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Explaining the moral of the story

Caren M. Walker [a,*], Tania Lombrozo [b]

[a] University of California, San Diego, Department of Psychology, 9500 Gillman, # 0109, La Jolla, CA 92093-0109, United States
[b] University of California, Berkeley, Department of Psychology, 3210 Tolman Hall, Room 1221, Berkeley, CA 94720, United States

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ABSTRACT

Although storybooks are often used as pedagogical tools for conveying moral lessons to children, the ability to spontaneously extract "the moral" of a story develops relatively late. Instead, children tend to represent stories at a concrete level – one that highlights surface features and understates more abstract themes. Here we examine the role of explanation in 5- and 6-year-old children's developing ability to learn the moral of a story. Two experiments demonstrate that, relative to a control condition, prompts to explain aspects of a story facilitate children's ability to override salient surface features, abstract the underlying moral, and generalize that moral to novel contexts. In some cases, generating an explanation is more effective than being explicitly told the moral of the story, as in a more traditional pedagogical exchange. These findings have implications for moral comprehension, the role of explanation in learning, and the development of abstract reasoning in early childhood.

1. Introduction

> *"There once was a boy named Pierre who only would say, 'I don't care!' Read his story, my friend, for you'll find at the end that a suitable moral lies there."*
> ["Pierre: A Cautionary Tale" (Prologue), *Maurice Sendak (1962)*]

Moral stories have long been thought to improve "moral literacy" and "moral character" in children (Bennett, 1993; Honig, 1987; Kilpatrick, 1992; Lickona, 1991; Nash, 1997; Wynne & Ryan, 1993), and storybooks are often used with the intention to convey moral lessons during childhood. However, the ability to spontaneously extract underlying themes from a story appears to develop quite late; some have proposed that this ability does not truly mature until adolescence (McKenna & Ossoff, 1998; van den Broek, 1997; Williams, 1993). Instead, beginning with Piaget (1952), many researchers have suggested that young children are "context bound," and therefore *unable* to grasp the abstract goal or lesson of a story (Fisch, 2000; van den Broek, 1997; van den Broek, Lynch, Naslund, Ievers-Landis, & Verduin, 2003). In the present paper, we investigate whether prompting young children to explain – a process that has been shown to facilitate learning (Fonseca & Chi, 2011; Lombrozo, 2006, 2012) – can help young children go beyond superficial content and successfully abstract the moral of a story.

1.1. Development of theme comprehension

Despite the popularity of stories with moral lessons in literature for young children, a sizable body of research suggests that children under 10 years of age typically interpret story meaning in ways that deviate from the writer's intent (e.g., Goldman, Reyes, & Varnhagen, 1984; Lehr, 1988; Mares, 2006; Mares & Acosta, 2008; Narvaez, 1998; Narvaez, Bentley, Gleason, & Samuels, 1998; Narvaez, Gleason, Mitchell, & Bentley, 1999; Whitney, Vozzola, & Hofmann, 2005). In particular, when children are asked to generate the moral of a story, they tend to produce a salient story event or repeat a familiar but irrelevant moral. According to the dominant line of thought from this body of work, children fail to represent narratives at a level that highlights abstract generalizations and understates surface content (Goldman et al., 1984; Williams et al., 2002). Although it has been proposed that drawing attention to the underlying structure of a narrative could facilitate children's grasp of the moral and its generalization to novel contexts, interventions taking this approach have been largely unsuccessful, particularly with young children.

To illustrate, consider a study by Narvaez et al. (1999), in which 3rd and 5th graders were asked to identify the moral of a story and to select a new story with the same moral theme. The target story was a brief vignette, in which a character stops for gas, pays, receives too much change, and then returns the extra money. The test vignettes were designed to provide several attractive options: (1) same setting (character stops for gas); (2) same main character; (3) same actions (character pays the bill at a restaurant

* Corresponding author at: Department of Psychology, University of California, San Diego, 9500 Gillman Dr., La Jolla, CA 92093-0109, United States.
E-mail address: carenwalker@ucsd.edu (C.M. Walker).

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and gets change); or (4) same theme (character returns something that doesn't belong to him [candy]). The most common response was to select the "same action" vignette, suggesting that children were attracted to stories with shared surface content. The authors conclude that at least part of children's difficulty in grasping moral themes is explained by their tendency to be distracted by superficial details. In fact, children in this study did not extract the theme at all until at least 4th grade (10 years of age), with 3rd graders performing at chance. In addition, the 3rd graders seemed surprisingly resistant to training. After 14 weeks of an educational intervention, these children were able to generate morals that had been explicitly discussed during the training, but failed to do so when presented with new material (Williams et al., 2002).

This pattern of results extends beyond storybooks to televised narrative as well. For example, in a study by Mares and Acosta (2008), 5-year-old children watched a television program with a moral theme intended to portray tolerance of social differences. In this program, a disabled character (a dog with three legs) was initially feared, and then eventually accepted. Children who watched this program were asked to select the moral from several provided options and to select another episode that shared the same lesson. Performance was poor on both tasks. Notably, when asked to generate the lesson in an open response, children provided a lesson that was tied to literal story content: "You should be kind to three-legged dogs." The authors conclude that 5-year-olds take televised content at face value, or assume a literal interpretation of narrative.

The abstraction of a theme from a story has also been examined in a related but separate literature examining children's analogical transfer. For example, Brown, Kane, and Echols (1986) assessed transfer in preschool-aged children using a task in which learners were required to notice the common underlying structure of a set of problems in order to succeed. Three- to 5-year-olds were presented with sets of stories that differed in their surface content (e.g., a genie transferring jewels into his lamp and a farmer transferring cherries into his truck), but shared a common problem solution (i.e., transfer objects by rolling them through a hollow tube). The authors examined whether children could transfer the solution from one story to another, and if so, which factors mattered most for success. Children were split into several conditions. In one case, children were prompted to provide the explicit goal structure, recalling the protagonist, the goal, the problem, and the solution. In a second condition, children were prompted to simply recall the events of the story, with no additional guidance. In a third condition, children were given no prompt. Results demonstrated that children prompted to provide the explicit goal structure were best able to draw an analogy between stories. However, when participants' responses were coded, children in the recall condition who *spontaneously* provided the explicit goal structure in their response were just as likely to transfer the solution. It seems that the key factor was whether children achieved a level of representation that highlighted the common goal structure and understated the surface content of the stories, irrespective of the experimental prompt.

Brown et al. (1986) offer an interpretation of these results in terms of children's "depth of representation," which predicted the probability a child would transfer the solution from one story to another, even controlling for memory, age, and the ability to verbalize the solution. The idea that "deeper" processing facilitates memory and problem solving has appeared in a variety of forms (e.g., Craik & Lockhart, 1972), and deeper processing is credited with facilitating retention and transfer in children (Brown, 1975; Murphy & Brown, 1975). However, it is often unclear how to distinguish deep processing from alternatives, except by circular reasoning: the child who performs well is processing at a deeper level, and we know this is the case because she performs well (see also Bransford, 1979). With respect to the goal of extracting a story's lesson, however, we can safely say that more *abstract* reasoning is better: children must appreciate that much of the surface content is incidental to the main lesson that the story's author intends to convey. If this is the case, then children's moral comprehension should benefit from interventions that promote abstract reasoning over attention to idiosyncratic details.

The literature on analogical reasoning provides a further hint about what such an intervention might be: prompting children to *explain* key aspects of the story as it unfolds. Crisafi and Brown (1986) found that asking 2- to 4-year-olds to teach a puppet how to solve a problem improved analogical transfer of the solution to a novel situation. In addition, Brown and Kane (1988, Experiment 7) provided 4-year-old children with three examples of mimicry in the natural world (i.e., caterpillars, rats, and beetles). When children were asked to explain – for example – why a caterpillar would want to look like a snake, and then to explain a second example (e.g., about mimicry in rats), they were more likely to transfer the concept of mimicry to a third example (e.g., about mimicry in beetles). These effects of explanation on analogical problem solving suggest that when it comes to extracting the moral of a narrative story, explanation could have a beneficial effect by facilitating abstraction.

1.2. Explanation and abstraction

Previous research has found that the act of generating explanations can be a powerful mechanism for learning, scaffolding knowledge acquisition and contributing to theory change (Chi, Bassok, Lewis, Reimann, & Glaser, 1989; Chi, de Leeuw, Chiu, & LaVancher, 1994; Fonseca & Chi, 2011; Crowley and Siegler, 1999; Lombrozo, 2006, 2012; Walker, Lombrozo, Legare, & Gopnik, 2014; Wellman & Liu, 2007). Among previous accounts of these effects, several suggest a direct or indirect relationship between explanation and abstraction. At a theoretical level, for example, explanation has been linked to supporting generalization (e.g., Lombrozo & Carey, 2006), which benefits from abstract representations. At a mechanistic level, abstraction could be a consequence of the process by which learners generate explanations. In particular, explanations tend to involve an implicit or explicit appeal to an explanatory generalization that subsumes the instance being explained by relating it to a more general framework (Lombrozo, 2006, 2012; Wellman & Liu, 2007; Williams & Lombrozo, 2010, 2013). In so doing, they may highlight the abstract features of a situation in virtue of which the generalization applies, and downplay idiosyncratic particulars.

