MISCONCEPTIONS, SHARKS, AND STORYBOOKS

Exploring Children's Perceptions of Sharks through Drawing and Word Use After Exposure to Environmentally Focused Storybooks

Nicole Warren[1,2] and Rachel Yoho[2]

[1]North Carolina Aquarium at Pine Knoll Shores, Pine Knoll Shores, North Carolina, USA

[2]Department of Biology, Project Dragonfly, Miami University, Oxford, Ohio, USA

Sharks play a vital role in the health and well being of our ocean environment. As top predators, sharks help maintain a healthy balance in prey populations by removing sick and weak individuals (Griffin, Miller, Freitas, & Hirshfield, 2008). Despite this important role, sharks are still considered controversial and often feared by the general public due to sensationalized stories and stereotypes. Since a quarter of the world's species of sharks are threatened with extinction, the continuation of these misunderstandings is of growing concern (Dulvy et al., 2014). Although sharks receive a lot of media coverage, their future is uncertain as controversial animals are often overlooked for protection and conservation. As such, it is essential not only to address misconceptions, but also inspire appreciation for sharks.

Children's perceptions of animals are often carried with them into adulthood, shaping their ability to learn about and empathize with generally unfavored animals (Sorin & Gordon, 2016). Children receive information about animals and the natural world from many different sources, including books. As such, children's literature can be used to promote learning and interest in environmental issues, even from a young age (Kellert & Westervelt, 1983). Wildlife themed storybooks allow youth the chance to generate an emotional connection with the natural world. Similarly, these types of books have been found to improve attitudes, dispel myths, encourage discussion about conservation, and alter unfavorable viewpoints (Burke & Cutter-Mackenzie, 2010). While it is well understood that the media can influence the public's perception of unfavored animals (Muter, Gore, Gledhill, Lamont, & Huveneers, 2013), studies on how storybooks influence children's perceptions of these same animals are less prevalent. In an attempt to shed light on the complexities of children's understandings of sharks, our study explored whether books with personal connection texts and questions address negative stereotypes and misconceptions.

In storybooks, anthropomorphism, attributing human characteristics and emotions to animals, is a long-standing technique used by authors to encourage young readers to identify with animals. Previous research suggests that after reading storybooks with anthropomorphic animal characters, children are more likely to give factual and biological explanations of real animals if the animal characters are presented in a more realistic manner potraying limited human social and psychological abilities (Geerdts, Van de Walle & LoBue, 2016). Similar to realistic anthropomorphism, we investigated whether personal connection text and questions that connected children's everyday actions with that of sharks could change children's perceptions of sharks when compared to the same storybook that included only facts about sharks. Personal connection text and questions inculded examples such as, "Sand tiger sharks gather together in large groups where they find food. Do you like to eat lunch with your friends?"

Methods

Study Approach and Participants

Informal education centers such as zoos and aquariums receive more than 700 million visitors annually (Gusset & Dick, 2011). Consequently, zoos and aquariums have an opportunity to impact attitudes about animals and their conservation which can have lasting benefits (Gusset & Dick, 2011; Seraphin, 2010). To aid in this venture, the North Carolina Aquariums, in conjunction with Unite For Literacy, designed a book that highlights common facts about sharks that are often exaggerated by stereotypes. We used this book to investigate children's attitudes about sharks in a formal educational setting. The book contains personal connection texts and questions for the reader. These questions and texts were designed to encourage a link between the everyday actions of children and sharks (for example, a child using a fork and a sand tiger shark using its teeth like a fork). A modified book, which focussed on facts, without the personal connection text and questions, was also written.

Children (ages 9-10) from two fourth grade classes (N=37) participated in the study. The students were divided into two groups (n=19 and n=18) based on their existing fourth grade class. The students in Group A were read the original book, while students in Group B were read the modified version. Specific information on ethnicity, gender, and socioeconomic status was not collected as part of this study. However, general demographic information about the county indicates that this population of students may represent a range of ethnic and socioeconomic diversity. Miami University's Institutional Review Board approved all procedures in the study and parents gave

written consent for their children's participation. Students also gave verbal assent to participate in the study. Upon completion of the study, students received a copy of the Sand Tiger Sharks book.

