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Moral and Fearful Affiliations with the Animal World: Children's Conceptions of Bats

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ABSTRACT The purpose of this study was to extend knowledge on how children understand their affiliation with an animal that can evoke both fear and care: bats. We interviewed 120 children, evenly divided between four age groups (6–7, 9–10, 12–13, and 15–16 years) after each child had visited an exhibit at Brookfield Zoo that displays Rodrigues fruit bats. Results showed that in the same children a fear orientation toward bats existed alongside of a caring orientation. Children accorded bats the right to live free and to be wild. Yet most of the same children also said that zoos did not violate the rights of bats by keeping them in captivity. Discussion focuses on this seeming contradiction, and the resulting implications for the ecological mission of many zoos today.

Keywords: bats, biophilia, care, fear, moral development

There is little disagreement that people affiliate positively with many aspects of nature. People enjoy walking along the ocean's edge, for example, or watching the sunrise, listening to song birds, and cuddling a dog. People also fear aspects of nature. It can be the fear of walking in woods at dark, or of encountering a rattlesnake, or of being battered by a winter storm. But is it possible that people can affiliate positively with—and bring caring and moral relationships to—an aspect of nature that they simultaneously fear?

Toward investigating this question from a developmental perspective, we interviewed children about a type of animal—bats—that we believed

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would readily evoke in children both moral and fearful affiliations. Rather than ask children questions in a hypothetical context (e.g., "imagine if you saw a bat…"), we recruited our participants from children that had just exited from an exhibit at Brookfield Zoo (Brookfield, IL, USA) that displays Rodrigues fruit bats. In this mostly darkened exhibit, there was no barrier (such as a glass or wire mesh) between the bats and visitors; and, indeed, sometimes the bats swooped around the visitors, occasionally within inches. Thus, by providing children with direct, unmediated contact with live bats, we were in a strong position to pursue three central lines of investigation: caring for bats, fear of bats, and the potential moral basis for keeping or not keeping bats in captivity.

Caring for Bats

At an early age, children come to care for a wide range of animals. In a year-long study, for example, Myers (2007) documented the caring relationships that children formed with a dog, turtles, a guinea pig, goldfish, doves, ferrets, pythons, a spider monkey, bugs, and squirrels. Covert et al. (1985) found that 75% of the children in their study between ages 10 and 14 said that they turned to their pets when they were upset. Melson (2001) writes that a pet's "animate, responsive proximity makes children feel less alone in a way that toys and games, television or video, even interactive media, cannot" (p. 59). In other literature, Kahn and colleagues conducted interviews in diverse locations, including Houston, USA (Kahn and Friedman 1995), the Brazilian Amazon (Howe, Kahn and Friedman 1996), and Lisbon, Portugal (Kahn and Lourenço 2002) with children about their environmental views and values. Results showed that animals, plants, and parks and open spaces played an important role in children's lives. Children were aware that water pollution can harm birds, water, insects, and landscape aesthetics. Moreover, it mattered to children that harm might occur to each of these environmental constituents. Based on measures that controlled for magnitude of environmental harm and proximity to harm, children also believed that polluting a waterway violates a moral obligation. Thus, one important finding from the research literature is that children in diverse cultures—and even in harsh urban landscapes—have in at least certain respects meaningful and moral relations with nature.

In the current study, we investigated how children conceive of the idea of caring for a type of animal, a bat, that is neither the large, charismatic megavertebrate nor warm and cuddly, but a somewhat scary-looking animal that people can fear (Lawrence 1993). We asked children questions about whether they cared about bats and why, and what they meant by the idea of care. We expected that in various ways children would express care for bats. We also sought to characterize the different ways that children conceptualize the idea of caring. Here we expected to build on the distinction between anthropocentric and biocentric reasoning (Nevers, Gebhard and Billmann-Mahecha 1997; Kahn 1999; Kahn 2006). Anthropocentric reasoning focuses on how effects to the environment affects human beings. In other words, environmental constituents may be given consideration (e.g., "it's wrong to kill fish by polluting the waters") but the reason is human-oriented (e.g., "because I like to go fishing"). Biocentric reasoning appeals to the moral standing of nature at least partly independent of its value to humans (e.g., "animals have rights to their freedom").