Recent evidence additionally suggests that when learners generate explanations, they tend to favor hypotheses that support *good* explanations (Lombrozo, 2016). This introduces a systematic bias in information processing, with consequences for what learners discover, remember, and infer. For example, adults favor explanations that are simple (Lombrozo, 2007) and broad (Read & Marcus-Newhall, 1993), and engaging in explanation can amplify the influence of these preferences: adults who are prompted to explain the category membership of individual items are more likely to discover simple and broad classification rules (Williams & Lombrozo, 2010, 2013; Williams, Lombrozo, & Rehder, 2013). Even preschool-aged children favor some explanations over others: like adults, they prefer explanations that are simple (Bonawitz & Lombrozo, 2012) and broad (Walker, Lombrozo, Williams, Rafferty, & Gopnik, 2016), and they prefer explanations that omit extraneous details (Frazier, Gelman, & Wellman, 2009). As with adults, the influence of simplicity and breadth is exaggerated when children are explicitly prompted to explain (Walker, Bonawitz, & Lombrozo, in press; Walker et al., 2016). Given that simpler and broader explanations also tend to be more abstract, the process

of identifying a "good" explanatory generalization is likely to result in more abstract representations.

Consistent with these ideas, there's evidence suggesting that when prompted to explain, children tend to favor more abstract properties, such as causal relationships, over salient perceptual properties, such as color (Legare & Lombrozo, 2014; Walker, Lombrozo et al., 2014; see also Williams and Lombrozo (2010) for evidence from adults). To illustrate, consider the first study reported by Walker, Lombrozo et al. (2014), in which preschool-aged children were prompted to *explain why* (or *report whether*) each object in a set of three did or did not make a machine play music when the object was placed on top of it. Each set contained a target object with the relevant causal property (making the machine play music) as well as salient perceptual properties (e.g., yellow color and cylindrical shape). The other two objects included a *causal match* (which similarly activated the machine, but looked different) and a *perceptual match* (which looked just like the target object, but did not activate the machine). After each object was placed on the machine and children either explained or reported, the experimenter revealed that the target object had a previously-occluded internal part: a red pin. Children were asked which of the other two objects, the *causal match* or the *perceptual match*, was more likely to contain this hidden feature. The 3-, 4-, and 5-year olds in the *report* condition tended to select the *perceptual match* or chose at chance. However, children in the *explain* condition chose the *causal match* significantly more often than children in the *report* condition, and above chance levels. This suggests that generating explanations helped children overcome the allure of the salient perceptual similarities, and instead focus on the potential relationship between internal parts and causal affordances. Additional support comes from Legare and Lombrozo (2014), who found that children who were prompted to explain how a gear toy worked were more likely than controls to learn how the gears' size and shape made the machine go, but *less* likely to recall causally-irrelevant details, such as the colors of the gears.

While the work reviewed above offers reasons to expect an association between explanation and abstraction, the evidence itself is indirect. In previous work, a more abstract feature (e.g., a causal property) was pitted against a perceptual feature (e.g., color). However, it was not necessary for children to abstract these properties from their observations, since they were explicitly provided. Moreover, the competing abstract and concrete representations were representations of *different features*, not representations of the same content at different levels of abstraction. In the case of moral stories, the child must abstract away from the particulars to extract the lesson, and more abstract and concrete representations *for the same story* can compete and co-exist. Moral story comprehension is therefore an ideal task for testing the prediction that explanation facilitates abstraction. Indeed, theme comprehension is widely used in educational contexts as a means for assessing abstraction abilities in children. Further, Williams (1993) defined the moral [theme] of a story as "expressing a pattern among story components in a form that is abstracted from the specific story context..." Similarly, Mar and Oatley (2008, p. 176) propose that the type of abstraction involved in fictional narrative constitutes "...an explanation of what goes on beneath the surface to generate observable behavior."

1.3. Current research

In the studies that follow, we directly investigate the hypothesis that explanation can facilitate 5- and 6-year-old children's abstraction of a moral from a story. We focus on this age group for several reasons. First, the large literature on narrative comprehension (reviewed above) suggests that although 5- to 6-year-old children likely have the relevant inferential skills to understand simple and familiar narratives, the ability to extract the lesson from a story develops well into the elementary school years and beyond. We therefore selected an age group that would be unlikely to spontaneously abstract the theme of a story, and could potentially benefit from a prompt to explain (e.g., Walker, Gopnik, & Ganea, 2014; Walker et al., in press). Second, previous research indicates that by this age, children have many of the basic cognitive prerequisites needed to complete our tasks. By 5 years old, children have intuitions about what counts as a satisfying explanation (e.g., Bonawitz & Lombrozo, 2012; Frazier et al., 2009), produce domain-appropriate explanations (Hickling & Wellman, 2001; Schulz, Bonawitz, & Griffiths, 2007), and are able to represent and reason about complex causal relationships (Carey, 1985; Gelman & Wellman, 1991; Gopnik & Meltzoff, 1997; Inagaki & Hatano, 1993; Perner, 1991).

In both studies presented below, we test the specific prediction that prompting children to explain key story events (without training or feedback) will make them more likely than children in a control condition to successfully identify, generate, and generalize the moral of the story. Such a finding would be quite surprising in light of the previous work on narrative comprehension, and additionally provide some evidence for the mechanisms underlying the development of these abilities. Further, although the predictions are in line with claims from prior work that explanation leads children to shift away from surface similarity, the current research departs from these previous studies in several important and novel ways. First, to our knowledge, these are the first studies to directly assess the role of explanation in promoting abstraction in young children. Second, the current studies are the first to consider the effects of explanation on learning prescriptive (moral) content, which, by definition, cannot be derived from the descriptive information that is provided. Third, in Study 2, we compare the effects of explanation on abstraction to the effects of directly teaching children the moral of the story. Although a handful of previous studies have examined the relative benefits of explanation versus more traditional pedagogical techniques like direct instruction, this has been in the context of procedural knowledge acquisition (Rittle-Johnson, 2006; Siegler, 1995), not abstraction from a single example.

2. Study 1

In Study 1, 5- and 6-year-olds were assigned to either *explain* or *report* conditions. In both conditions, the experimenter began by reading an illustrated storybook that involved a moral lesson. Children were then provided with two opportunities to either explain or report the events in the story – once mid-way through and once at the end. Afterwards, children completed four dependent measures, adapted from Narvaez et al. (1999), to assess their understanding of the story's moral: (1) *memory assessment* (true/false questions about the story), (2) *vignette selection* (select a novel vignette that best matches the theme of the original story), (3) *theme selection* (forced choice between the theme and a salient surface property), and (4) *open response* (describe "the most important thing" learned from the story).

2.1. Method

2.1.1. Participants

A total of 48 5- and 6-year-olds (M = 69.7 months; SD = 8.1, range: 60.0–85.1) were included in Study 1, with 24 children randomly assigned to each of two conditions (*explain* and *report*). There was no significant difference in age between conditions, and there were approximately equal numbers of males and females assigned to each. Two additional children were tested, but excluded for failing to complete the study. Children were

recruited from local preschools and museums, and a range of ethnicities resembling the diversity of the population was represented.

2.1.2. Materials and procedure

2.1.2.1. Storybook reading. Four 10-page illustrated storybooks were constructed for this study. All stories depicted human protagonists engaged in realistic, familiar activities (helping around the house, playing with children, painting a picture, planting a tree), which has been shown to support theme comprehension (Afflerbach, 1990; Lehr, 1988; Narvaez et al., 1999; Richert & Smith, 2011; Walker, Ganea, & Gopnik, 2013). In all stories, a problem was presented and then resolved by affirming the values of the moral.

Stories presented a range of morals. "Tall People" described a boy who looks different from the other people in his town. The townspeople learn that *it's important to be nice to those who are different from you.* "Henry the Hero" described a boy who learns that you don't have to be a superhero to help others. Instead, *anyone can be a hero and help people.* "Mr. Muffet's Apple Tree" described a man who plants some apple seeds in his garden and must wait for them to grow. He learns that *good things come to those who wait.* "The Queen's Painting" concerned several families who each have a favorite color. When they are asked to create a painting for the queen, they learn to combine their colors and *work together to achieve something greater.* Appendices A–D provide the full script of each story. Storybooks were randomized among participants within each condition.

Children were tested individually, seated at a table in a quiet room or corner with the experimenter. After a brief warm-up, the experimenter read the story to the child, interacting naturally and pointing to illustrations. The experimenter introduced the story saying, "I am going to read you a story, and I want you to pay very close attention because afterwards, I am going to ask you some questions about it." The experimenter did not engage with the child in conversation about the content. If a child commented on story events during the interaction (e.g., "I have an apple tree in my backyard!"), the experimenter would acknowledge the comment and continue reading.

