

Children Prefer Storybooks with Causal Information

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ABSTRACT

One way to foster early literacy is by engaging and inspiring children's early interest in reading. Enriching the causal content of children's books may be one way to address this goal, as causal information has been empirically shown to capture children's attention. Indeed, young children appear to broadly prefer expository books, which are typically rich in causal information, over narrative books, which are more variable in their causal content. To more directly test whether children's book preferences might be driven by causal content, we created pairs of storybooks closely matched for content and complexity, but with differing amounts of causal information embedded therein. Three- and 4-year-old participants ($n = 48$) were read both books and their interests and preferences were evaluated. Although ratings revealed equally high levels of enjoyment across book types, when asked to choose, children preferred the highly causal over the minimally causal books. Results are discussed in terms of broader implications for creating books that optimally engage young children, thereby potentially promoting interest in reading and early literacy.

INTRODUCTION

From a young age, children have a strong intrinsic interest in discovering the causal structure of the world around them. Although this “causal stance” has been well documented in terms of children’s exploration and inquiry patterns (Alvarez and Booth, 2016; Cook, Goodman, & Schulz, 2011; Greif, Kemler Nelson, Keil, & Gutierrez, 2006), motivational responses (Alvarez and Booth, 2014), and explicit preferences (Alvarez and Booth, 2015), its relevance to real-world contexts remains unclear.

Perhaps most intuitively, interest in the causal properties of objects and animals might be fundamental to children’s engagement in scientific inquiry in both naturalistic and academic learning environments. However, its relevance might be considerably broader than this. Children’s causal stance might, for example, also be a potent motivating factor in the context of shared-book reading, potentially driving children’s selection of books and boosting engagement in the reading process.

Children’s interest in causality has already been demonstrated across numerous experimental settings. For instance, children will spontaneously and persistently ask questions about novel objects until causally-relevant information is revealed (Alvarez and Booth, 2016; Greif, et al., 2006). Children also explore novel toys longer if their causal structure is ambiguous or contradictory than if it is expected (Bonawitz et al., 2011; Cook, et al., 2011; Marcis and Sobel, 2017). Still other work reveals that young children will persist longer at a tedious motor task when rewarded with causally rich rather than minimally causal descriptions of novel objects (Alvarez and Booth, 2014), and tend to favor informants who have a history of providing causal information (Sobel and Corriveau, 2010). For example, when Alvarez and Booth (2015) presented preschoolers with two identical puppets that offered either causally rich or causally

weak descriptions of novel items, children were more likely to ask to hear from the former.

Although this body of research compellingly demonstrates children's early attunement to causal information, it is limited by the fact that each contributing study was conducted in a contrived experimental context. As a result, its relevance to more naturalistic settings remains unclear. One such context in which children's special interest in causal information could have particularly significant developmental consequences is shared book reading.

Shared book reading is known to facilitate early print awareness, vocabulary acquisition and, ultimately, reading skill in young children (for a review, see Bus, Van Ijzendoorn, & Pellegrini, 1995; Ezell and Justice, 2005; Farrant and Zubrick, 2012; Sénéchal, 2010). However, in order to maximize the impact of shared book reading on early literacy, it is crucial to foster children's early affinity for this activity (Holdaway, 1979; Lyytinen, Laakso, & Poikkeus, 1998; Sénéchal, 2010; Whitehurst et al., 1988). Although the manner in which books are read to young children clearly affects their engagement in the activity (e.g., Hargrave and Sénéchal, 2000), it is also important to select specific books that appeal to the child.

We currently know very little about the factors that might influence young children's attraction to particular books. Two recent studies do, however, suggest that young children have a broad preference for expository (i.e., informational) over narrative storybooks. In one study, teachers asked kindergarten students about book pairs that were used over the course of an 8-week read-aloud activity (Kotaman and Tekin, 2017). Both before and after reading each pair of books, kindergarteners preferred expository over narrative books. In another study, Robertson and Reese (2017) asked parents of 3- to 5-year-old children to take home two books (one expository and one narrative), read them to their child, and then report which book their child liked more. Though parents reported owning and reading more narrative books, they also reported that their child preferred the expository book to the narrative fiction book (Robertson

and Reese, 2017).

Although these studies suggest that expository books are of particular interest to young children, the reason behind this preference remains unclear. One possibility is that it is the causal content of expository texts that captures children's attention. Both narrative and expository texts can of course reveal the causal structure of the world, but only the latter are typically designed to do so in an explicit manner. Recent investigations into children's book preferences (Kotaman and Tekin, 2017; Robertson and Reese, 2017) cannot directly address this possibility because the narrative and expository texts offered to children in those studies potentially varied on a number of dimensions.