Fear of Bats

The research literature has established what perhaps we know intuitively: that children can fear various aspects of nature. Bowd (1983) found that kindergarten children feared such animals as bears, tigers, snakes, lions, horses, and elephants, and children's reasons most often focused on being bitten or hurt. According to Maurer (1965, p. 265), "[a]lmost all 5- and 6-year-olds and

more than one-half of 7-to-12-year-olds claim that the things to be afraid of are mammals and reptiles (most frequently): snakes, lions, and tigers." Through counter-conditioning experiments, Ulrich reports that the processing of biologically prepared fear-relevant natural stimuli (including spiders and snakes) "can be very fast and may often occur automatically or 'unconsciously'" (Ulrich 1993, p. 85). Ascione (1993) has shown that some children can be cruel to animals. Kaltenborn and colleagues (2006) report that the majority of residents around the Serengeti National Park in Tanzania favored killing lions, cheetahs, leopards, and hyenas if the animals threatened domestic livestock or people. Fears of nature extend beyond the animal form. For example, Bixler and Floyd (1997) suggest that people most often express fear of objects and situations as to their reason for negatively reacting to wild lands. Overall, Kellert (1996) largely captures this orientation under what he calls the negativistic value: an aversion, fear, and dislike of nature.

In the current study, even granting that there is a great deal of safety in experiencing animals in a zoo context, it seemed likely that some children would directly express fears about bats. We sought to assess the extent of such fears, and to characterize their quality. For example, is the fear more or less like fear they feel in a dangerous part of a city? Or is it a type of fear that they like, that makes them more alert? We expected that expressed fears would diminish with age. We also expected that we would find evidence for the coexistence of fear and caring even in young children.

Moral Basis for Keeping or Not Keeping Bats in Captivity

Treating an other as a full moral entity usually depends not only on caring about or for that entity, but on attributing to that entity certain psychological qualities, such as sentiency, agency, and free will (Regan 1983). Thus, we asked questions about whether bats had these qualities, and expected that to some degree children would affirm them. Then we assessed whether children also accorded bats rights, such as the right to live free and to be wild. If they did, then we investigated how children understood the legitimacy of zoos for keeping bats in captivity. It was on open question how children would coordinate such competing claims.

Methods

Participants

Participants were 120 children, evenly divided across four age groups: 6–7 years (13 male, 17 female), 9–10 years (15 male, 15 female), 12–13 years (15 male, 15 female), and 15–16 years (17 male, 13 female). Seventy percent of participants volunteered information about their race. Of these, 86% were Caucasian, 7% were Hispanic/Latino, 2% were African American, 1% were Asian/Pacific Islander, and 4% were Other. All participants were non-members of Brookfield Zoo. Only non-members were included in the study, since they are more representative of the general population than zoo members.

Procedures and Measures

One of the exhibits at Brookfield Zoo is the "Australia House": a darkened, cave-like enclosure, about 80 feet long, that people enter and walk through. The exhibit displays Rodrigues fruit bats. A notable feature of this exhibit is that there is no barrier between the exhibit animals and the public. Thus, as people walk through the exhibit, they not only look at and hear the bats, but experience their immediate proximity.

At the entrance to the exhibit, a researcher visually identified potential participants who appeared to meet two eligibility criteria for the study. These criteria were being within the desired age range (6–16 years) and not being part of an organized party, such as a school group or

camp group. Based on these criteria, a potential participant was then chosen visually at the entrance to the exhibit, observed visually through the exhibit, and then approached after exiting the exhibit. At that junction, if the child said that he or she was a non-zoo member, was within our desired age, and was interested in participating in our study, then the researcher escorted him/her to a public zoo building for an interview. Written consent was obtained at that time from the child's parent or guardian. Researchers initially identified potential participants randomly; insofar as the younger age categories filled more quickly, researchers shifted toward targeting the older age groups.

In terms of response rate, we approached a total of 348 people. Of those, 84 did not meet the eligibility criteria (61 were zoo members and 23 fell outside of our desired age range). That left a total of 264 people. From this total, our response rate was 56% (27 pilot participants, 120 regular participants). The reasons people said that they did not want to participate in this study included that it took too much time (56 individuals), they were not interested (47 individuals), and other reasons (14 individuals).