Midway through the storybook, the experimenter would interrupt to provide the first condition prompt (see Table 1). In the *explain* condition, the experimenter would say, "Can you tell me, why did [event] happen?" and in the *report* condition, the experimenter would say, "Can you remind me, did [event] happen?" In each case, the event referred to the problem that was introduced. For example, in *Mr. Muffet's Apple Tree* the protagonist plants some apple seeds and is sad that the seeds did not sprout after many days (problem). For this storybook, the mid-story prompt asked "Can you tell me, why was Mr. Muffet sad?" in the *explain* condition, and "Remind me, was Mr. Muffet sad?" in the *report* condition. Later in the story, Mr. Muffet's wife suggests that he be patient, since good things come to those who wait (lesson). At the end of the story, Mr. Muffet has his apple tree and is very happy that he was patient. At the conclusion of the story, the experimenter would prompt the child again, this time probing for the lesson, saying, "Can you remind me, [Can you tell me, why] was Mr. Muffet happy at the end of the story?" All story prompts appear in Appendices A–D. These prompts were the only differences between conditions, and children never received feedback on their responses. Instead, the experimenter provided a neutral response ("Okay!") and continued.

2.1.2.2. Tasks. After reading the story, all children completed several tasks to measure comprehension and lesson extraction. All tasks appear in order of presentation below.

2.1.2.2.1. Memory assessment. Children were asked a set of four memory questions to ensure their attention and recall. Questions were presented in "true/false" format. True statements were factual claims endorsed in the storybook. False statements were factual claims that were not endorsed in the story. The experimenter explained, "Some of the things I say will be right, and some of the things will not be right. I want you to say 'yes' to the things that are right and 'no' to the things that are not right." Each story was accompanied by two true memory questions (e.g., "Mr. Muffet watered his seeds every day") and two false memory questions (e.g., "Mr. Muffet wanted to grow oranges"), presented in random order. Correct responses were coded as "1" and incorrect responses were coded as "0." Children could receive a total of 4 points. Memory questions for all stories appear in Appendices A–D.

2.1.2.2.2. Open response. Next, children were asked to generate the lesson in an *open response*. The experimenter said, "Let's think about the storybook. There is going to be another kid coming in today, and we have to tell them what we learned about the story. What should we tell them? What is the most important thing we learned in the story?" Children's answers were recorded and coded as belonging to one of three categories: (1) lesson-based, (2) content-based, and (3) irrelevant. Lesson-based responses were assigned a score of "1" and all other responses were assigned a score of "0."

2.1.2.2.3. Vignette selection. Children were then asked to select between pairs of vignettes to assess their recognition of the story lesson in a novel context. Two pairs of vignettes were constructed for each storybook. One set was the *lesson probe,* designed to pit the lesson of the target story (e.g., "good things come to those who wait") against a novel lesson (e.g., "listen to your parents"). In this set, both vignettes contained the same novel content (characters, scene, activity), which was always different from the content of the target story. The second pair of vignettes was the *conflict probe* (see Table 2), designed to pit the surface content of the target story against its lesson. In this set, one vignette contained content that matched the target story (same characters, scene, activity), but presented a novel lesson. The other vignette presented a lesson that matched the target story, but differed in content (novel characters, scene, activity). All *lesson probe* and *conflict probe* vignettes for each target story appear in Appendices A–D.[1]

Each vignette was presented with four illustrated cards (see Table 2). The experimenter introduced the task saying, "I am going to show you two different sets of cards, and each set of cards tells a short story. And then I am going to ask you which set of cards best matches what we learned in the longer storybook that we just read." The experimenter would read each card aloud, laying it face up on the table. After all cards had been presented, the child was asked to retell the events in the vignette. If the child had any difficulty doing this, the experimenter would read the vignette again. After both vignettes were displayed, the experimenter asked, "Which of these short stories best matches what we learned in the storybook?" The presentation of vignettes was counterbalanced. Children's selections that were in line with the lesson were coded as "1," and all other selections were coded as "0."

2.1.2.2.4. Theme selection. Finally, children were provided with a forced-choice between the lesson and salient surface content of

[1] We included one additional pair of vignettes that always appeared last. This final vignette pair was intended as a *content probe* in which the target story's lesson appeared in both vignettes, but one had content that matched the target story and one did not. The task was confusing for children because the story with matching content was effectively a repetition of the target story. Children performed at chance in both conditions. We therefore exclude this vignette pair from further analyses and discussion.

Table 1
Sample storybook pages with corresponding mid-story and end-story prompts in each condition, corresponding to the story "Tall People." (See Appendix D for complete story.)

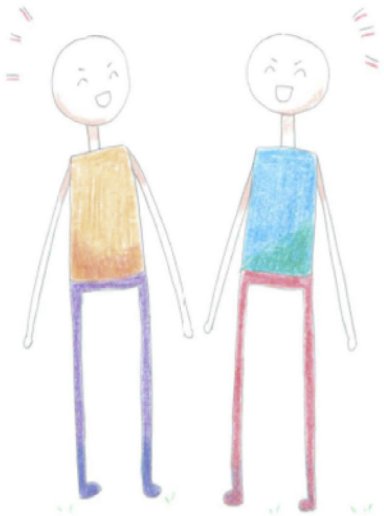
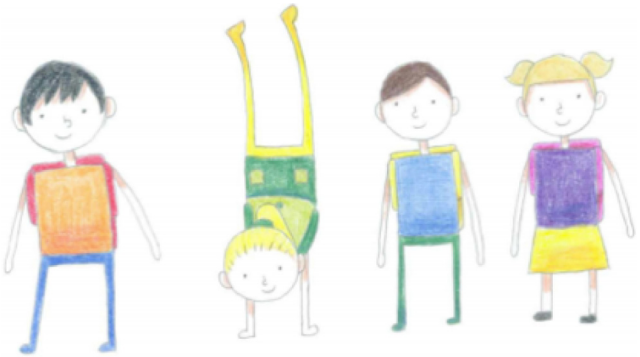
Prompt	Mid-story	End-story
Storybook page		
	But the villagers kept laughing, and said they didn't want to play with him. Jocko was so sad that he started to walk back home...	...So Jocko played with the people in Talleg, and it turned out that they all had the most wonderful time even though they were different! And from then on, no one ever laughed at Jocko again, and they played together every day!
Report prompt	"Remind me, was Jocko sad?"	"Remind me, did the tall people decide to play with Jocko?
Explain prompt	"Tell me, why was Jocko sad?"	"Tell me, why did the tall people decide to play with Jocko?"
Pedagogy prompt (Study 2)	"Jocko was sad because the people in Talleg laughed at him for being different from them."	"The tall people decided to play with Jocko because its okay to be friends with people who are different from you."

Table 2
Sample *conflict probe* item, corresponding to the story "Tall People." Participants were asked: "Which of these short stories best matches what we learned in the storybook?"

Match type	Sample image	Probe story text
Lesson match		Jenny is different from other people, because instead of walking on her feet, she walks on her hands! The other kids didn't let Jenny walk to school with them, because they thought it was weird that she walked on her hands. Jenny became very sad, but finally one of the kids said she could walk with them to school, because it didn't matter that she walks differently. She walked to school with them, and they had a wonderful time, and they all became very good friends!
Content match		The tall people were playing a game and a short person named Jocko asked if he could play with them. First they laughed at him and he became very sad. Then one of the tall people hurt his leg… …and Jocko was able to help him, and it was so nice that Jocko helped the tall person.

the target story, and asked to select "the most important thing" they learned from the storybook. The experimenter said, "Another kid was here today, and he said that the most important thing that we learned was [the lesson]. And another kid said that the most important thing that we learned was [surface content]." For example, in "Mr. Muffet's Apple Tree," the prompt pit the lesson that "good things come to those who wait," against the content that "plants take a long time to grow." In order to reduce memory demands, each of these options was accompanied by an illustrated card that was laid on the table and represented each choice. The order of presentation of these cards was counterbalanced between subjects. Children's selections in line with the story lesson were coded as "1" and selections in line with the surface content were coded as "0." All theme selection choices appear in Appendices A–D.

2.1.2.3. Coding. All of children's responses were coded by a second researcher during test sessions and also video recorded for reliability purposes. Sixty-three percent of videos were available for reliability coding. A second researcher who was naïve to the purpose of the experiment recoded all responses from available videos. Inter-rater reliability on all true/false and binary selection tasks was very high; the two coders agreed on more than 99% of children's responses. Inter-rater reliability for coding the open response task was somewhat lower, with the twocoders agreeing on 88% of children's responses. All disagreements were settled by discussion among the two researchers and a third party.

2.2. Results and discussion

To test the hypothesis that prompts to explain can facilitate children's ability to extract the moral from each story, we compared performance across the *explain* and *report* conditions for each of our dependent variables.

First, a univariate ANOVA was conducted to assess differences in children's recall (out of 4 memory questions) between conditions (*explain, report*). Explaining did not lead to better recall of story content, with children in the *explain* ($M = 3.8$, $SD = 0.51$) and *report* ($M = 3.7$, $SD = 0.44$) conditions recalling story content equally well, $F(1,46) = 0.092$, $p = 0.76$. These results provide some evidence that any effects of explanation cannot be reduced to an indiscriminate increase in attention to story content. As a more sensitive measure, we also analyzed only those memory questions that referred to content presented after the first experimental prompt. All but one of the stories (Tall People) included two questions from before the mid-story prompt and two questions from after the mid-story prompt (see Appendices A–D). There were no differences in recall for events occurring either before ($M = 1.78$) or after ($M = 1.94$) the mid-point explanation prompt, $t(34) = -1.45$, $p = 0.16$. There were also no differences in recall between *report* ($M = 1.94$) and *explain* ($M = 1.94$) conditions on those memory questions that occurred after the mid-story prompt, $t(34) = 0$, $p = 1.0$. However, memory scores were uniformly high, which may indicate that questions were not sensitive enough to pick up on possible differences.

