CHILD DEVELOPMENT

# Learning to learn from stories: Children's developing sensitivity to the causal structure of fictional worlds

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# Learning to Learn from Stories:

# Children's Developing Sensitivity to the Causal Structure of Fictional Worlds



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**Abstract**

Fiction presents a unique challenge to the developing child, in that children must learn when to generalize information from stories to the real world. This study examines how children acquire causal knowledge from storybooks, and whether children are sensitive to how closely the fictional world resembles reality. Preschoolers listened to stories in which a novel causal relationship was embedded within realistic or fantastical contexts. Results indicate that by at least 3 years of age, children are sensitive to the underlying causal structure of the story: Children are more likely to generalize content if the fictional world is similar to reality. Additionally, children become better able at discriminating between realistic and fantastical story contexts between 3 and 5 years of age.

KEY WORDS: cognitive development; causal inference; learning; fiction; generalization

# Learning to learn from stories: Children's developing sensitivity to the causal structure of fictional worlds

Discovering causal structure in the world is a major inductive problem faced by young learners. Over the course of development, new information is continuously integrated with children's existing representations of causal relationships (see Gopnik & Wellman, 2012). Here we explore how children acquire causal knowledge from storybooks. Fictional stories provide important opportunities for children to learn information that cannot be experienced directly – particularly with regard to unobservable phenomena. There is a growing literature examining the development of preschoolers' ability to comprehend and interpret fictional narratives (e.g., Kendeou, Bohn-Gettler, White, & van den Broek, 2008; Trabasso & Wiley, 2005; Skolnick-Weisberg, Goodstein, Sobel, & Bloom, in press), as well as the various factors that affect learning and generalization from stories (e.g., Chiong & DeLoache, 2012; Fazio & Marsh, 2008; Ganea, Canfield, Ghafari, Chou, in press; Ganea, Pickard, & DeLoache, 2008; Ganea, Ma, & DeLoache, 2011; Richert & Smith, 2011; Schulz, Bonawitz, & Griffiths, 2007; Simcock & Dooley, 2007; Walker, Walker, & Ganea, 2012). To date, much of the work examining young children's ability to learn novel content about the real world from storybooks has focused on transferring information from realistic representations, rather than from representations embedded in unrealistic fictions. However, children's fiction varies considerably – many stories are essentially realistic depictions of the world, while others are highly unrealistic and fantastical. As a result, learning from stories represents a unique challenge to the developing child.

It is widely known that the transfer of knowledge is generally facilitated by similarity between the context in which the information is learned, and the context in which it is applied

(e.g., Catranbone & Holyoak, 1989; Spencer & Weisberg, 1986). Despite this, many of the learning contexts that are created for young children in storybooks and educational media act to *reduce* perceived similarity by embedding information in a fictional world that interweaves fantasy and reality (Woolley & Cox, 2007). Therefore, like adults, children often encounter the "reader's dilemma": the need to compartmentalize story content to insulate real world knowledge from false information, and the simultaneous need to incorporate story content due to its potential application to the real world (Gerrig & Prentice, 1991; Potts, St. John, & Kirson, 1989). How does a preschooler correctly conclude that caterpillars turn into butterflies when she encounters those events in one story, but not conclude that frogs turn into princes when she reads another story? Examining the mechanisms underlying children's selective learning from stories can help us understand how young children acquire causal knowledge about the world from this important and ubiquitous source.

Research has demonstrated that preschoolers differentiate between realistic and fantastical stories, and that this ability improves between 3 and 5 years of age. For example, preschoolers are more likely to say that realistic story events "could happen in real life" than fantastical story events (Wooley & Cox, 2007), indicating that story context matters in reality judgments. In addition, there is substantial evidence that the ability to distinguish reality from fantasy develops significantly during the preschool years (e.g., Flavell, Flavell, & Green, 1989; Morison & Gardner, 1978; Taylor, 1999; Woolley & Cox, 2007; Woolley & Van Reet, 2006), as well as the ability to distinguish possible from impossible events (e.g., Cook & Sobel, 2011; Shtulman, 2009; Shtulman & Carey, 2007).

