Empathy Towards Wildlife at Zoo Boise

Sarah Coose, Zoey Bevington, and Ryan Porter

Abstract

Empathy towards wildlife is a crucial aspect of a developing child's sense of connectedness to and perception of the world around them in relation to others. This study examined children's empathetic responses to two types of exhibits at Zoo Boise: preexisting exhibits with older interpretive features and new exhibits with updated interpretive features. These included interactive signage, videos, and more naturalistic exhibit design. Behaviors were defined and categorized based on a pre-established protocol and standardized observation instrument called the *observational framework of empathetic behavior*. We hypothesized that the observations of both empathy and related emotions would increase among children in the new exhibits. The instrument contained two sections: one for defining empathetic behavior and one for related emotions. Results showed that the category "has interest or curiosity toward animal" was the only behavioral category of the ten to be significantly higher at the new exhibits. The results of "Ability to take perspective of animal" were counter to our predictions. Time spent at each exhibit was also significantly higher at the new exhibits. While this study serves as a good start to begin measuring the impact of zoo exhibits on empathy in children, further research is needed to fully understand the nuances of these effects.

Introduction

As climate change continues to lead to habitat destruction and escalation in wildlife extinction rates, protecting and preserving global animal populations is becoming an increasingly important task. Empathy is an emotion and a construct that has a myriad of definitions, but it is essential to building a sense of connectedness and compassion between humans and animals (Seattle Aquarium 2015). Empathy is a stimulated emotional state that relies on our ability to understand and care about others, whether human or animal (ibid.). Empathy is a skill that can be developed and reinforced through interactions with our environment. Fostering empathy between humans and animals is a practice that can lead to better environmental policies and greater public support for environmental movements and actions. While empathy can develop at any age, early childhood years are critical to its development (Seattle Aquarium 2015). Animals have differing abilities to elicit empathy, based on their level of perceived charisma, but there are certain properties that living creatures inherently possess that encourage connections to humans:

1. Agency - An animal showing behaviors like eating, grooming, and playing that are similar to human behaviors.
2. Affectivity - Humans attribute emotions to an animal's patterns and movements.
3. Coherence - An animal is easily characterized as a whole being.
4. Continuity - More time spent with an animal increases our empathy and understanding (Seattle Aquarium 2015).

All animals have the potential to elicit empathy from humans, but the strength of that reaction falls on a continuum.

Zoo Boise developed a new expansion project, which focused on creating new exhibits with key design changes intended to elicit empathetic responses from children towards animals. The Baboon and Vervet exhibits comprise those renovations while the Spider Monkey and Patas exhibits remained unaltered. The aim of this study was to determine if the changes to exhibit design and interpretive techniques would elicit a stronger empathetic behavioral response in children at the new exhibits than at the old exhibits. By actively seeking to foster empathy and connectedness in children, Zoo Boise can become a valuable space to encourage positive behavioral growth. These influences could potentially last into adulthood, resulting in a generation attentive to environmental campaigns that directly benefit and protect animals.

Methods

The study was conducted during the summer of 2019 at Zoo Boise and focused on comparing the behavioral responses of children at two pairs of primate exhibits. The first pair consisted of two preexisting primate exhibits with old interpretive features. These are referred to as the “pre” exhibits. The second pair includes new primate exhibits with improved interpretive features. These are referred to as the “post” exhibits. Such improved interpretive features included textured, interactive signage, naturalistic exhibit design, and videos played on a screen.

All children in the study were members of the general public. Neither they nor their guardians were aware that they were being observed and researchers did not interact with subjects in any way. Behaviors were defined and categorized based on a pre-established protocol and standardized observation instrument called the *observational framework of empathetic behavior*. The instrument contains two sections -- one for defining empathetic behavior and one for related emotions. Each of these was then further subdivided into 5 categories under which individual behaviors were recorded (see appendix for more detailed information on individual behaviors). These categories were as follows:

Empathy

1. Understands needs of animals
2. Ability to take perspective of animals
3. Has compassionate concern for animals
4. Shows positive behaviors towards animals
5. Has desire to help animals

Related Emotions

6. Has curiosity towards animals
7. Has appreciation/respect for animals
8. Recognizes animals as individuals with agency
9. Engages in direct action to help animal
10. Caregivers support positive behaviors towards animals

Before data were collected, all researchers practiced recording observations using the instrument together to ensure consistency among observers and reduce observer bias.