We next focused on the dependent measures designed to assess whether children had successfully extracted the story's lesson: the *lesson probe, conflict probe, theme selection,* and *open response* (see Fig. 1). While each measure is importantly distinct, we began with an omnibus test to capture global trends and reduce the probability of Type I errors from performing multiple independent tests. To do so, we generated a total score (out of 4) for each participant by summing scores across all four tasks. A univariate ANOVA with condition (*explain* and *report*) as the independent variable and total score (out of 4) as the dependent variable revealed a main effect of condition, $F(1,46) = 6.68$, $p < 0.02$, $\eta_p^2 = 0.127$, with children in the *explain* condition signficantly more likely to privilege the lesson across tasks ($M = 2.7$, $SD = 1.0$) than children in the *report* condition ($M = 1.8$, $SD = 1.3$). This pattern held for each of the four stories.

We also performed independent analyses of each task with Chi-Square tests. Children who were prompted to explain performed significantly better than those prompted to report on the lesson probe, $\chi^2(1) = 5.5$, $p < 0.02$, and theme selection, $\chi^2(1) = 4.5$, $p < 0.04$, tasks. Moreover, while children prompted to explain performed above chance on both tasks (*lesson probe:* $p < 0.03$; *theme selection:* $p < 0.001$), children who were prompted to report did not (*lesson probe:* $p = 0.54$, *theme selection:* $p = 0.31$). For the more challenging *conflict probe* vignette, there was no significant difference between *explain* and *report* conditions, $\chi^2(1) = 0.765$, $p = 0.38$, with both groups performing at chance levels (*explain:* $p = 1.0$, *report:* $p = 0.15$). Finally, children who explained also provided signficantly more lesson-based responses (50%) in their *open response,* compared with children who reported (33%), $\chi^2(1) = 6.4$, $p < 0.05$. Thirty-seven percent of explainers and 47% of reporters offered a content-based response, with all remaining children (*explain* = 13% and *report* = 20%) offering irrelevant responses.

Although we coded the content of children's explanations in the *explain* condition, very few children provided a lesson-relevant explanation in response to the prompt (29%), with all remaining children noting surface content of the story. It was therefore not

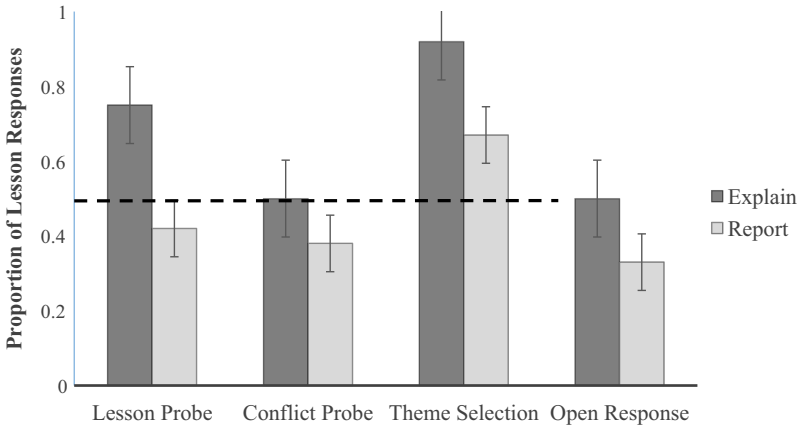


Fig. 1. Proportion of children who privileged the lesson in the *lesson probe vignette, conflict probe vignette, theme selection,* and *open response* in the *explain* and *report* conditions of Study 1. The dashed line indicates chance performance (except for the *open response* task, for which chance performance is not well defined). Error bars indicate standard error of the proportion.

possible to perform additional analyses on these data, though it is noteworthy that the explain prompt facilitated lesson extraction despite the fact that the lesson appeared in a minority of children's explanations.

3. Study 2

In Study 1, we found that explanation facilitated children's ability to extract the moral of the story and recognize this moral in novel contexts. In Study 2, we further explored these results by including several additional probes. First, we included more difficult memory questions in order to ensure that the effects of explanation are not just a downstream consequence of increased attention or engagement. Second, we included a brief training in what constitutes a story's "lesson" to disambiguate requests for what children learned from each story. Third, we assessed whether explaining during learning would help children generalize the lesson of the story to a novel, open-ended moral reasoning problem. To do so, children were asked to reason about a real-world event involving the experimenter.

Study 2 also included a "*pedagogy*" prompt condition in addition to the *explain* and *report* conditions from Study 1. Recent research suggests that children's interpretation of evidence may vary depending on whether learning occurs in pedagogical or non-pedagogical contexts (Bonawitz et al., 2011; Buchsbaum, Gopnik, Griffiths, & Shafto, 2011; Rhodes, Gelman, & Brickman, 2010; Shafto, Goodman, & Frank, 2012), and there's also evidence that the effects of self-generated explanations can sometimes differ from those of experimenter-provided explanations or direct instruction (e.g., Rittle-Johnson, 2006; Wittwer & Renkl, 2008; but see Crowley & Siegler, 1999). Like explanations, pedagogical cues can promote attention to inductively rich features (Csibra & Gergely, 2006, 2009). On the other hand, explaining is a constructive activity, whereas passively receiving instruction is not (Chi, 2009). Evidence exists for the benefits of both types of learning (Rittle-Johnson, 2006). Direct instruction has been demonstrated to be particularly effective in providing well-structured schemas in contexts in which working memory limitations prevent children from coordinating information (e.g., Sweller, van Merrienboer, & Paas, 1998). We might therefore predict that direct instruction would be particularly beneficial in this context. On the other hand, the benefits of explanation observed in Study 1 occurred even though children rarely offered the lesson in their explanations, suggesting that the *process* of generating explanations could have promoted more abstract representations. We were thus interested in how the effects of explanation compare to a more traditional pedagogical technique, namely direct instruction.

3.1. Method

3.1.1. Participants

A total of 96 5- and 6-year-olds (M = 69.5 months; SD = 6.2; range: 59.3–83.3) were included in Study 2, with 32 children randomly assigned to each of three conditions (*explain*, *report*, and *pedagogy*). There were no significant differences in age across conditions, and there were approximately equal numbers of males and females assigned to each group. Seven additional children were tested, but excluded. Four of these exclusions were due to failure to complete the study and three were due to interference by the caregiver. Recruitment procedures were identical to those used in Study 1.

3.1.2. Materials and procedure

3.1.2.1. Storybook reading. In Study 2, we selected two of the four stories ("Tall People" and "The Queen's Painting") from Study 1 and randomly assigned half of the children in each condition to receive each one. The same prompts that appeared in Study 1 were used in the *report* and *explain* conditions in Study 2. In the new *pedagogy* condition, children were simply provided with a statement of the problem and the lesson of the target story in lieu of the mid-story and end prompts (see Table 1).

3.1.2.2. Tasks. After reading the story, children completed several tasks to measure comprehension, lesson extraction, and generalization. Tasks appear in order of presentation below.

3.1.2.2.1. Memory assessment. In Study 2, four additional memory questions were added to the original four, for a total of eight questions. These questions were designed to be more challenging than those in Study 1 to provide a more sensitive measure. These memory questions appear in Appendices C and D. Correct responses were coded as "1" and incorrect responses were coded as "0." Children could receive a total of 8 points.

3.1.2.2.2. Lesson training. To aid children in reasoning about the lesson of the storybooks, we added a *lesson training* in which the experimenter defined the term "lesson," saying, "I want to teach you what a lesson is. Some stories have a moral or a lesson – which is what the person who made up the story wanted us to learn from it. Do you think that this story has a lesson? I want you to think about what the person who made up the story wanted us to learn from it." By adding this instruction, we hoped to decrease any ambiguity in the prompt.

3.1.2.2.3. Vignette selection. Materials and procedures for the *vignette selection* task were identical to those used in Study 1 (see Table 2). However, the instructions were revised to improve clarity and incorporate the new *lesson training.* The experimenter said, "I'm going to show you two different sets of cards. Each set of cards tells a short story. Then, I will ask you which set of cards best matches the *lesson* of the story about [story title]. I want you to pick the one that best matches what the person who made up the story wanted us to learn. Remember, you only get to choose one set of cards, so we have to choose the one that best matches what the author wanted us to learn from the story."

3.1.2.2.4. Generalization task. Finally, we added a *generalization task*, in which children were given an opportunity to apply the lesson from the target story in reasoning about a novel, real world situation. The generalization task was presented in first person, as a real event that had occurred to the experimenter that day. Unlike the vignette selection task, the generalization task required that children reason outside of a fictional context. For example, in "The Queen's Painting," the experimenter said, "*I went to the store today with my brother to buy flowers for our mom's birthday! I only had one dollar, and my brother also only had one dollar. When we got to the store, there were small flowers for one dollar, or big bunches of flowers for two dollars. What should my brother and I do?*" By applying the lesson from "The Queen's Painting" to this novel, real world situation, children might suggest working together and combining their resources to purchase the big bunch of flowers. The generalization prompts for both stories appear in Appendices C and D. Children were provided with an illustrated card that represented the novel situation as it was described. Children's responses that were in line with the lesson were coded as "1" and all other responses were coded as "0."