Previous work also indicates that children attend to the nature of the representation of story content and the similarity between that content and the real world when they acquire new

knowledge from storybooks (e.g., Ganea et al., in press; Richert, Shawber, Hoffman, & Taylor, 2009; Richert & Smith, 2011). In particular, the higher the level of similarity between the picture and the real-world object, the easier it is for children to transfer between the two. For example, preschool-aged children are less likely to transfer factual information from storybooks including anthropomorphic content (representations that attribute human characteristics and mental states to animal characters), compared to more realistic stories (Ganea et al., 2011; Ganea et al., in press). The representation of story content has been shown to influence children's ability to draw analogies between fictional and real world events (Richert, Shawber, Hoffman, & Taylor, 2009; Richert & Smith, 2011). For example, in a series of experiments, Richert et al. (2009) presented 3½- to 5-year-old children with analogical problems in the context of a story which involved either real or fantasy characters. In general, children were more likely to transfer solutions to novel problems from real sources than from fantasy sources. When asked to generalize these same solutions to structurally similar problems in a different domain (games involving the manipulation of objects), children were again more likely to transfer the solution from the real source.

One explanation for these findings may be that children are sensitive to the *proximity* of the story world to reality, or the similarity of the causal structure of the fictional world to the real world, when deciding whether to generalize. This hypothesis is based upon Gerrig's (1993) proposal that fictional worlds vary in their "distance" from reality. In line with this idea, research with adults indicates that the perceived proximity of the fictional world to reality influences participants' decisions to use real world knowledge in making inferences about fictional environments (Skolnick & Goodstein, 2009). For example, when presented with stories that varied in similarity to reality, adults were more likely to import true facts from the real world

to the fictional worlds that were similar in underlying causal structure (see also Gerrig, 1993). It is currently unknown whether and when children display this sensitivity to the distance that a story world lies from reality, and to what extent (if any) this sensitivity to world proximity would affect children's learning and generalization between worlds, and in particular, from fictional representations to reality.

In the current research, we explore how 3- to 5-year-olds learn causal information from fictional stories, and examine whether this learning is influenced by the developing ability to consider the proximity of the causal structure of the story world to reality. To do so, children were introduced to a novel causal property embedded in one of two versions of a storybook. One version of the story (the *close world*) was realistic, and the other version of the story (the *far world*) was fantastical. We then assessed whether children's willingness to generalize causal information from the story to the real world varied according to the proximity of the fictional world to reality. Given children's developing ability to interpret the reality status of storybook events over the preschool years (e.g., Woolley & Cox, 2007), we predict that as children get older they will be more likely to transfer the novel causal information from a story context that resembles the real world context.



## Method

### Participants

One hundred and eight preschoolers participated in the study, including 36 3-year-olds ($M$ = 43.7, $SD$ = 3.9, range = 37.2 – 48.0, 19 girls), 36 4-year-olds ($M$ = 54.9 months, $SD$ = 3.2, range = 49.8 – 59.9, 20 girls), and 36 5-year-olds ($M$ = 66.8 months, $SD$ = 2.8, range = 61.6 – 71.8, 17 girls). Approximately equal numbers of males and females were included in each condition. Ten additional children (eight 3-year-olds and two 4-year-olds) were tested, but

excluded for failure on memory questions or failure to complete the training for the sorting task. Most children were from White, middle-class backgrounds, however a range of ethnicities was represented. Children were recruited from local preschools and museums.

**Materials and Procedure**

Two 13-page illustrated storybooks were constructed. Both stories depicted human protagonists going on a family camping trip. One version of the story (the *close world*) was realistic, including no explicit violations of reality (i.e., all events could have occurred in the real world), and the other version of the story (the *far world*) was fantastical, including several major violations of reality. Both stories shared the same structure, the same order of events, and the same number and type of events, but varied in the degree of proximity (i.e., similarity) to the real world (see Table 1 for a list of all major story events and Figure 1 for sample pages).