Observations were made in the viewing areas of the old Spider Monkey and Patas Monkey exhibits as well as the new Vervet Monkey and Baboon exhibits. Subjects were randomly selected and their age was approximated and categorized into one of four age brackets, K1 (5-8), K2 (9-12), K3 (teen), or K4 (adult). Since the purpose of this study was to examine empathetic behavior in children, we only examined individuals in brackets K1, K2, and K3 with the highest density of observations between K1 and K2. Their time spent at an exhibit was measured using an

iPhone stopwatch app. Behaviors were then recorded using the observation instrument. For example, a child verbalizing “The monkey needs food” would be considered a specific behavior defined as “Talks about animal’s basic needs of food and water” and would fall under the “Understands needs” category in the “empathetic behavior” section of the instrument.

Depending on whether a child exhibited an individual behavior under one of the ten categories, we recorded either a one or a zero for that category. We then performed chi-square analyses for each category to see whether observed behavior proportions differed significantly between the two pairs of exhibits. Similarly, depending on whether a child displayed a behavior in the empathy or related emotions section, we recorded a one or a zero for that section and performed chi-square analyses to see whether observed behavior frequencies differed significantly between the two pairs of exhibits. Finally, we were interested in whether the mean time in seconds spent at an exhibit differed significantly between the exhibits. We used an unpaired two samples Wilcoxon test to assess this.

Results

In the dataset there are 1,032 unique observations derived from both the old and new exhibits. Between the two exhibits, there are four different species of monkeys viewed by the children in the study. These are categorized by group. Patas and Spider Monkeys are denoted as “pre” since they are the original exhibits. Baboons and Vervet Monkeys are classified as “post” since they are part of the new exhibit “post-opening”.