Children's responses were coded by a second researcher during test sessions and also video recorded for reliability purposes. Ninety-four percent of videos were available for reliability coding. A second researcher who was naïve to the purpose of the experiment recoded all responses from available videos. Inter-rater reliability on all true/false and binary selection tasks was very high; the two coders agreed on more than 99% of children's responses. Inter-rater reliability for coding the open response and generalization task also relatively high, with the two-coders agreeing on 92%

of children's responses. All disagreements were settled by discussion among the two researchers and a third party.

3.2. Results and discussion

First, a univariate ANOVA was conducted to assess differences in children's recall (out of eight memory questions) across conditions (*explain, report,* and *pedagogy*). Even with the inclusion of more difficult memory questions, explaining did not lead to better recall, $F(2,93) = 0.802$, $p = 0.45$, with children in the *explain* ($M = 5.7$, $SD = 1.1$), *report* ($M = 6.0$, $SD = 0.91$), and *pedagogy* ($M = 5.7$, $SD = 1.3$) conditions recalling story content equally well. Unlike Study 1, performance was not at ceiling. These data provide stronger evidence that effects of explanation cannot be reduced to an increase in overall attention to or engagement with story content.

Following Study 1, we generated a total score (out of 5) for each participant by summing scores on all tasks designed to reflect children's recognition of the story's moral: *lesson probe, conflict probe, theme selection, open response,* and *generalization*. A univariate ANOVA with condition (*explain, pedagogy,* and *report*) as the independent variable and total score (out of 5) as the dependent variable revealed a main effect of condition, $F(2,93) = 4.20$, $p < 0.02$, $\eta_p^2 = 0.083$, with children in the *explain* condition privileging the lesson most often across tasks ($M = 3.6$, $SD = 1.0$), and children in the *pedagogy* and *report* conditions privileging the lesson less often across tasks ($M = 3.0$, $SD = 1.0$ and $M = 2.9$, $SD = 1.1$, respectively). There was a significant difference in this total score between the *explain* condition and both the *report* ($p < 0.01$) and *pedagogy* ($p < 0.03$) conditions, with no significant difference in this total score between the *report* and *pedagogy* conditions ($p = 0.72$). This pattern of performance – with the children in the *explain* condition most likely to privilege the lesson, followed by those in *pedagogy* and then in *report* – was found for each of the two stories tested.

We also assessed the presence of condition differences on each individual task using Chi-Squared tests (see Fig. 2). First, the addition of the *lesson training* to the procedure in Study 2 led to substantial differences in performance (relative to Study 1) on several tasks. In particular, children in all conditions privileged the lesson more often than chance on the *lesson probe* vignette (*report:* $p < 0.001$, *explain:* $p < 0.001$, and *pedagogy:* $p < 0.05$), with no significant differences across the three conditions, $\chi^2(2) = 4.1$, $p = 0.13$.

For the most challenging task, the *conflict probe*, we did find a significant effect of condition, $\chi^2(2) = 7.6$, $p < 0.03$. Children prompted to explain privileged the lesson more often than children in the *report,* $\chi^2(1) = 13.07$, $p < 0.001$ or *pedagogy,* $\chi^2(1) = 14.77$, $p < 0.001$) conditions, with no significant difference between *report* and *pedagogy*, $\chi^2(1) = 0.07$, $p = 0.80$. Moreover, children prompted to explain privileged the lesson more often than chance, $p < 0.05$, while those in the *report* and *pedagogy* conditions responded at chance levels, with $p = 0.37$ and $p = 0.22$, respectively. For the *theme selection* task, children in all conditions selected the correct theme more often than chance ($ps < 0.001$), with no significant differences across *explain*, *report*, and *pedagogy* conditions, $\chi^2(2) = 0.18$, $p = 0.92$.

In the open-ended measures, there was a significant effect of condition on performance in the *open response* task, $\chi^2(2) = 6.8$, $p < 0.04$. Children in the *explain* condition provided significantly more lesson-based responses (41%) than children in the *report* condition (13%), $\chi^2(1) = 6.5$, $p < 0.02$. Children in the *pedagogy* condition also provided significantly more lesson-based responses (34%) than children in the *report* condition (13%), $\chi^2(1) = 4.27$, $p < 0.04$. There was no difference between the *explain* and *pedagogy* conditions, $\chi^2(1) = 0.27$, $p = 0.60$.

Children's responses in the *generalization task* were coded according to whether they applied the lesson to a novel, real-world context. Eighty-four percent of children in the *explain* condition, 72% of children in the *pedagogy* condition, and 63% of children in the *report* condition successfully applied the lesson. Children in the *explain* condition generalized the lesson significantly more often than children in the *report* condition, $\chi^2(1) = 3.9$, $p < 0.05$. Performance of the children in the *pedagogy* condition fell between that of children in the *explain* and *report* conditions, and there was no significant difference between the *explain* and *pedagogy* conditions, $\chi^2(1) = 1.5$, $p = 0.23$, nor between the *pedagogy* and *report* conditions, $\chi^2(1) = 0.64$, $p = 0.42$.

Finally, we again coded the content of children's explanations in response to the prompt at the conclusion of the storybook in the *explain* condition. However, very few children provided a lesson-relevant explanation in response to the prompt (9%), with all remaining children noting surface content of the story. As in Study 1, it was not possible to perform additional analyses on these data, but it's interesting to note that explanation was so beneficial in promoting children's learning of a story's moral even when the content of the explanations focused elsewhere.

In sum, the results of Study 2 provide additional support for the claim that explanation facilitates children's ability to abstract the moral of a story, recognize the moral when it is presented in novel contexts, privilege the moral over story content, and use the moral in reasoning about a novel situation. In addition, results of the generalization task demonstrate that children who explain not only learn the moral of the story and recognize it in other story contexts, but also extend that moral to inform their reasoning about the real world. Finally, in some cases, the effect of explanation went above and beyond the effect of a pedagogical intervention, in which children were explicitly provided with the lesson.

4. General discussion

Across two experiments, we find that prompting young children to explain makes them more likely to recognize and identify the moral of a story, even when doing so requires them to favor abstract themes over surface content. In Study 1, children who explained were more likely to identify the lesson in a novel context, select the lesson in a forced choice, and generate the lesson in an open response. In line with previous research, children in the control condition based their judgments on surface similarity. In Study 2, the effect of explanation emerged for a more challenging probe, which pit the lesson of the story against salient surface details, and in a novel generalization task, which required children to apply the lesson to an open-ended reasoning problem. In addition, explaining produced benefits above and beyond direct instruction, for which children were explicitly told the moral of the story.

The comparison between generating explanations and direct instruction provides strong evidence that the cognitive benefits of explanation are not simply a byproduct of drawing the learner's attention to the moral. Moreover, the fact that we saw no differences in memory between conditions in either study challenges the idea that explanation produces a *general* benefit for learning by globally and indiscriminately increasing engagement or motivation. Instead, it appears that the process of explaining generates selective effects on children's learning, facilitating the abstraction and application of a story's moral. These results provide empirical support for an emerging theoretical perspective on the unique and selective effects of explanation on early learning and inference (Legare & Lombrozo, 2014; Lombrozo & Vasilyeva, in press; Walker, Gopnik et al., 2014; Walker, Lombrozo et al., 2014; Walker et al., in press; Wilkenfeld & Lombrozo, 2015), but are

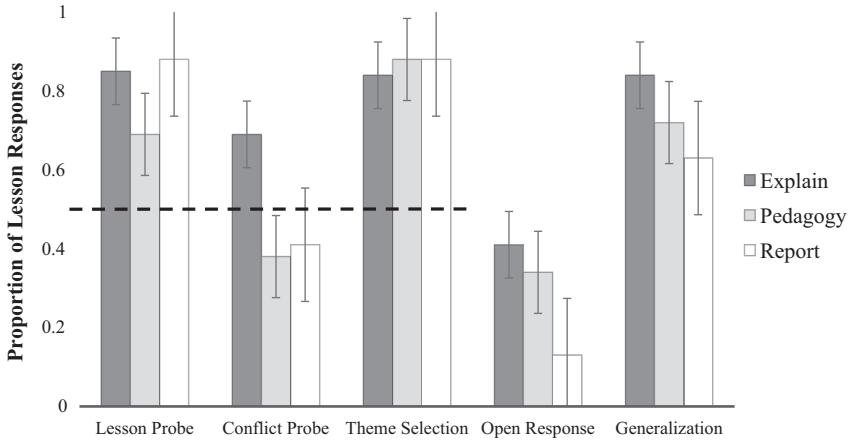


Fig. 2. Proportion of children who privileged the lesson for each relevant task in the *explain, pedagogy,* and *report* conditions of Study 2. The dashed line indicates chance performance for the *Lesson Probe, Conflict Probe,* and *Theme Selection* tasks (chance performance is not well defined for *Open Response* or *Generalization*). Error bars indicate standard error for each proportion.

the first to provide direct evidence of a role for explanation in children's formation of more abstract representations. Our results go beyond prior work in a number of other ways, as well.