Each story event was matched across both versions of the story. For example, in both the *close* and *far world* stories, the protagonist encounters a tree. However, in the *close world* story, the protagonist climbs the tree (a realistic event) and in the *far world* story, the protagonist has a conversation with the tree (a fantastical event). In both stories, a novel causal relationship was embedded within the context of the other events – smelling a 'Popple Flower' causes the protagonist to get the hiccups (see Figure 1). This was identical across stories.

**Storybook Reading.** Half of the children in each age group were randomly assigned to the *close world* or *far world* story conditions. Children were tested individually. After a brief warm-up, the experimenter read one of two books to the child, interacting naturally, and pointing to illustrations. The experimenter introduced the story saying, "This is a made up story about a boy who goes on a camping trip," and then began reading. The experimenter did not engage with the child in conversation about the content. If a child occasionally commented on story

events (e.g., "My dad took me camping!") during the interaction, the experimenter would acknowledge the comment and continue reading.

**Memory Assessment.** Immediately afterwards, children were asked two memory questions to ensure their attention and recall of story events. One question assessed recall of the novel causal relationship (*"What happened to the boy in the story when he smelled the Popple Flower?"*). The second question was intended to assess recall for the contextual story events (*"What kinds of things did the boy do on his camping trip in the story?"*). If children recalled fewer than three events (e.g. "they went camping") or facts about the story (e.g., "there was a tree"), the experimenter asked, "Did anything else happen?" Six children who failed to respond to the experimenter or provided incorrect (or incomplete) answers to both memory questions were excluded.

**Sorting task.** A sorting task assessed whether children were sensitive to the distinction between the stories as either realistic (in the *close world* condition) or fantastical (in the *far world* condition). In this task, children were asked to sort picture cards depicting each of the story events into "real" or "pretend" piles.

To orient the child to the testing procedures, participants were trained to sort picture cards as either "real" or "pretend." In the training task, 8 unique cards were presented, one at a time, and children were instructed to sort the cards into two piles: one pile for things that "can really happen" and one pile for things that "cannot really happen, and are just pretend." The 8 training cards depicted a total of 4 matched pairs of events (one realistic and one fantastic event) that were unrelated to the story. For example, children were asked to sort one card depicting a boy eating spaghetti (realistic) and a second card depicting a boy eating lightning (fantastic). Other training pairs included: a cat 'meowing' and a cat talking, a boy building a wall and a boy

walking through a wall, and money falling from a pocket and money falling from a tree. Feedback was provided if a training card was sorted incorrectly. Training was discontinued after children successfully sorted 4 cards in a row, without feedback. Four children who were unable to successfully sort at least 4 consecutive training cards were excluded.

Immediately following the training, children were asked to continue sorting with six test cards. Two sets of six story event cards were constructed that depicted each of the story events (see Table 1 for a list), including a card depicting the target causal relationship. One set was constructed for children in the *close world* condition and the other set was constructed for children in the *far world* condition. One of the six cards in each set was an identical depiction of the target causal relationship (i.e., a boy smelling a 'Popple Flower' and getting the hiccups). As in the training, children were instructed to sort each story event card into the "real" pile or the "pretend" pile. However, unlike in the training trials, no feedback was provided. Children were given a score of 1 for each event sorted to the "real" pile and a score of 0 for each event sorted to the "pretend" pile.

Pilot data collected from 14 new preschool-aged children (mean age = 51.2, *SD* = 6.9, 7 girls) indicated that 85.7% of children found the novel causal property to be plausible when it was introduced out of the context of the story. This was assessed using the same sorting task procedure described above. Children were trained to sort picture cards into "real" or "pretend" piles using the 8 training cards, and were then asked to sort a single test card depicting the target causal property. Results indicated that 12/14 children (*M* = .86, *SD* = .36) sorted the test card to "real" pile, indicating that they believed the novel causal property was highly likely at baseline. This finding is consistent with research indicating that preschool-aged children believe that

within-domain cause and effect relations (i.e., a biological cause producing a biological effect) are highly probable (see Schulz, Bonawitz, & Griffiths, 2007).