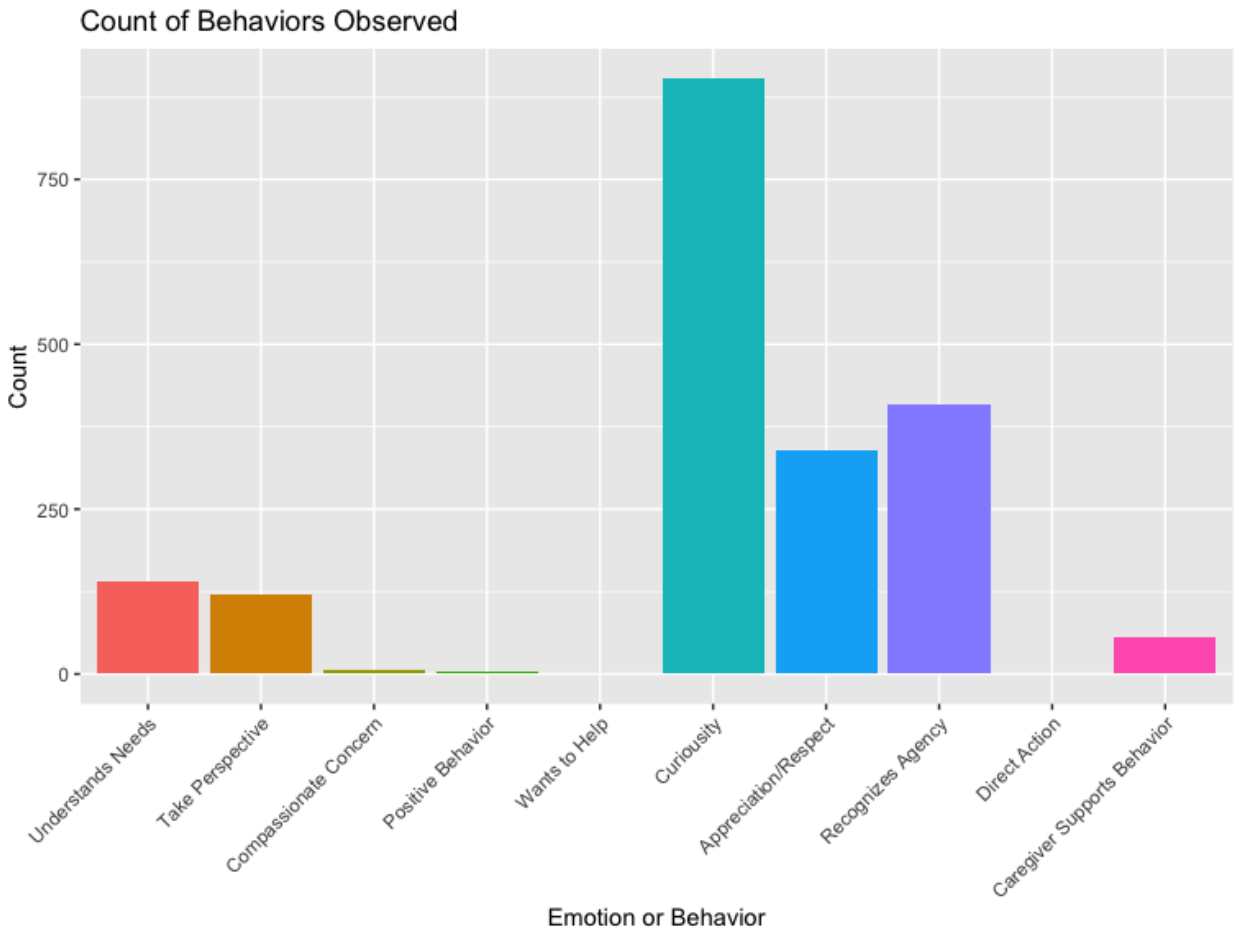

Figure 1. Total behaviors observed across all categories

Figure 1 details the ten behavioral categories on the x-axis and the count of each behavior observed on the y-axis. Categories “Wants to help the animal” and “Engaged in a direct action to help an animal” did not have any behaviors observed.