Perhaps most strikingly, this is the first study to demonstrate success on moral theme comprehension in children of this age. Prior work overwhelmingly finds that children in our age range (and even older) focus on surface details (e.g., van den Broek, 1997; Van den Broek, Lorch, Linderholm, & Gustafson, 2001; see also Gelman, 2003; Keil, 1989; Sobel, Yoachim, Gopnik, Meltzoff, & Blumenthal, 2007; Wellman & Gelman, 1992). For example, Taylor (1986) found that although 9- to 11-year-olds had no difficulty summarizing the plot of a narrative, they were unable to summarize the theme (defined as the "point" of the story). The ability to extract the theme of a story requires generalizing from the literal level of the text to pull out the main point (Kintsch & van Dijk, 1978). This is a difficult task; the theme is rarely constructed from a story *automatically*, even in adults (e.g., Afflerbach, 1990; Williams, 1993). Some have argued that younger children lack the cognitive or conceptual prerequisites to achieve this construction (e.g., Narvaez, 2002; Perfetti, 1985; van den Broek, Lorch, & Thurlow, 1997), regardless of the type of intervention applied. Others argue that narrative comprehension is an inferential skill that develops more continuously, with theme extraction occurring later in development (e.g., Goldman, 1985; van den Broek, 1997; van den Broek et al., 2005), or that differences in prior knowledge account for age-related changes (e.g., Afflerbach, 1990). Our findings instead reveal that even 5–6-year-old children can extract the theme of the story following a minimal prompt. This suggests that young children do have the cognitive and conceptual resources, as well as the prior knowledge, to abstract the theme of a story – under appropriate conditions. It is therefore not the case that children in this age range *can't* abstract the moral, but that they *don't.* By cueing them to the correct level of analysis, they are able to extract the theme of the story and recognize abstract similarity.

Our findings also identify a process that helps children succeed in theme abstraction: engaging in explanation. How does explanation generate this effect? In prior work, we have proposed that explaining recruits specific constraints on learning, changing how information is evaluated by encouraging learners to privilege those hypotheses that offer "good" explanations (Lombrozo, 2016; Lombrozo & Vasilyeva, in press; Walker, Gopnik et al., 2014; Walker, Lombrozo et al., 2014; Walker et al., in press; Williams & Lombrozo, 2010, 2013; Williams et al., 2013), in particular those that are simple (Bonawitz & Lombrozo, 2012), broad (Walker et al., 2016), and consistent with prior knowledge (Walker et al., 2016). One possibility, then, is that when children were prompted to explain key events in the story, they relied more heavily on prior knowledge to identify a broad and simple principle that could account for the events. In so doing, idiosyncratic surface content was demoted in favor of the more abstract features of the narrative that conformed to the explanatory generalization. For example, in explaining why Jocko was sad in the story "Tall People," children would naturally recruit prior knowledge about what might cause sadness, and search for explanatory generalizations to differentiate the actual state of affairs (Jocko is sad) from an implied alternative (Jocko is not sad), with a preference for those generalizations that explained the most story content (breadth) without making many additional assumptions (simplicity). The result of this process would be the identification of an explanatory generalization formulated in terms of social exclusion broadly (or being "left out" for being different), not in terms of the details of the story (e.g., exclusion due to *height,* exclusion in the context of *play*).

One alternative possibility is that being prompted to explain promoted "deeper processing." In particular, being asked "deeper" questions as probes could have signaled children to produce "deeper" responses at test. One reason to doubt this alternative comes from the selectivity of the observed effects – it is not obvious that "deeper processing" should lead children to uncover the *moral* of the story, in particular, rather than leading them to elaborate on the content or engage in some other form of processing. It is also notable that explanation led children to generate the intended theme, rather than inventing their own theme – as has been demonstrated in previous work (e.g., Lehr, 1988, 1991). Perhaps most tellingly, previous research in theme comprehension has not shown marked improvement following similar "deep" probes. For example, Williams et al. (2002, 2005) developed an instructional program to help students learn about the concept of a "theme," identify the theme in stories, and apply them to real world situations. This program included teacher explanation and modeling, guided practice, and independent practice. In one study, elementary-aged children participated in a total of 14 lessons, each organized around a single story. Children read the story aloud, engaged in discussion of the theme using organizing questions and probes, identified the theme, transferred the theme to other stories, and engaged in a variety of other enrichment activities. Afterwards, 2nd and 3rd grade students were still unable to apply the theme to a real world context or transfer skills to uninstructed themes. If any form of "deep" processing is sufficient to promote

theme learning, it is quite surprising that these interventions were not more effective.

Our findings also shed light on the differential effects of generated versus instructional explanations. Previous research comparing the effects of explanation to those of direct instruction has focused on the acquisition of particular procedures, such as solving mathematical equivalence problems or executing tic-tac-toe strategies. In one such study, prompts to explain led to improvements in procedural learning and transfer over and above direct instruction in 3rd through 5th graders (Rittle-Johnson, 2006). However, other experimental evidence indicates that providing children with high quality explanations of the same mathematical equivalence problems is sufficient to support learning and transfer (e.g., Perry, 1991; Rittle-Johnson & Alibali, 1999). Relatedly, Crowley and Siegler (1999) found that the facilitative effect of explanation on procedural knowledge did not vary based on whether children generated correct explanations on their own, or adopted correct explanations that were provided by an experimenter. Our findings instead suggest that when it comes to extracting and applying an abstract representation from a single example, explanation can be more beneficial than instruction, and that the benefits are not restricted to children who produce correct explanations.

This naturally raises the question of how explaining affected children's performance, if not through the theme-related content of the explanations themselves. Our finding is consistent with prior research, which has found that preschoolers who are prompted to explain often show a more sophisticated pattern of responses on later inferences, even when the content of their explanations falls short of the more mature pattern (Walker, Gopnik et al., 2014; Walker, Lombrozo et al., 2014; Walker et al., 2016; Walker et al., in press). Elsewhere, we have proposed several mechanisms by which explanation could have indirect but beneficial effects (see also, Wilkenfeld & Lombrozo, 2015). For example, generating an incorrect explanation could help learners identify gaps or inconsistencies in their current understanding (e.g., Chi, 2000). Explaining could also encourage other cognitive processes, such as comparison (e.g., Edwards, Williams, Gentner, & Lombrozo, 2014), that could change a learner's representation of the hypothesis space, carrying downstream implications. On these views, engaging in explanation helped children to appreciate the abstract structure of the story, even if it fell short of delivering the moral lesson in the explanation itself.

Finally, our findings are the first (to our knowledge) to demonstrate effects of explanation prompts on learning normative content. The studies reported here required children to learn a prescriptive (moral) lesson from a single narrative, not a descriptive generalization from multiple observations. It is thus all the more remarkable that explanation had reliable effects, and that the effects so closely paralleled those found in prior work. This suggests that the mechanisms involved in explanation-based learning may be domain-general, though to the extent that prior knowledge is invoked through explanation, the specific effects of that prior knowledge will also be a function of its (domain-specific) content.

Even if the mechanisms that underlie explanation-based learning are quite general, there are reasons to suspect that explanation could play a particularly central role in moral learning. Unlike more typical examples of observational learning, prescriptive content necessarily goes beyond the data observed: you might observe a child cry when she is excluded from play for being different, but you don't "observe" that it is wrong to exclude others on this basis. It's likely, then, that moral learning is especially dependent on inferential mechanisms that aren't strictly data-driven and bottom-up. Explaining to oneself (without new data, as in our experiments) is one candidate mechanism, as are inductive and deductive reasoning, analogy, and mental simulation, to name a few. These are all mechanisms that support what we call "learning by thinking" (Lombrozo, in press; Lombrozo & Walker, in preparation): cases of genuine learning or insight that occur in the absence of novel data from "outside the head." Like thought experiments, explaining can help us leverage what we already know in order to extract novel conclusions – in this case prescriptive lessons about moral virtues or how to treat others. Future work could extend these results beyond moral learning to explore whether explanation and other forms of learning by thinking can also influence moral *behavior*.

To conclude, we find that 5- and 6-year-old children can successfully extract the moral lesson from a story, and that prompts to explain key events in the story significantly support their ability to do so. This finding is surprising in light of prior work suggesting that children lack the cognitive or conceptual prerequisites to succeed, and in light of the fact that our intervention – prompts to explain – did not provide children with novel evidence or feedback. The benefits that we report are therefore instances of "learning by thinking," and provide evidence for the existence of cognitive processes that impose top-down constraints on how evidence and prior knowledge are recruited, interpreted, or deployed. Such processes are likely central to all learning, and play a special role when it comes to content that is not strictly descriptive, as in the moral domain.

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Appendix A. Henry the hero story, prompts, and tasks

A.1. Henry the hero

(Lesson: "Anybody can help")

Henry sat on the floor at school listening to his teacher, Mrs. Peach. Mrs. Peach was talking about helping. "Henry," she said, "can you think of someone who helps other people?"

"Yeah, heroes help people and they have big muscles and he fights bad guys and they can fly!" Henry said.

"That's right, heroes *do* help people!" Mrs. Peach replied. "But not only heroes help people, regular people can help too!"

Later that day, Henry went home, still thinking about heroes and helpers. He put on his blue pajamas and draped his red towel like a cape over his back. Then he ran into the kitchen and saw his dad reaching for a plate in a cabinet way up high!