Data Collection and Attitude Assessment

Before and after reading the book, Sand Tiger Sharks, students were asked to create a drawing with labels and share verbally their ideas, opinions and beliefs about sharks through open-ended conversations. Each student was also asked to "List the first three words that come to mind when thinking of the word shark." The use of "first-word" impressions allowed children the opportunity to express ideas that they may not have been able to draw (Seraphin, 2010). Other prompts included "Tell me about your drawing" and "How do you feel about sharks?" In the questioning, positive and negative descriptive wordings were avoided to minimize bias.

Using word themes developed by Seraphin (2010), we created a flowchart to separate shark words into emotional and non-emotional categories. Within the emotional word group, words were further divided into negative and positive. Likewise within the non-emotional group, words were divided into science content and stereotypes. Words which could not be placed into the above categories were considered unclassified (Figure 1).

Analysis of Drawings

Hughes' (2013) study on investigating youth's perceptions of cheetahs through storytelling and Fawcett's (2002) study on Children's Wild Animal Stories inspired our methodological analysis. We used Chambers' (1983) Draw-a-Scientist-Test as a tool to assess students' perceptions of sharks through drawing. In an unobtrusive manner, drawing can also give students the opportunity to reflect and articulate their ideas and perceptions in a way that could be more comfortable and interesting to them (Hughes, 2013; Fawcett, 2002).

Chambers (1983) used seven standard image indicators (eg. lab coat and eye glasses) to analyze the extent to which a drawing presented the standard image of a scientist. In an attempt to remove subjectivity, we did not choose any indicators of the stereotypical image of a shark. Instead, we used interpretative phenomenological analysis (IPA), similar to that used by Hughes (2013). We examined the students' drawings for details "within [the] experience that may be taken for granted" with the objective of achieving a sense of understanding (Laverty, 2003; Titscher et al., 2000). IPA is a particular method of qualitative analysis of data that "aims to offer insights into how a given person, in a given context, makes sense of a given phenomenon" (Orford, 2008). Pre-drawings and post-drawings of Group A and Group B were separated and each drawing was analyzed for central characteristics that appeared to represent how students perceived sharks. We identified major themes through the use of conceptual and nonlinear emergent processes and discuss a selection of those themes here.

Results

Children's Word Choices

Before reading Sand Tiger Sharks, many students used negative (Group A - 45%,; Group B - 41%) and stereotypical (19% and 28%, respectively) words to describe sharks (see Table 1). After being read the book with personal connection text, students most frequently used positive words (36%) to describe sharks. For those who were read the modified book, many students used stereotypical words (32%). Although paired pre to post comparisons revealed no significant change in the use of stereotypical words, after reading the original book with personal connection text there was a significant increase in positive words ($p = 0.04$) and a significant decrease in negative words when reading the modified shark facts only book ($p = 0.05$).

Perceptions of Sharks Based on their Role as a Predator and Drawing Analysis

In over half of the pre-reading drawings (57%), sharks were shown chasing or eating prey. First impression words that accompanied these pictures often included "meat-eater," "blood," or "predator." Drawings in this theme appeared to demonstrate students' understanding that sharks were top predators in the ocean. After the reading, this theme was still apparent in both groups of students. However, the language and words accompanying the drawings changed. More than half of the drawings (63%) now included words such as "helpers" and "boss of the ocean," especially in post-drawings from students who read the book with personal connection text. (Figure 2).

Although post reading drawings still demonstrated sharks as predators that could attack and kill prey, students did not appear to depict as much fear or hostility towards sharks in their work. Interestingly, drawings by the group that read the facts only book revolved around human and shark interactions. Before the reading, only 3 drawings included humans, all of which illustrated humans either being eaten by sharks or running away from sharks while on the beach. After the reading, all 3 drawings by the same students included humans swimming or boating alongside the sharks. In fact, 2 out of the 3 drawings included the human characters smiling. Additionally, 2 of these drawings now showed sharks pursuing the correct prey (i.e., fish) instead of people.

After reading both versions of the book, Sand Tiger Sharks, students appeared to represent sharks in a more positive manner, demonstrating less malice and fear. For example, a student prior to reading stated, "all good sharks are dead sharks" and drew a de-finned shark. After reading, this student depicted an intact shark and said,"I guess sharks are more interesting than I thought" (Figure 3).