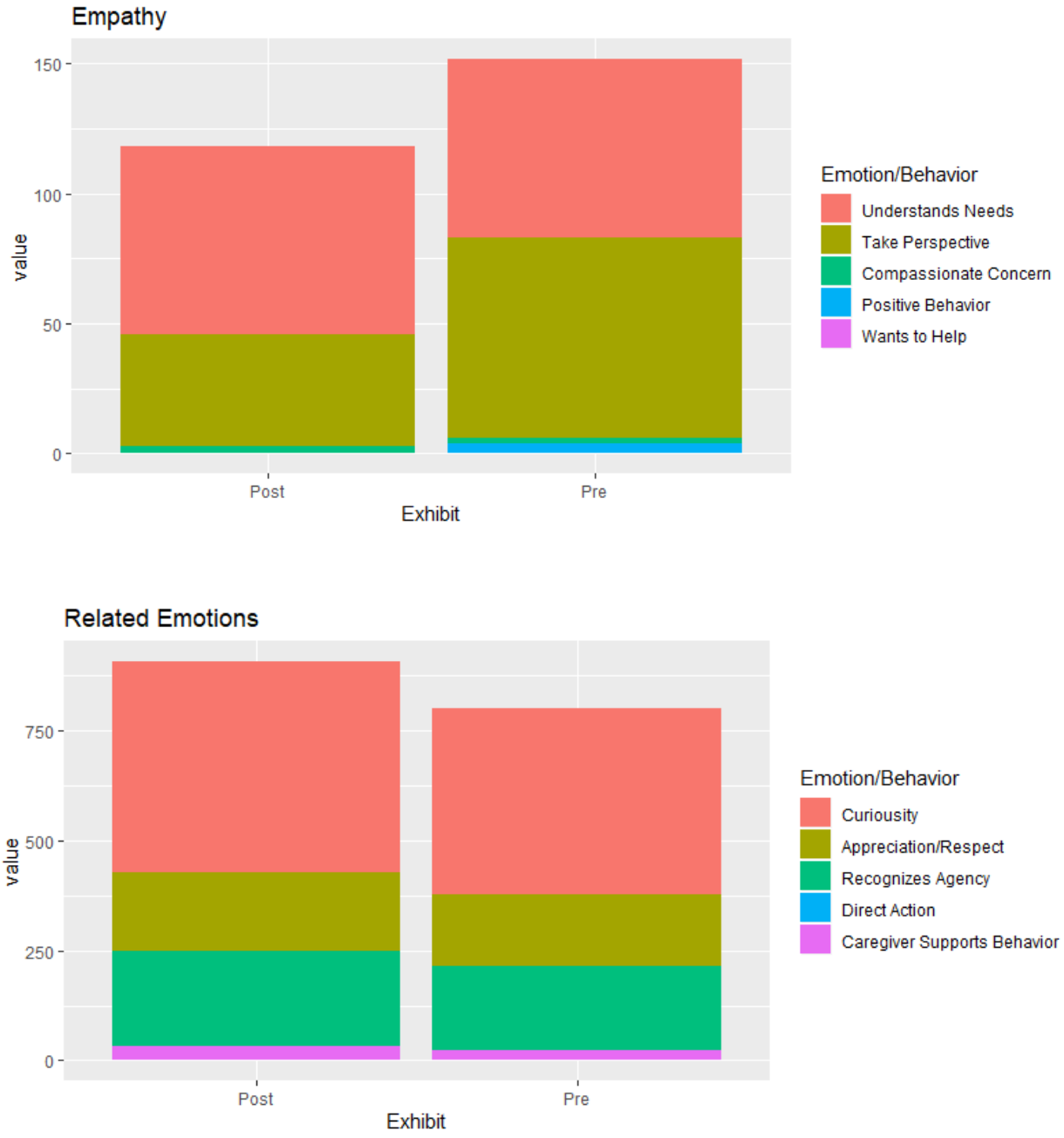

Figure 2. Comparison of behavioral response proportions between pre and post exhibits for Empathy and Related Emotions sections.

The two graphs above show the number of observations in each of the ten categories split into the pre and post exhibit. The variables are split into two graphs which correspond with empathy and related emotions. There is an individual breakdown

of each of the behavioral categories by animal in the table below. Each unique color represents the total number of unique individuals that expressed that observation, not the total number of observations in each category. Many individuals had multiple observations in each category but we went with unique individuals in order to keep the data independent (an assumption of the chi-square test).

Table 1. Proportion of observations per animal

Animal	Average Time (s)	Understands Needs	Take Perspective	Compassionate Concern	Positive Behavior	Wants to Help	Curiousity	Appreciation /Respect	Recognize Agency	Direct Action	Caregiver Supports Behavior
Baboon	44.56	9.4%	3.2%	0.2%	0.0%	0.0%	49.6%	13.2%	19.7%	0.0%	4.7%
Patas	79.13	9.9%	8.1%	0.0%	0.2%	0.0%	41.6%	18.3%	19.4%	0.0%	2.5%
Spider	24.72	3.4%	8.1%	0.5%	0.8%	0.0%	48.7%	14.8%	21.4%	0.0%	2.3%
Vervet	69.75	5.0%	5.0%	0.4%	0.0%	0.0%	44.5%	20.6%	22.3%	0.0%	2.2%

In Table 1, the percentage for each cell is the unique individuals that demonstrated that characteristic in the observation per animal. Since we are curious as to whether or not empathy is increased with the new exhibits, we decided to use a chi-square test between the new exhibits and old exhibits. There are two assumptions of a chi-square test which are independence and expected frequencies greater than five. The data is independent because each observation represents the behavior of an individual person and the behavior of one subject did not affect the behavior of another. The second assumption is met in most of the behavioral categories except “wanting to help an animal” and “engaging in direct actions to help an animal” because they both have zero observations in each of them. Also, “compassionate concern” and “positive behavior” had low frequencies so we also ran a Fisher's exact test. Ten different contingency tables were constructed for each of the different observations. A contingency table of the first observation (‘understands needs of animal’) is shown below to demonstrate how each of them were constructed.