In order to more definitively test whether causal content drives children's book preferences, we narrowed our focus to expository texts and specifically compared those that are rich with causal information (e.g., why animals behave in a certain way) to books that included only minimally causal information (e.g., visual descriptions of the same animals). We chose animals as the subjects of our expository texts as they are some of the most popular subjects of children's books (Marriott, 2002) and garner children's interest from a young age (DeLoache, Pickard, & LoBue, 2011).

Based on the theory and research described above, we hypothesized that the causal content of books would be particularly compelling to children and thus would both draw their attention during the book reading activity and influence their preferences for particular books. Importantly, this is not a foregone conclusion. It is entirely possible that children are not sensitive to the causality of information presented in the otherwise engaging context of shared book reading. Indeed, the high level of stimulation inherent in reading novel books with an attentive adult could overwhelm children's sensitivity to qualitative differences in book content. A controlled examination is therefore critical for disambiguating these possibilities.

METHOD

Participants

Our sample included 48 children (21 female) from the Austin, Texas area. Participating children were three- to four-years old at the first session ($M = 4;0$, $SD = 0;3$, range = 3;3 – 4;7). Children were recruited through an existing database of families interested in participating in research. Children did not have any diagnosed developmental disorders or hearing impairments, and spoke English more than 50% of the time in the home. An additional fourteen children were excluded from analyses due to attrition after the first visit ($n = 6$), noncompliance with study tasks ($n = 3$), prior exposure to the books used as stimuli ($n = 2$), and experimenter error ($n = 3$).

Based on parent report, 10.4% of participating children were African American, 72.9% were White, 4.2% were Asian, and 12.5% identified as multiple races or “other.” In addition, 31% of these children were also identified by their parents as being Hispanic or Latino. With respect to maternal education, 8.3% held a high school degree, 8.3 % completed some college or additional training beyond high school, 48.0% had a four-year bachelor’s degree, and 35.4% held a master’s degree or higher.

Materials

Two expository children’s books about animals were selected as stimuli. Although both were authored and illustrated by Steve Jenkins, and targeted the same-aged audience, they differed in the degree to which they emphasized causal information. “Biggest, Strongest, Fastest” (Jenkins, 1997) contained minimally causal information, while “What Do You Do When Something Wants to Eat You?” (Jenkins, 2015) contained a wealth of causally rich information. To ensure that any observed preference for the causally rich book could not be accounted by the

appeal of its unique illustrations, we created a second version of each book by editing the text to contain the inverse amount of causal information. Thus, in the edited pair, “Biggest, Strongest, Fastest” became the causally rich book, while “What Do You do When Something Wants to Eat You?” became the minimally causal book. The four book versions are summarized in Table 1. Specifically, causally rich versions explained how a given behavior or body part was relevant to the animal’s survival, whereas minimally causal versions provided factual descriptions of the same property (see Table 2). Although causal properties could certainly be inferred from the descriptions and pictures provided in the minimally causal versions, they were never explicitly stated. Importantly, the edited texts were carefully matched to their original counterparts as closely as possible in length (see Table 3).

Table 1
Book Pairs

	“What Do You Do When Something Wants to Eat You?”	“Biggest, Strongest, Fastest”
Pair 1	causally rich (original version)	minimally causal (original version)
Pair 2	minimally causal (rewritten version)	causally rich (rewritten version)

Note. Half of the participants were read Pair 1 while the other half were read Pair 2.

Table 2

Example sentences from the original and rewritten texts

	Original	Rewrite
“What Do You Do When Something Wants to Eat You?”	When an octopus is threatened... it squirts a thick cloud of black ink into the water, confusing its attacker.	The brown-skinned octopus... has eight really long arms covered with suction cups that feel super sticky if you touch them.
	If a puffer fish is in danger... it takes in water and swells up like a prickly balloon, making itself almost impossible to swallow.	If you see a pufferfish in the ocean... its puffy body will be filled up with water and covered with lots of prickly little spikes.
“Biggest, Strongest, Fastest”	The land snail is one of the slowest animals.	The land snail hides in its shell for protection.
	The blue whale is the biggest animal that has ever lived.	The blue whale closes its blowhole to hold its breath under water.

Table 3

Book version comparison summaries

		<u>Number of Words</u>		<u>Number of Syllables</u>	
		original	rewrite	original	rewrite
“What Do You Do When Something Wants to Eat You?”	total	357	359	506	507
	average per page	25.5	25.6	36.1	36.2
“Biggest, Strongest, Fastest”	total	132	138	198	199
	average per page	9.43	9.86	14.14	14.21

General Procedure

This study involved two sessions, spaced approximately two weeks apart. At each session, a female experimenter read one pair of books to the child. After reading each one, the child rated how they felt about the book, and answered five comprehension questions. Lastly, the child chose which of the two books he or she preferred. Both sessions took place in a quiet room with minimal distractions at our research lab on the University's campus. Parents consented for both themselves and their child by signing a single consent form in person. We also obtained children's verbal assent. All sessions were audio-visually recorded for offline coding. Upon completion of each visit, the family was compensated, and each child was given a book to take home.

