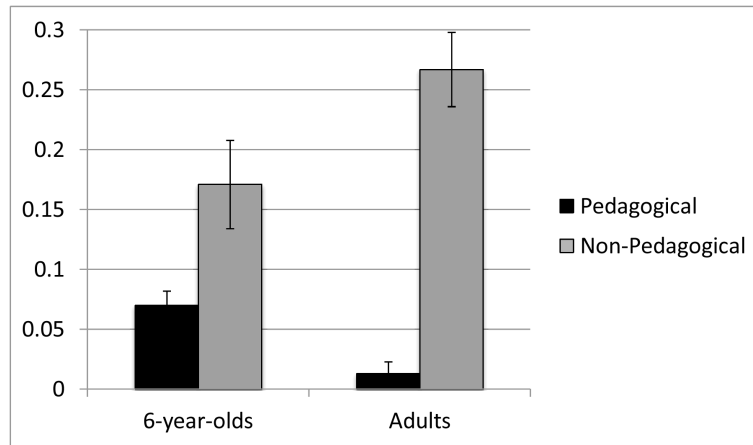
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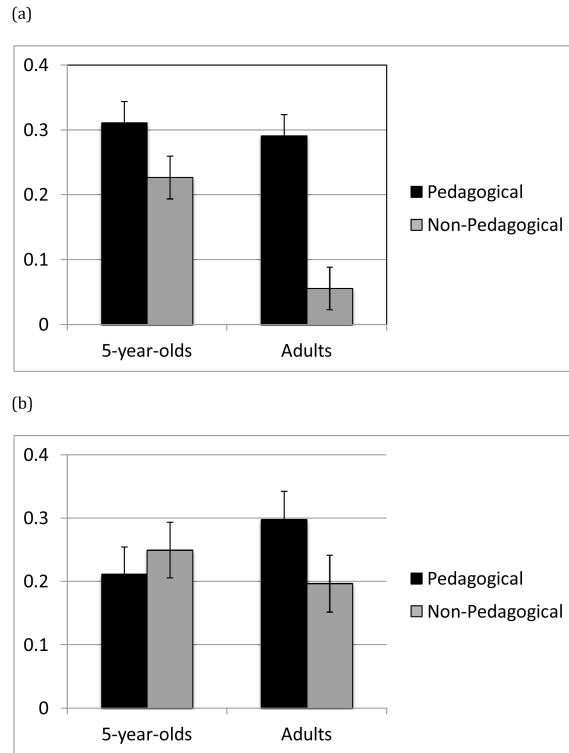
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**Figure 1.**  
Study 2: Mean proportion of on-task utterances that are generic, as a function of age group and pedagogical context.

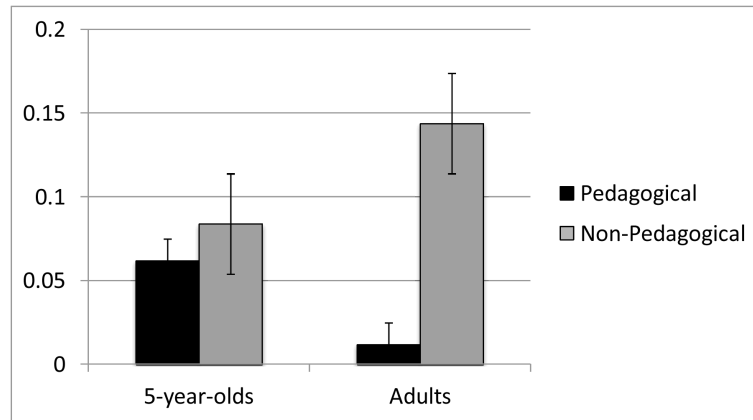


**Figure 2.** Study 2: Mean proportion of on-task utterances relating personal information, as a function of age group and pedagogical context.



**Figure 3.** Study 3: Mean proportion of coded utterances that are generic, as a function of age group, pedagogical context, and block order: (a) non-pedagogical block first, (b) pedagogical block first.





**Figure 4.** Study 3: Mean proportion of coded utterances containing personal information, as a function of age group and pedagogical context.

**Table 1**

Picture Book Items, Studies 2 (animals and food only) and 3 (animals, food, and people)

|                | <b>BOOK A</b>   | <b>BOOK B</b> |
|----------------|-----------------|---------------|
| <b>ANIMALS</b> |                 |               |
|                | Butterfly       | Dog           |
|                | Cat             | Duck          |
|                | Elephant        | Ladybug       |
|                | Penguin         | Lion          |
| <b>FOOD</b>    |                 |               |
|                | Banana          | Carrot        |
|                | Broccoli        | Cheese        |
|                | Cake            | Ice cream     |
|                | Pretzel         | Orange        |
| <b>PEOPLE</b>  |                 |               |
|                | Ballerina       | Clown         |
|                | Baseball player | Farmer        |
|                | Pirate          | Fireman       |
|                | Police officer  | Witch         |