Table 2. Contingency table of Post vs Pre behavior proportions for “understands needs of animal”

Exhibit	Number of kids who demonstrated "Understanding needs of animal"	Number of kids who didn't' demonstrate "Understanding needs of animal"
Post	72	445
Pre	69	446

After running a chi-square test the p-value was 0.88 which means we fail to reject the null hypothesis in that instance, meaning that there is not a significant difference in the proportion of kids who exhibit “understanding needs of the animal” across the old and new exhibits. Below is a chart of all the p-values for each of the different tests for each behavioral category.

Table 3. Proportion of children who exhibits the behavior and the corresponding p-value from a chi-square test. Green indicates a significantly greater proportion in the post exhibit, orange indicates a significantly greater proportion in the pre exhibit.

Exhibit	Understands Needs	Take Perspective	Compassionate Concern	Positive Behavior	Wants to Help	Curiousity	Appreciation/ Respect	Recognize Agency	Direct Action	Caregiver Supports Behavior
pre	13.4%	15.0%	0.4%	0.8%	0.0%	82.1%	31.3%	37.3%	0.0%	4.5%
post	13.9%	8.3%	0.6%	0.0%	0.0%	92.8%	34.2%	41.8%	0.0%	6.6%
p-values	0.876	0.0013	1	0.132	N/A	< 0.001	0.341	0.157	N/A	0.178

Table 3 shows that only “take perspective” and “curiosity” showed significant differences across pre and post exhibits. In “compassionate concern” and “positive behavior” the assumption of expected frequency greater than five was not met for the chi-square test so we ran a Fisher’s exact test to examine them further. The p-value for “compassionate concern” from the Fisher’s exact test was 1 and the p-value for “positive behavior” was 0.06. Like the chi-square test, the Fisher’s exact test also failed to reject the null hypothesis in “compassionate concern” and “positive behavior”, meaning that there is not a significant difference in empathy in old and new exhibits.

We decided to run an additional chi-square test comparing proportions of behavior among the empathy behaviors (understands needs, takes perspective, compassionate concern, positive behavior, and wants to help) and the related emotions behaviors (curiosity, appreciation/respect, recognizes agency, direct action, and caregiver supports behavior).

Table 4: Contingency tables of Empathy and Related Emotions grouping

Exhibit	Empathy	Nulls
Post	105	412
Pre	131	384

Exhibit	Related Emotions	Nulls
Post	517	0
Pre	509	6

For empathy the p-value was 0.59 thus we fail to prove that empathy improved in the new exhibits. Related emotions had a p-value of 0.04 which indicates that there is evidence that empathy-related emotions improved in the new exhibits. Since the related emotions group had low frequencies of null values, we also ran a Fisher's exact test which produced the p-value of 0.02. Thus, indicating that there is evidence that empathy-related emotions increased in the new exhibits compared to the old exhibits.

Since continuity and time spent with animals are properties that animals have that can elicit empathy in humans, we decided to run an unpaired two-samples Wilcoxon test. The assumption of this test is that the data is independent, and since each data point is a single child, our data is independent. This test does not rely on normality, and since the time spent was heavily skewed to the right, we decided to run this test instead of a t-test which requires a normal sampling distribution. After running the Wilcoxon test, the p-value was 0.005, indicating that the time spent at the post exhibits was significantly longer than at the pre exhibits.