"I'll help you daddy!" he said like a superhero. "I am a superhero, so I can get that plate down for you!" He reached and reached, and jumped as high as he could, but Henry couldn't reach

the plate! Finally he was so tired. "Oh no! Why can't I help?? I'm a superhero!!" "That's okay," Henry's dad said. "I'm sure you can help with other things."

"I know what I'll do!" Henry thought to himself, "I'll put on a mask. Maybe *that* will make me a hero so I can help people!" So he ran to his room and found a silly mask. He put it on, and went outside. He found his mom carrying something really heavy into the house.

"I'll help you mommy!" he said, like a superhero. "I am a superhero, so I can carry that box in for you!" He tried to pick up the box, but it wouldn't budge – it was too heavy!! He tried and tried, until he was so tired. "I *still* can't help! But why not?? I am a superhero!"

"Henry," his mom said, "is that why you are all dressed up?"

"I want to be a hero so I can help people!" he replied, "so I put on my hero outfit and I'm trying to find ways to help!" [*Mid-story prompt*]

"But," his mom said, "you don't have to be a superhero to help people, and you don't have to wear a cape or a mask either."

"But my teacher said I could be a hero!"

"She was right! You can be a hero, but not all heroes have super strength and wear masks! Most heroes wear normal clothes, just like you and me!"

So Henry took off his red cape and his silly mask and his blue pajamas, and put on his regular clothes, and ate a regular dinner, and went to bed. He didn't know *how* he was going to be a hero *without* wearing hero clothes and having super strength.

The next morning, as Henry walked into the kitchen, he saw his dad reaching for something underneath the counter. But his hands were too big too fit in the small crack, so he couldn't reach it! "Henry," he said, "could you help me and reach for the fork I dropped?"

So Henry reached with his smaller hands and got the fork out very easily.

"Thank you so much, Henry!" he said, "you helped me so much!"

Henry was so happy, because he finally knew that he could do what heroes do - *even* without a cape or a mask.

A.2. Prompts for Henry the hero

Mid-story prompt (*report*): "Remind me, did Henry dress up like a super hero?"
Mid-story prompt (*explain*): "Tell me, why did Henry dress up like a super hero?"

End-story prompt (*report*): "Remind me, was Henry happy at the end of the story, even though he wasn't dressed like a super hero?"
End-story prompt (*explain*): "Tell me, why was Henry happy at the end of the story, even though he wasn't dressed like a super hero?"

A.3. Memory questions for Henry the hero

Is Henry able to get the plate down by himself? (no)
Is the box too heavy for Henry to carry? (yes)
Is Henry able to pick up the fork for his dad? (yes)
Does Henry's cape turn him into a super hero? (no)

A.4. Vignettes for Henry the hero

A.4.1. Lesson probe

Diff. content/Diff. lesson: Mandy's mom was cooking lunch. Mandy was feeling silly so she started calling her mom "lunch lady", which made her mom upset. Mandy's mom told her that calling people names makes them upset and it isn't very nice, so Mandy decided not to call her mom "lunch lady" because she didn't want to hurt her feelings.

Diff. content/Same lesson: Mandy's mom was cooking lunch. Mandy decided to set the table so that her mom could finish cooking sooner. When they sat down for lunch, the food was delicious and Mandy felt so good that she could help her mom prepare for lunch.

A.4.2. Conflict probe

Same content/Diff. lesson: Henry was learning in class about people who help other people. He went home and dressed up like a superhero and bragged to his friends that he was cooler than them. Their feelings were hurt, and Henry noticed that it wasn't nice or fun to brag to anyone. He said sorry to his friends for bragging.

Diff. content/Same lesson: School was over, and all of the parents came to pick up their kids. But some of the kids were playing with the blocks and didn't clean up when their parents came to take them home! Brandon saw the messy area with all the blocks, and decided to clean the blocks up so that his teacher wouldn't have to do the work all on her own. When his teacher saw him cleaning up the blocks, she said thank you and Brandon felt so good that he helped clean up after his friends!

A.4.3. Theme selection for Henry the hero

Lesson: Anyone can be a hero and help other people.

Surface content: Superheroes wear capes and masks and help other people.

Appendix B. Mr. Muffett's apple tree story, prompts, and tasks

B.1. Muffett's apple tree

(It is good to be patient/Good things come to those who wait)

Mr. Muffett lived with his wife and children in a beautiful house. The only thing he wanted to change about his house was his garden! There wasn't anything there except dirt, a few patches of grass, and weeds everywhere!

"I know what I want," he said to himself one day. "I want my own fresh apples, and I want a beautiful garden! I'll grow an apple tree!"

So Mr. Muffett went to the nearest plant shop and asked the owner for some apple seeds to plant in his backyard.

"Are you sure you want to grow an apple tree?"

"I am sure!" replied Mr. Muffett. So he paid for his apple seeds and rushed home to plant them.

Mr. Muffett planted the seeds right in the center of his garden, where the sun would shine the most. He dug a hole and placed the seeds inside. He patted the dirt down on top of the seeds, and then watered the patch of dirt.

"I am so excited for my apple tree!" Mr. Muffett thought to himself as he went inside his house for dinner.

The next morning, Mr. Muffett jumped out of bed and rushed out the door to his garden to see how his apple tree was doing. But all he found was a patch of dirt!

"Humf!" he said, "I thought I would see *something* by now…" so he watered the patch of dirt again and went on with his regular day.

Every day for two whole months Mr. Muffett would jump out of bed and rush to see his apple tree. But every day he would see just a patch of dirt. One day he woke up, ran down to his garden, but again he only found that patch of dirt.

He went back into his house, feeling very sad, and his wife asked what the matter was.

"My apple tree isn't growing! It never will! I'm not going to keep watering that silly patch of dirt!" [*Mid-story prompt*]

"Don't worry," his wife replied, "keep watering the dirt, and wait just a little bit longer. Soon it will start to grow, I'm sure!"

So Mr. Muffett watered the dirt for another month, and the patch of dirt was still just a patch of dirt, and Mr. Muffett's wife kept telling him to wait a bit longer.

One morning, Mr. Muffett woke up and walked outside to water the patch of dirt. He was so surprised to find that in the patch of dirt, a little green stem had popped its head out!

"Finally!" he said, "all that waiting finally paid off!" He was so happy.

And for five years, Mr. Muffett took care of his plant, and waited, until finally the plant grew into... the most beautiful apple tree Mr. Muffett had ever seen. It made him happy for many, many years.

B.2. For Mr. Muffett's apple tree

Mid-story prompt (*report*): "Remind me, was Mr. Muffett sad?"
Mid-story prompt (*explain*): "Tell me, why was Mr. Muffett sad?"
End-story prompt (*report*): "Remind me, was Mr. Muffett happy at the end of the story?"
End-story prompt (*explain*): "Tell me, why was Mr. Muffett happy at the end of the story?"

B.3. Questions for Mr. Muffett's apple tree

Did the little green stem ever pop out of the ground? (yes)
Does Mr. Muffett want to grow oranges? (no)
Does Mr. Muffett's tree grow the very first day he plants it? (no)
Did Mr. Muffet water his apple tree seeds? (yes)

B.4. For Mr. Muffett's apple tree

B.4.1. Lesson probe

Diff. content/Same lesson: Sara had a yellow blanket that she carried with her everywhere. It was her favorite blanket! One day, Sara's yellow blanket was so dirty that her mother decided it should be put in the laundry. Right after her mother put the blanket in the wash, Sara missed her favorite blanket. "When will the blanket be done?" she asked, "I want it now!" Just wait a little longer her mom said. So Sara decided to wait without becoming upset. Soon enough, the blanket was done washing! Sara was so happy she waited because now the blanket was clean and fluffy.

Diff. content/Diff. lesson: Sara had a yellow blanket that she carried with her everywhere. It was her favorite blanket! One day, Sara's yellow blanket was so dirty that her mother decided it should be put in the laundry. Her mom said, "While your blanket is washing, why don't you clean your room?" So Sara cleaned her room, and when her blanket was done washing, she had a clean room *and* a clean blanket! She felt so good she listened to her mother.

B.4.2. Conflict probe

Diff. content/Same lesson: Dina sat at home with her father, waiting for her mother to come home from work. Her mother was late and Dina was upset. Her dad told her to wait a little longer, and not to be upset because her mom would be home soon. Dina waited without getting upset, and her mother came home and Dina was so happy that she waited the extra time because her mom had brought home Dina's favorite ice cream!

Same content/Diff. lesson: Mr. Muffett bought apple seeds to plant an apple tree in his garden. Every day he watered the seeds and the dirt but they weren't growing! His wife asked him if he needed help. He said no. Every day Mr. Muffett found that the seeds weren't growing. Finally, he asked his wife for help, and she helped him because she knew how to grow apple trees. The apple tree grew and Mr. Muffett was so happy he had asked his wife for help.

B.5. Selection for Mr. Muffet's apple tree

Lesson: It is good to be patient.
Surface content: Plants take a long time to grow.

Appendix C. The Queen's painting story, prompts, and tasks

C.1. The Queen's painting

(Theme: "Work together to make something better.")

In a faraway land there lived a wise old queen. Her whole kingdom was very happy, except for three families! The Yellows were a family of painters who thought that everything should be painted – only in YELLOW! They only used yellow paint, and they thought that the other colors were silly looking and not as good! The Reds were also painters and they ONLY used red paint, because they thought that red was the most beautiful! The third family, the Blues, only painted with BLUE paint because they thought blue was the best! So all three families thought that their colors were the best!