**Generalization task.** The generalization task assessed children's willingness to generalize the novel causal relationship from the story to a real world situation. Children were presented with the target causal property that appeared in the story (*smelling 'Popple Flowers' causes hiccups*) in a real world context, and asked to judge whether this causal relationship would hold in the real world. The experimenter showed the child a 5 x 7 color photograph of a real flower that was similar in shape and color to the illustrated 'Popple Flower' in the stories. Holding up this photograph, the experimenter said, "On my way here today, I saw these. I didn't know what kind of flowers they were, but I smelled them. What do you think happened to me, here in the real world?" To control for a possible "yes" bias, the generalization question was presented in a forced choice format: "Do you think that I got the hiccups or that I did not get the hiccups?" Additionally, the order of presentation of possible outcomes (i.e., hiccups; no hiccups) was counterbalanced. Children received a score of "0" if they responded that the experimenter did not get the hiccups (no generalization of the causal relationship) and a score of "1" if they responded that the experimenter did get the hiccups (generalization of the causal relationship).

The order of the sorting task and generalization task was counterbalanced across participants. Children's responses were recorded by a second researcher during the testing session, and all sessions were video recorded for independent coding by a third researcher who was naïve to the hypotheses of the experiment. Interrater reliability was high; the two coders agreed on 99% of the children's responses to the test questions. The few minor discrepancies were resolved by a third party.

**Video Coding.** To ensure that there were no differences in the communicative styles of the experimenters in the *close* and *far world* conditions, we conducted a video analysis of the picture-book reading sessions. A total of 14 adult participants (mean age = 20.1, *SD* = 2.8, 10 girls) who were ignorant to the hypothesis of the study observed a random sample of 40 videos recording of the picture-book reading. Each video included a 30 second clip of the experimenter as they read the pages that introduced the target causal property to the child. Adult participants were asked to judge each clip as being taken from a realistic or fantastical story. Because the content of these clips was identical across conditions, participants based their judgments on the communication style of the reader (i.e., tone of voice, gestures, facial expressions, etc.). Results indicate that judgments did not differ significantly ($M$ = 20.75 [of 40], $SD$ = 3.32), $t(15) = .91$, $p = .38$). Therefore, any differences found between conditions cannot be explained by the communication style of the experimenters.

## Results

Most children who were included in analyses answered both (2 out of 2) memory questions correctly (97% of 3-year-olds, 97% of 4-year-olds, and 100% of 5-year-olds). To assess differences in children's recall between conditions, a one-way ANOVA was conducted with condition as the independent variable and recall (out of 2) as the dependent variable. Children in both the *close world* and *far world* story conditions recalled the content of the story equally, $F(1, 106) = 1.86$, $p = .18$ ($d = .26$), indicating that children paid equal attention to the story content in both conditions.

Additionally, analysis of sorting judgments indicates that children in both conditions were sensitive to the presence of fantastical or realistic content in the story that they heard. There were a total of five contextual story events (excluding the target causal relationship), and

children received a score from 0 (sorted all events to the "pretend" pile) to 5 (sorted all events to the "real" pile), which served as the dependent variable. Results of *t*-tests indicate that children in the *close world* condition sorted the majority of contextual story events to the "real pile" ($M$ = 4.33, $SD$ = 1.06, $p < .001$), while children in the *far world* condition did not ($M$ = .57, $SD$ = .92, $p < .001$). When asked to sort the single story event card depicting the target causal relationship, children in the *close world* condition were more likely to sort this individual event in the "real pile" ($M$ = .67, $SD$ = .49), than were children in the *far world* condition ($M$ = .27, $SD$ = .45), $\chi^2$ (108, 1) = 9.69, $p < .01$ ($d$ = .42). Thus, although this story event was identical in both conditions, children categorized it differently, suggesting an effect of condition on children's assessment of information presented in the story.

Next we examined differences in children's categorical (yes/no) responses on the generalization task for each condition to assess whether condition predicted children's generalization of the target causal relationship from the story to the real world. We hypothesized that the proximity of the story world to reality would influence children's inferences regarding the target causal property. In particular, we predicted that children in the *close world* condition would be more likely to generalize the target causal relationship to the real world than children in the *far world* condition.