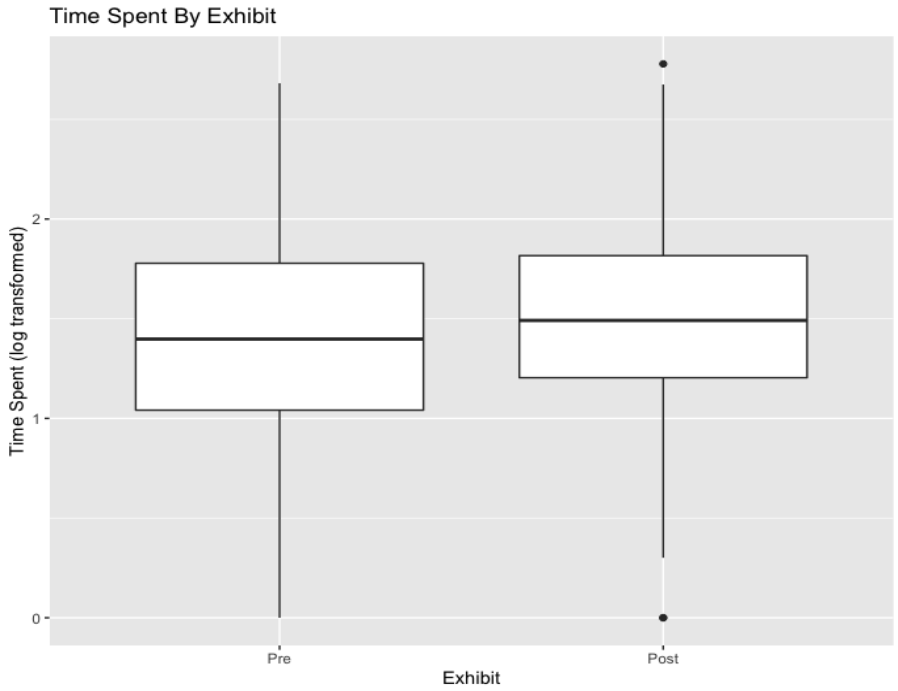

Figure 3. Box plot of time spent by exhibit type

Figure 3 illustrates how the time spent at the post exhibits was higher. The mean time spent at the pre exhibits was 50.8 seconds, and 57.5 seconds at the post exhibits. The y-axis was log transformed because of outliers that skewed the distribution.

Discussion

While the results from our analysis showed that empathetic and related emotional responses did increase at the post exhibits, there was not an overall significant change. “Takes perspective of animal” showed a significant p-value, but it was counter to predictions, where the pre exhibits had higher rates than the post exhibits. “Curiosity”, was the only behavioral category that showed a significant increase in frequency in the post exhibits. The time spent at each exhibit was also significant, indicating that children spent significantly more time at the post exhibits than the older pre exhibits. Since the amount of time spent around animals is a factor in increasing empathetic responses, this is evidence that the renovated and interactive post exhibits have the ability to foster curiosity and empathetic emotions.

There were a number of factors in this study that could have influenced our results. Due to limited resources, we did not include the same primate species in both the pre-opening exhibit and post-opening exhibits. Because all four species in the study varied widely from each other in terms of appearance, activity, charisma, and level of interaction, these differences alone could have potentially influenced the observed behavioral responses. Future studies should consider keeping the species consistent across exhibits. Future studies should also consider recording observations from the same child across both exhibits to strengthen the demonstration of a causal relationship between interpretive features and increased empathetic response. Furthermore, future research is also needed to determine which specific interpretive features are most effective in increasing empathy.

Empathy is a complex emotion that can take years to fully develop. This study is a good start at looking at the interactions of children and their environment, but a longitudinal study that observes children over longer periods of time is needed to fully understand how empathy towards wildlife can develop in children.

References

Seattle Aquarium. *Best Practices in Developing Empathy Towards Wildlife.* 2015.

Seattle Aquarium. *Measuring Empathy: Collaborative Assessment Project (MECAP).* 2015.