Procedure: Visit 1

Book rating training

To measure how much the children enjoyed each book, we used a 5-point Likert-like "Smiley-Face Scale" (adapted from the Wong-Baker FACES Scale; Wong, Hockenberry-Eaton, Wilson, Winkelstein, & Schwartz, 1996). Before reading, the experimenter trained the child on how to use the scale by demonstrating her own preferences for example toys. First, she explained what each face meant (e.g., "If I really don't like the toy at all, I will choose the very sad face.") while simultaneously pointing to the corresponding face on the printed scale. After the experimenter demonstrated her ratings of two objects (a plastic toy dog and a ballpoint pen), each child was encouraged to give his or her own ratings of three additional objects (a toy banana, a plush elephant, and a crumpled tissue) to ensure they understood the procedure. This scale was chosen based on prior research that supports the use of Likert scales when working with young children (van Laerhoven, van der Zaag-Loonen, & Derkx, 2004), and the use of faces

in particular (Macklin and Machleit, 1990; Nelson, 1980; Smetana, 1981; West, Hailes, & Sammons, 1997).

Book reading

Each child was read one pair of books: one version of each title (“Biggest, Strongest, Fastest” and “What Do You Do When Something Wants to Eat You?”). One book was causally rich and the other was minimally causal (see Table 1). The order of presentation was counterbalanced across participants. At the second visit, the child was read the same pair of books, but in the opposite order. The same experimenter read both books to the child at both visits and maintained a friendly and consistent style of reading throughout. If the child asked questions, the experimenter redirected them to the book with neutral statements such as, “let’s see what the book says next!” She also used simple gestures that were kept consistent in both the causally rich and minimally causal versions of each book (e.g., circled an animal with her finger as she described it).

Book rating

After reading each book, the experimenter asked the child to rate how much they liked the book. The experimenter reminded the child of how to use the Smiley-Face Scale by saying, “Remember when we showed how we felt about those toys earlier using these smiley faces? Can you use these faces again to tell me how you felt about the book?” If necessary, the experimenter reiterated what each face meant. The same procedure was repeated after the second book.

Comprehension questions

Five comprehension questions were administered after reading each book to ensure the child was paying attention and understood the content. Each question was accompanied by two illustrations excerpted from the books. Children selected their answer by pointing or verbalizing their choice. It is important to note that while the questions were designed to be relatively easy for a child who read the book, the answers were not obvious from simply looking at the two pictures. The experimenter thanked the child for their responses but did not provide corrective feedback on any of the questions.

Measuring explicit book preference

Once both books were read, the child was given a short break. Afterwards, the experimenter placed both books in front of the child, read both titles, and asked them which book they liked more. If the child was hesitant at first, the experimenter rephrased the question by asking, “Which one was your favorite?” To ensure that the experimenter did not bias responding, she presented the books in the order in which they were read (which was counterbalanced across sessions) and looked only at the child when asking for their preference.

Procedure: Visit 2

Two to four weeks after their first visit, parent-child dyads each returned to the laboratory for a second session. All tasks at this session followed the same procedure as the first session, with two exceptions. First, the order in which the books were read to each child was reversed from the first session. Second, the story comprehension questions were rephrased so that the distractor pictures from questions at the first session were now the correct answers. This was done in order to control for any potential intrinsic appeal of a particular response option.

Coding

Participant data were coded and managed using Research Electronic Data Capture (REDCap; Harris et al., 2009). REDCap is a secure, web-based application designed to support data capture for research studies. Book ratings, story comprehension, and book preference were coded offline. A second reliable research assistant also coded 20% of the videos to ensure reliability. No discrepancies were detected.

Videos were also coded offline for children's overall engagement during the book reading activity. Pilot data demonstrated that this was most reliably measured using a flexible 3-point scale (rather than on the basis of specific indicators that manifested inconsistently across children). The scale differentiated between low, moderate, and high levels of engagement. A primary coder rated 100% of participant videos and a blind secondary coder scored 20% of the videos. Overall, there was excellent agreement between coders (Cohen's kappa = .96).

RESULTS

Children performed similarly on comprehension questions for causally rich ($M = 4.04$, $SD = .97$) and minimally causal ($M = 4.05$, $SD = .90$) books, $t(47) = -.074$, $p = .94$, confirming that our books were well matched in terms of the accessibility of their content. Additionally, children rated both the causally rich ($M = 4.19$, $SD = 1.34$) and minimally causal ($M = 4.06$, $SD = 1.49$) books equally likable on our Likert Smiley-Face Scale, $t(47) = .65$, $p = 0.52$. Overall, 76.56% of the time, children indicated that reading the book made them either “a little bit happy” or “very happy.” A uniformly high level of enthusiasm during book reading sessions was also evident in the 3-point global ratings of engagement ($M_{rich} = 2.24$; $SD = .66$, $M_{minimal} = 2.36$, $SD = .62$), $t(47) = -1.60$, $p = .12$.