In line with our prediction, loglinear analysis demonstrated an effect of condition on generalization, $\chi^2$ (108, 1) = 27.39, $p < .001$ ($d$ = 1.16), indicating that children differentiated between *close world* and *far world* stories when selectively generalizing novel causal information from the story to the real world. Results of the generalization task appear in Figure 2. To further explore this difference, two-tailed binomial tests revealed that children in the *close world* condition generalized the target causal information to the real world scenario more often

than expected by chance (39 out of 54 children, $M = .72$, $SD = .44$) (binomial, $p < .01$). There was no significant difference between age groups, $\chi^2$ (54, 2) = 0.45, $p = .80$ ($d = .18$), indicating that preschoolers tend to generalize novel causal information learned from realistic stories.

Children in the *far world* condition made the opposite inference, with the majority of children choosing *not* to generalize the target causal information to the real world scenario (13 out of 54 children, $M = .24$, $SD = .43$) (binomial, $p < .001$). These results indicate that the proximity of the story world to the real world influences children's generalization of novel causal information from the story to the real world scenario.

While 3-, 4-, and 5-year-olds generalized more often from the *close world* story than from the *far world* story, (3-year-olds: *close world,* $M = .76$, *far world,* $M = .39$) $\chi^2$ [36, 1] = 5.04, $p < .05$ ($d = .81$); (4-year-olds: *close world,* $M = .74$, *far world,* $M = .28$) $\chi^2$ [36, 1] = 7.80, $p < .01$ ($d = 1.05$); and (5-year-olds: *close world,* $M = .67$, *far world,* $M = .06$) $\chi^2$ [36, 1] = 14.57, $p < .001$ ($d = 1.65$), respectively), results of a logistic regression also indicate a developmental change: children's willingness to generalize novel causal information from the *far world* decreased with age, $\chi^2$ (54, 2) = 5.67, $p = .059$ (marginal), with 3-year-olds more likely to generalize the target causal relationship (39%) than 4-year-olds (28%) and 5-year-olds (6%). There was a significant difference between 3- and 5-year-olds' willingness to generalize from the *far world*, $\chi^2$ (36, 1) = 5.79, $p < .02$ ($d = .88$). These results indicate that preschool-aged children become increasingly sensitive to proximity when generalizing novel causal information.

Finally, in order to assess the validity of our measures, we examined the relationship between children's choice to sort the target causal event to the "real pile" in the sorting task and their choice to generalize this causal relation to the real world in the generalization task. There

was a significant relationship between children's choice to sort the target causal property to the "real pile" and their choice to generalize to the real world, $\Phi$ ($N$ = 108) = .57, $p$ < .001.

Importantly, there were no significant differences in generalization due to the order of presentation of the sorting and generalization tasks. Combining ages and conditions, those children who received the sorting task first performed no differently on the generalization task ($M$ = .41, $SD$ = .50) than children who received the sorting task second ($M$ = .51, $SD$ = .51), $\chi^2$ (108, 1) = 1.23, $p$ = .27 ($d$ = .19). This was also true for each condition (*close world*: $p$ = .39, $d$ = .24; *far world*: $p$ = 1.0, $d$ = .04).

## Discussion

In the current research, we examined children's generalization of novel causal information from stories that varied in their similarity to the real world. Our findings provide evidence that preschool-aged children are sensitive to the underlying proximity of the fictional world to reality when selectively learning and applying novel causal information from stories. While children in both conditions remembered the target causal relationship, whether the story was realistic or fantastic influenced their subsequent interpretation and generalization of this novel information to a real situation. These results are congruent with previous findings in demonstrating that children begin to differentiate between realistic and fantastic stories from a very early age (by at least 3 years), and that this sensitivity undergoes a process of developmental change, increasing significantly between 3 and 5 years.