Beyond the perception of sharks as predators in the pre- and post-reading drawings, other emergent themes included the anatomical presentation of the sharks, colors used, and type of shark. Of the 51 total colored shark drawings, the majority (96%) represented sharks as blue, black, or gray. Out of a total of 74 drawings from both

groups, all showed a caudal fin, 91% showed a dorsal fin and/or pectoral fin, 84% showed teeth, and over half (59%) included gills. Of the 74 total drawings only 8 drew a distinctly differently shaped shark (such as a hammerhead shark or a thresher shark with a long tail). Overall, most students created a visually similar shark before and after reading both version of the Sand Tiger Sharks book. Although student's drawings were similar pre- and post- reading, a difference in descriptive langugage was observed.

From this study, we find several indicators for potential differences between the book with personal connection text and the book with shark facts only. We observed an increase in phrases such as "like me" or "like humans" or, for example, an illustration showing sharks going out to eat in groups (an example used in the personal connection book; see Figure 4). As such, we hypothesize that books with personal connection text and questions may be useful for the intended purpose of this activity, which was creating a meaningful connection between the reader and sharks.

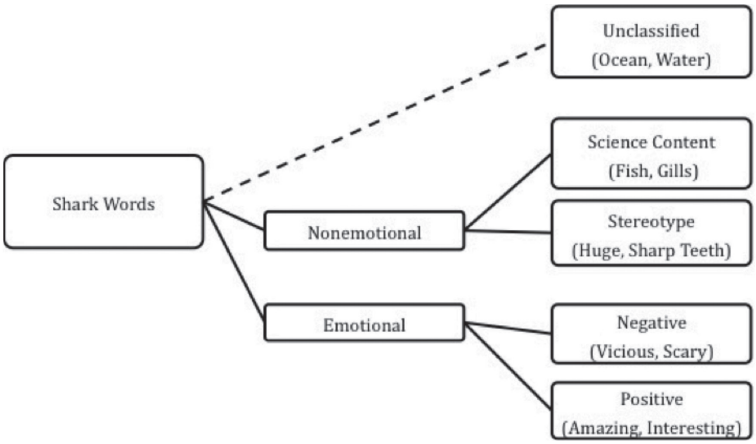


Figure 1: Flow chart of shark word categories.

Discussion and Conclusions

A growing number of educators, both informal and formal, have embraced the value and impact that storybooks can have on young children's interest in learning about wildlife. In many ways, children's literature allows for connections to be made between classroom learning and the outside natural world. At an important developmental stage, storybooks may influence a child's environmental behaviors in the future. Books with added personal text and questions can connect young readers with scientific information in an age-appropriate and familiar format. This format can enhance young reader's understanding of the relationship animals have with humans and their habitats. In general, books can be a catalyst for observation and a path to informed dialogue that is crucial to critical thinking. As such, zoos and aquariums are uniquely positioned to capitalize on using storybooks to inspire learning experiences and help address children's misconceptions about environmental topics, including endangered large predators. Storybooks with added personal text and questions may be a useful educational tool in increasing children's knowledge of a particular animal species, while also addressing possible negative perceptions.

Aquariums and zoos have the opportunity to use storybooks as a technique to engage visitors in shark conservation and alter children's perceptions. Overall, it is important to note that this study represents only a small fraction of children's experiences with sharks, the media, and books. It is unknown how exposure to this type of storybook over an extended period of time relates to a shift in attitude of children long-term. However, we hope that our work will inspire group reading and conservation education learning experiences at other zoos and aquariums.

Table 1: Words used to describe sharks

	Sand Tiger Sharks book with additional personal connection text and questions			*Sand Tiger Sharks* book with shark facts only		
Shark Words	Total Pre A	Total Post A	*t*-test *p* Value	Total Pre B	Total Post B	*t*-test *p* Value
Negative	26	17	**0.19**	22	12	**0.05***
Vicious, mean, fierce, unkind, violent, deadly, scary, creepy, terrifying, frightful, bloody, blood, run, crazy, stupid, dangerous, greedy, weird, reckless, bite, killer						
Positive	10	20	**0.04***	8	14	**0.08**
"Like me," "like humans," cool, rad, gnarly, amazing, awesome, strong, helper, not scary, silly, funny, smart, cute, cuddly, friendly, nice, boss, safe, fun, caring, prefect						
Science Content	8	6	**0.60**	5	5	1.0
Fish, fishy, gills, soft, a sea animal, lives in the sea, specifically named sharks (such as Hammerhead sharks or whale sharks)						
Stereotype	11	7	**0.23**	14	18	**0.45**
Big, large, hungry, meat-eater, large or sharp teeth, great white, predator, hunter, gray						
Unclassified	3	5	**0.36**	4	8	**0.23**
Other (water, ocean, plant, food)						
Total words	58	55		54	57	

* Asterisk represents statistical significance after paired t-test analysis of paired pre and post samples.