We compared children’s explicit book preferences across both sessions using a chi-square goodness-of-fit test (see Table 4). Our observed findings were significantly different from what would be expected by chance, $\chi^2(2, N = 48) = 12.13$, $p = .002$, and the size of the effect was relatively large ($\omega = .50$). Indeed, 43.75% of children chose the causally rich book at both sessions, 27.08% chose the causally rich book at just one session, and 29.17% chose the minimally causal book at both sessions. A follow-up binomial test confirmed that the number of children who selected the causally rich book during both visits was greater than the chance value of 25%, $p = .004$.

Table 4

Explicit book choices combined across sessions

	<u>Frequency of Book Choice Patterns</u>		
	Minimally Causal (at both visits)	One of Each	Causally Rich (at both visits)
Observed	14	13	21
Expected (chance)	12	24	12

Children's observed preference for causal books was significantly larger than what might be expected if they were merely choosing at chance levels.

DISCUSSION

This investigation focused on the intersection between existing research on young children's attunement to the causal structure of the world and on children's book preferences. Specifically, we asked whether children's book preferences might be driven, at least in part, by their interest in causality. The core finding revealed by this investigation was that young children do indeed prefer storybooks containing causally rich information to those containing minimally causal information. Importantly, this result emerged even though comparison books were matched carefully in terms of text complexity, length, illustrative quality, and comprehensibility.

This finding is consistent with prior research and theory detailing young children's "causal stance," or early emerging motivation to acquire causally-relevant knowledge (e.g., Gopnik, 2000). In particular, the current work parallels Alvarez and Booth (2015), in which preschoolers explicitly chose to learn about the causal powers of objects and animals over other types of information. This study also makes a further contribution by extending the generalizability of these findings to a more naturalistic setting: shared book-reading. Given all of the distractions that might capture a young child's attention in this context (e.g., the novel laboratory setting, the unfamiliar experimenter, a new book packed with bold illustrations), it is remarkable that children detected the key qualitative difference in causal content and used it to guide their book selections.

Our results are also consistent with the small but growing literature on children's book preferences. Prior evidence suggests that children generally prefer expository texts over narrative texts (Kotaman and Tekin, 2017; Robertson and Reese, 2017). To the extent that the former typically contain more information about the causal structure of the world than the latter, the preference for causally rich books observed here is well aligned with this finding. However, it

should be noted that, on average, narrative storybooks might actually be *richer* than expository texts in other types of causal information, specifically with respect to psychological or narrative causality. Future work will be necessary to systematically test the basis for children's book preferences across different genres and types of causality.

Other directions for future work are also spotlighted by the current study. For example, it will be important to explore why children's preference for causally rich content was evident when books were explicitly pit against each other, but not when each was independently rated by the child, or when the child's engagement was coded globally. The consistently high ratings observed on these measures indicate that overall, children were highly engaged in, and enjoyed, the book reading sessions. This was likely due to the generally novel context, including the playful lab setting, new books, and the attentive adult reader. As a result of this high level of baseline stimulation, the sensitivity of our measures of engagement and book liking might have been unintentionally constrained. To overcome this limitation, future work might focus on recording parents reading books to their child in their home, thus minimizing irrelevant stimulation and further increasing ecological validity. Following Robertson & Reese's (Robertson and Reese, 2017) work, families could be given several books that systematically vary on key dimensions to assess children's preferences.

It will also be important to specify, in future work, whether children's preferences for causally rich books translates into superior learning. Causal explanations have already been shown to support the acquisition of knowledge in other settings (e.g., Bauer, Booth, & McGroarty-Torres, 2016; Booth, 2015; Gopnik and Sobel, 2000). For instance, in one study, preschoolers recalled more novel labels for unfamiliar objects or animals after a delay when they were accompanied by causal descriptions than when they were accompanied by non-causal descriptions (Booth, 2009). Although the current study tested children's knowledge of book

content, these questions were intended only as a basic comprehension check. More difficult questions (perhaps again focusing on novel vocabulary) would be necessary to gain sufficient sensitivity to variations in learning.

Although much remains to be done in this area of inquiry, the current work lays a solid foundation for exploring the potential relevance of children's causal stance to real-world learning contexts. Specifically, it demonstrates that children's interest in causal information extends to personal book preferences. This insight could be useful to parents, educators, and authors working to facilitate early literacy. By choosing optimally engaging books, the documented benefits of shared book reading could further scaffold young children's oral language and literacy skills (for a review, see Bus, et al., 1995; Farrant and Zubrick, 2012; Hargrave and Sénéchal, 2000; Sénéchal, 2010).

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