Children's developing sensitivity to the proximity between fictional worlds and reality may be mediated by their increasing knowledge about the nature of fantastical representations. In line with this idea, previous research has shown that children who score higher on fantasy orientation scales (i.e., children who have more experience with fantasy) are less likely to

transfer solutions to analogical problems from fantastical stories to real world scenarios (Richert & Smith, 2011). In other words, those children with the greatest amount of knowledge about fantastical representations are the least likely to draw analogies between worlds. One explanation for these findings is that children with more experience with fantastical representations have developed an increased appreciation of the distinction between the causal structure of realistic and fantastical stories, which may lead to the sophisticated strategy of quarantining causal information acquired from these fantastical contexts. Additional research is necessary to explore the particular type of knowledge – knowledge about the true causal structure of the real world, knowledge about the nature of fictional representations, or some combination of the two – that is most relevant to children's sensitivity to the proximity between worlds.

For the purposes of simplicity, children in the current study were provided with one of two fictional contexts that were each consistent with only one possibility: that the causal structure of the fictional world is the same as the real world (making it reasonable to infer that causal relationships should generalize) *or* that the causal structure of the fictional world is different from the real world (making it reasonable to infer that causal relationships should not generalize). In this case, children were more likely to infer that the target causal relationship would generalize when contextual story events were determined to share causal structure with the real world. Future research should explore the effect of presenting children with multiple graded representations that vary in more subtle degrees from the causal structure of the real world. For example, it is not clear what generalizations children would make if they had been read a story in which all but one of the contextual events were realistic or plausible, particularly if the anomalous event constituted a major violation of reality (e.g., if the protagonist was an

anthropomorphized animal, rather than a human child) (see also, Ganea et al., in press; Skolnick-Weisberg et al., 2013; Shtulman, 2009).

Another potential avenue for future study is to examine children's generalization of causal relations in other domains of knowledge. Previous research has found that 4-year-olds possess a greater understanding of the physical principles of the world than of biological ones (e.g., Carey, 1985; Inagaki & Hatano, 1993, 2002; Rosengren, Gelman, Kalish, & McCormick, 1991), and believe that violations of physical knowledge are less likely to be possible than violations of biological knowledge (e.g., Cook & Sobel, 2011). While the target causal property in the current study did not pose a clear *violation* of biological knowledge, it is certainly possible that children may respond differently to novel information from different domains (e.g., see Shtulman, 2009). In ongoing research we examine the influence of story proximity on children's learning and transfer of *real* content in other domains (i.e., how to balance objects of uneven weight), rather than fictional ones. We expect that the story context will interact with children's existing knowledge about balance (see Karmiloff-Smith & Inhelder, 1974) to influence whether or not children learn and transfer new content from the book to the real world. For example, if children are "center theorists" (believe that objects always balance in the geometric center), they should be more likely to change their beliefs if they are exposed to ideas about mass in the context of a realistic storybook. Similarly, if children have already developed an understanding of balance in terms of mass (i.e., "mass theorists"), they should be less likely to change their beliefs if exposed to an incorrect center theory in the context of a fantastical storybook.

Finally, although our results demonstrate that realistic contexts lead to increased generalization when transferring information from the fictional story to the real world, these findings in no way undermine the potential role of fantasy in early learning and reasoning (e.g.,

Harris, 2000). In fact, there is a rich literature that suggests that fantasy may indeed improve children's performance on certain types of cognitive tasks, such as deductive and syllogistic reasoning (Dias & Harris, 1988; Dias, Roazzi, and Harris, 2005; Hawkins, Pea, Glick & Scribner, 1984; Richards & Sanderson, 1999), theory of mind (Lillard & Sobel, 1999; Pellegrini & Bjorklund, 2004; Sobel & Lillard, 2001; Youngblade & Dunn, 1995), and linguistic and narrative abilities (Pellegrini, 1985). Recent research also suggests that fantasy (particularly in the form of pretend play) may also facilitate a special type of causal inference – counterfactual reasoning – that is essential to processes underlying early learning and theory change (Buchsbaum, Bridgers, Skolnick, & Gopnik, 2012; Walker & Gopnik, 2013a; 2013b).