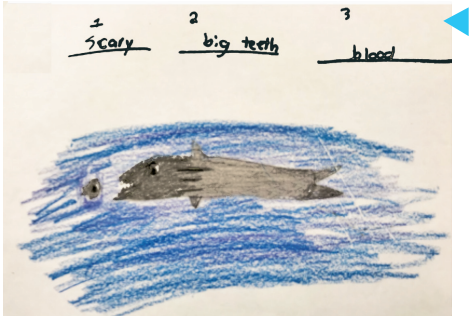


Figure 2: Perceptions of sharks as predators before (left drawing) & after (right drawing) the reading of the book by the same student. Note that although drawings were similar the students' language changed from negative & stereotypical to mostly positive.

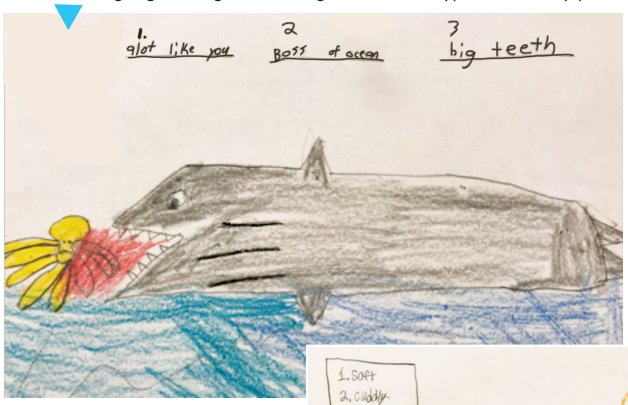
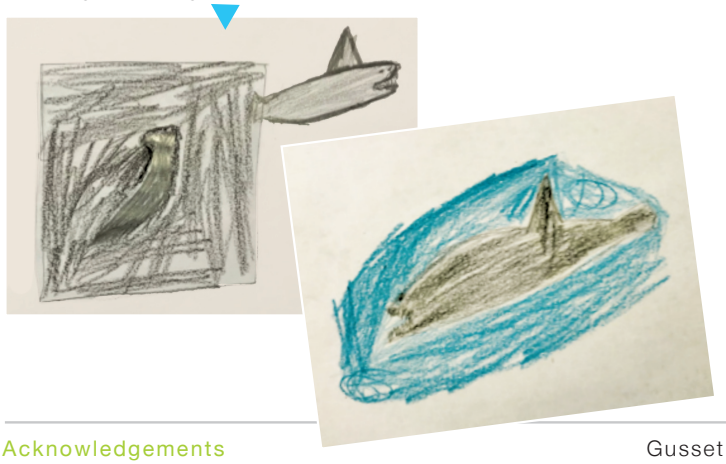


Figure 3, below: Perceptions of sharks by a student before (drawing left) and after (drawing right) the reading of the Sand Tiger Sharks book. Pre-reading, the student stated, "all good sharks are dead sharks." Post-reading the student said, "I guess sharks are more interesting than I thought."



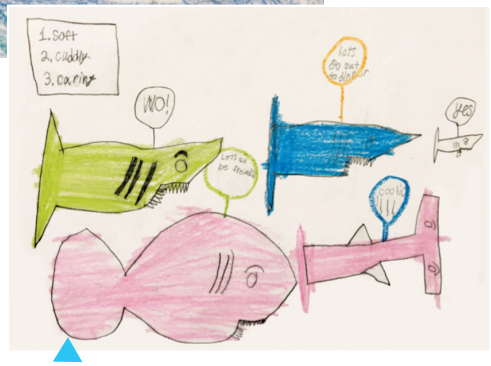


Figure 4, above: Perceptions of sharks eating in groups from a student in Group A after reading the Sand Tiger Sharks book with added personal connection text and questions. This is a direct representation of information shared in the book.

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