One day the queen asked all three families to come to her castle and said, "I would like for you three families to make the most beautiful painting for me!

"So," she asked Yellow family, "what color do you think should be used in the painting?"

"Yellow, over course!" they answered.

"Alright," the queen said, and she handed them a bowl, "put some yellow paint in this bowl, please."

So they did. Next the queen turned to the Red family and asked "now, what color do *you* think we should paint with?"

"RED!" they responded.

The queen was sad that the Yellow family only wanted to use yellow and the Red family only wanted to use red. [*Mid-story prompt*]

"Alright, then please put some red paint in this bowl with the yellow paint." So they did. Then, the queen took a spoon and mixed the red and the yellow paint together. "Look!" the queen said, "your yellow and your red can mix together to make another wonderful color – orange!"

Then the queen took some blue paint and some yellow paint and mixed them together, and the mixture created another beautiful color - green! Then she mixed the blue and the red and made even another beautiful color - purple!

"See?" the queen said, "you can make so many beautiful things with two colors. Now if you use all your colors for the same painting, you'll have SIX wonderful colors instead of just ONE!"

So the Yellow family and the Red family and the Blue family took the red, and the orange and the yellow and the green and the blue and the purple and painted the most BEAUTIFUL painting in the entire world! It was a rainbow made of all the colors. From then on, all the families painted together, because even though the Yellow family loved yellow and the Red family loved red and the blue family loved blue, what they all loved EVEN MORE was all the colors together!

C.2. Prompts for the Queen's painting

Mid-story prompt (*report*): "Remind me, was the queen sad?"
Mid-story prompt (*explain*): "Tell me, why was the queen sad?"

Mid-story prompt (*pedagogy;* Study 2 only): "The queen was sad because each family only wanted to paint with their own color and not work together."

End-story prompt (*report*): "Remind me, was the painting beautiful?"
End-story prompt (*explain*): "Tell me, why was the painting so beautiful?"
End-story prompt (*pedagogy*; Study 2 only): "The painting was so beautiful because the families worked together to combine their colors."

C.3. Memory questions for the Queen's painting

C.3.1. Study 1

Do the paints mix together to make new colors? (yes)
Does the yellow family think the painting should only have blue paint? (no)
Was the queen happy that the yellow family only wanted to use yellow and the red family only wanted to use red? (no)
Was the painting beautiful? (yes)

C.3.2. Study 2 additional questions

At the end of the story, did the red family, the blue family, and the yellow families share? (no)
Was the queen's hair purple? (yes)
Did the queen paint the picture together with the red family, the blue family and the yellow family? (no)
After they mixed the colors, did they have six colors to paint with? (yes)

C.4. Vignettes for the Queen's painting

C.4.1. Lesson probe

Diff. content/Same lesson: Recess time! Sam wanted to swing on the swings, but his best friend Julie wanted to play catch. Sam went on the swings, but there was no one to push him. Julie grabbed the ball, but there was no one to catch it. So they decided that they would play together. Julie would push Sam on the swings, and then Sam would catch Julie's ball.

Diff. content/Diff. lesson: Recess time! Sam was swinging on the swings, and his best friend Julie was pushing him. After a while, she got very tired, and Sam got very dizzy. Neither of them felt very well at all! So they decided that even though they love swinging on the swings, they shouldn't do it so much.

C.4.2. Conflict probe

Same content/Diff. lesson: The yellow family only painted with yellow, the red family only painted with red, and the blue family only painted with blue. One day, the queen asked all of the families to come to her house to paint the most beautiful painting for her. Each family started painting, but the queen wanted them to go faster because she didn't want to wait. But, when the paintings were done, they were so beautiful that the queen was happy that she had waited.

Diff. content/Same lesson: Ben and Cara were each making their own sand castles. But Ben didn't like his sand castle because it was too small, and Cara didn't like her sand castle because it kept falling apart. So they decided to build one sand castle and they made a huge castle that didn't fall apart. They were so happy that they worked together.

C.5. Theme selection for the Queen's painting

Lesson: When people work together instead of alone, they can do greater things.
Surface content: Mixing colors can make new colors for a painting.

C.6. Generalization task (Study 2 only)

Now, I have a story to tell you! I went to the store today with my brother to buy flowers for our mom's birthday! I only had one dollar, and my brother also only had one dollar. When we got to the store, there were small flowers for one dollar, or big bunches of flowers for two dollars. What should my brother and I do?

Appendix D. The tall people, prompts, and tasks

D.1. The tall people

(Be nice to people who are different)

In a town called Talleg there lived really, really tall people! They were as tall as trees, with big arms as long as huge branches. They had huge houses and huge schools and huge cars, and they liked being tall! They always like to play a game together, and they would have so much fun!

One day, someone new walked into town - he was short, with short legs and short arms. All the people in Talleg stared at the new guest, who made his way to the closest house. People snickered and snackered and giggled and laughed, but the new man didn't notice. Right outside the house, he knocked on the door. When a tall mother appeared with her tall baby, the short man cleared his throat and said very loudly "My name is Jocko, and I want to play with you! Everyone who heard him laughed and laughed, and finally Jocko was a little bit upset.

"Why is everyone laughing at me?" he said

"Because you look so… *silly*" someone replied

"Do I really? Why do I look silly?"

The villagers started to yell "you're short, with small legs and small arms"

"Is that so?" Jocko replied, "because I come from a land called Smalleg, and everyone who lives there is just my height, with small legs and arms! In all my life, no one ever told me I look silly."

But the villagers kept laughing, and said they didn't want to play with him. Jocko was so sad that he started to walk back home. [*Mid-story prompt*]

"Wait!" one tall person said, "I will play with you, because even though you're smaller than me, you still seem like a nice person."

"Oh, alright," another tall person said, "I'll play with you too. I don't really care that you're smaller than me."

"Really??" Jocko said, "that's so nice of you! Thank you, thank you so much!"

So Jocko played with the people in Talleg, and it turned out that they all had the most wonderful time! And from then on, no one ever laughed at Jocko again, and they played together every day!

D.2. Prompts for tall people

Mid-story prompt (*report*): "Remind me, was Jocko sad?"
Mid-story prompt (*explain*): "Tell me, why was Jocko sad?"
Mid-story prompt (*pedagogy*; Study 2 only): "Jocko was sad because the people in Talleg laughed at him for being different from them."

End-story prompt (*report*): "Remind me, did the tall people decide to play with Jocko?

End-story prompt (*explain*): "Tell me, why did the tall people decide to play with Jocko?"
End-story prompt (*pedagogy*; Study 2 only): "The tall people decided to play with Jocko because its okay to be friends with people who are different from you."

D.3. Memory questions for tall people

D.3.1. Study 1

Does Talleg have really small people in the town? (no)
Do the villagers from Talleg laugh at Jocko when he comes to their town? (yes)
Do the villagers tell Jocko that he looks silly? (yes)
Does Jocko have very long arms and legs? (no)

D.3.2. Study 2 additional questions

Did Jocko say that all the people in the town where he came from play together? (no)
Was Jocko from a town called Smalleg? (yes)
Did Jocko say to the people of Talleg, "Will you play with me, even though I am different?" (no)
Did the people in Talleg have no hair? (yes)

D.4. Vignettes for tall people

D.4.1. Lesson probe

Diff. content/Diff. lesson: Mrs. Trimble was directing a school play, and Sasha and Max were in the play together. One day, Max brought some cookies to play practice, and gave one to Mrs. Trimble. Sasha wanted to eat a cookie too, so Max shared his cookies with Sasha. The cookies were so yummy and Max felt so good that he gave Sasha a cookie.

Diff. content/Same lesson: Mrs. Trimble was directing a school play, but she only allowed kids with green eyes to be in the play! Sasha really wanted to be in the play, but Mrs. Trimble said no because Sasha had brown eyes. Sasha became really sad, but her friend Max gave Sasha his part in the play because it didn't matter that she had brown eyes, she was still his friend.

D.4.2. Conflict probe

Same content/Diff. lesson: The tall people were playing a game and a short person named Jocko asked if he could play with them. First they laughed at him and he became very sad. Then one of the tall people hurt his leg and Jocko was able to help him, and it was so nice that Jocko helped the tall person.

Diff. content/same lesson: Jenny is different from other people, because instead of walking on her feet, she walks on her hands! The other kids didn't let Jenny walk to school with them, because they thought it was weird that she walked on her hands. Jenny became very sad, but finally one of the kids said she could walk with them to school, because it didn't matter that she walks differently. She walked to school with them, and they had a wonderful time, and they all became very good friends!

D.5. Theme selection for tall people

Lesson: It doesn't matter if people are different, we can still be nice to each other and have fun together.
Surface content: The people from Talleg laughed at Jocko and didn't want to play with him at first.

D.6. Generalization task (Study 2 only)

Now, I have a story for you! I have a dog, named Rex, and Rex is a poodle! My town just made a brand new dog park. Rex loves to run and play, but all the other dogs in the dog park are Dalmatians. When I brought Rex to the dog park today, the people in charge said they weren't sure they could allow Rex to go into the dog park because he's a poodle. What should the people in charge of the dog park do?

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