Rather than transferring content *between* fiction and reality, these tasks typically require that children generate suppositions *within* the fictional world. For example, according to Dias et al. (2005), placing an unfamiliar premise in a fantastical context – particularly when the premise directly contradicts a currently-held theory – allows children to override a bias to consider their past experiences and generate suppositions on the basis of the premise alone. However, recent work by Sutherland & Friedman (2012) suggests that children may also acquire generic knowledge about the real world by engaging in realistic pretense with older play partners. Future work should consider how the inclusion of explicit fantastical content may impact children's learning from pretense, as well as guided play (e.g., Skolnick-Weisberg, Hirsh-Pasek, & Golinkoff).

In sum, these findings demonstrate that by at least 3 years of age, children are able to evaluate the information embedded within fictional stories when selectively learning and generalizing novel story content to the real world. Additionally, as children develop, they

become better able to discriminate between realistic and fantastic fictional worlds when assessing which stories are likely to provide relevant causal knowledge.

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**Tables**

Table 1: Close world (realistic) and Far World (fantastic) Story Events

| **Close World Events** | **Far World Events** |
|---|---|
| Drive in car | Fly with magic cape |
| Find a ladybug | Find a fairy |
| Climb a tree | Talk with a tree |
| Raining raindrops | Raining stickers |
| **Smell 'Popple Flower'** | **Smell 'Popple Flower'** |
| **Get Hiccups** | **Get Hiccups** |
| Swim in pond | Swim in chocolate pond |

## Figures

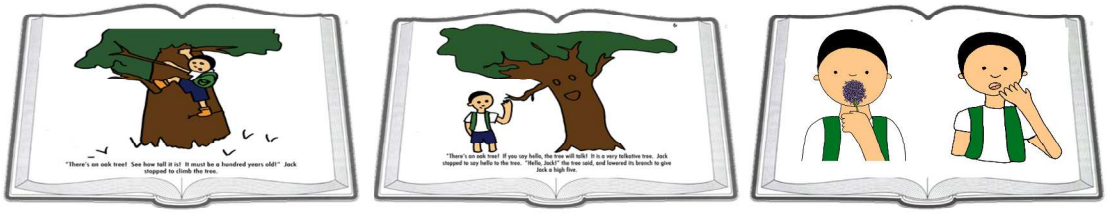


**Figure 1**: Sample pages from *close world* (left) and *far world* (center) versions of the storybook and the target causal relationship as it appears in both versions (right).

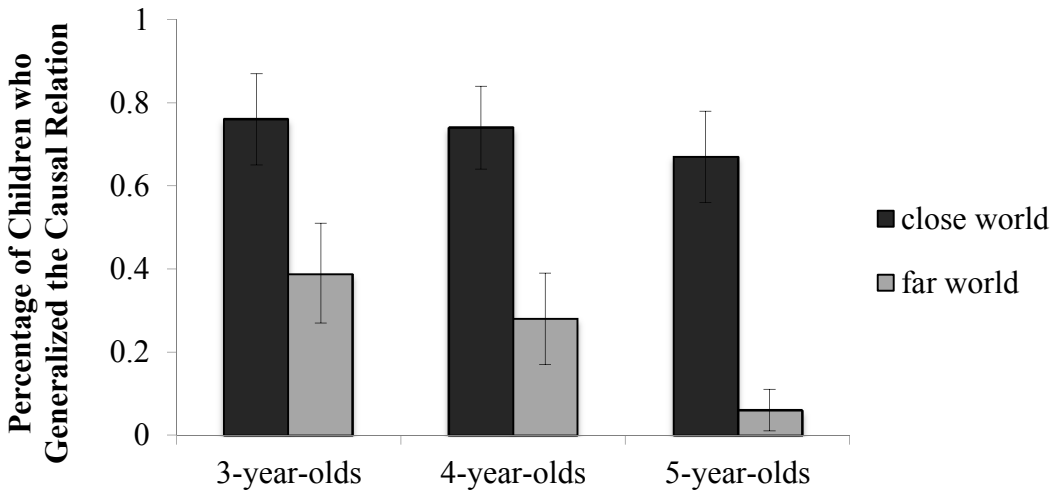


**Figure 2.** Percentage of 3-, 4-, and 5-year-old children in each condition who generalized the embedded target causal relationship from the story to the real world.