The interview was based on structural-developmental methods. These methods were pioneered by Piaget (1929/1960), and have been successfully extended by many social-cognitive researchers to date to investigate children's conceptions of social and moral life (e.g., Turiel 1998; Helwig 2006) and children's conceptions of environmental moral issues (e.g., Kahn and Friedman 1995; Howe, Kahn and Friedman, 1996; Nevers, Gebhard and Billmann-Mahecha 1997). For a chapter-length overview of this methodology, see Kahn (1999, Chap. 5). In brief, we first generated theory-guided interview questions. As a case in point, we know from the moral-developmental literature that moral relationships include substantive considerations of care, fairness, and rights, and that underlying such considerations lie judgments that the moral entities are experiencing subjects, with thoughts and feelings (Turiel 1998). Thus, we asked specific questions about all of these constructs as they apply to bats. Each participant was asked each initial question, and then the interviewer had the freedom to follow the questions in different directions, so as to tap each participant's individual understandings.

A full list of our questions can be found in Table 1. Questions focused on the study's three major areas of investigation: Caring for bats (e.g., "Do you care about bats? Why? What does it mean to care?"); fear of bats (e.g., "How did you feel with the bats flying around?" "How do you think it would feel to sleep in a place where bats were able to fly around?"); and the moral basis for keeping or not keeping bats in captivity (e.g., "Do bats have the right to be wild? Why? Does the zoo violate the rights of bats by keeping them in the Australia house? Why?").

Coding and Reliability

The interviews were tape recorded and transcribed for analysis. We then developed a coding manual, by which we mean a systematic document that explicates how to interpret and characterize (and thereby "code") the qualitative data. The generation of this coding manual followed well established methods in developmental psychology (Kohlberg 1984; Kahn 1999). In brief, we established initial conceptual categories, based on previous psychological coding systems (e.g., Kahn and Friedman 1995; Kahn and Lourenço 2002) and philosophical theory (e.g., Rawls 1971; Rolston 1989; Scheffler 1992). We then used these categories as a rough framework to interpret the qualitative data. The data, in turn, drove substantial modifications and further conceptualizations in our system, which was then reapplied to more data in an iterative manner. This dialectical process, where theory is grounded in data, and vice-versa,

Table 1. The questions used in the structured interview.

	Eval. *n*[1]	Just. *n*
Caring About Bats		
1. Do you care about bats? Why?	110	89
2. What does it mean to care?	–[2]	79
3. Do you like bats?	111	–
4. Could you love a bat as a pet?	110	–
5. Would you care if there were no bats in the world? Why?	106	64
6. Does it matter to you that you were able to see bats at the zoo?	105	–
7. Let's say you lived your whole life without ever seeing a real live bat – not in a zoo, not in the wild. Just pictures. Would that matter to you? Why?	108	–
Fear of Bats		
8. How did you feel with the bats flying around?	113	–
9. Did you think that the bats would hurt you?	113	–
10. Would you like it better if the bats were separated from you (e.g., with a wire mesh between you and the bats)? Why?	110	–
11. Some people say that they pay more attention and become more alert when they walk through this bat exhibit. What do you think? Did that happen to you?	108	–
12. How do you think it would feel to sleep in a place where bats were able to fly around?	101	–
13. Would you prefer or not prefer to sleep in a place where bats were able to fly around?	103	–
14. One person I talked with said that the fear she (he for male participant) feels with bats is similar to the fear she feels when walking down a dark city street at night. Do you feel this way? Why?	64	–
15. Another person I talked with said that the fear she (he for male participant) feels with bats is very different from the fear she feels in the city. Rather, she said she kind of likes the fear she feel with bats. Do you feel this way? Why or why not?	71	–
16. Do you think it would be harmful to you to pet a bat in the zoo?	97	–
17. Do you think it would be harmful to you to pet a bat in the wild?	110	–
The Moral Basis for Keeping or not Keeping Bats in Captivity		
18. Do bats in the Australia House have feelings? If not, why not? If so, what do you think they feel?	115	–
19. Do bats in the Australia House have thoughts? If not, why not? If so, what do you think they think?	114	–
20. If a bat got mad at another bat (for seemingly no reason at all) and bit it, do you think the bat should be blamed for doing something wrong? Why?	105	–
21. If a bat got mad at you (for seemingly no reason at all) and bit you, do you think the bat should be blamed for doing something wrong? Why?	106	–
22. If a person got mad at a bat (for seemingly no reason at all) and hit it with a stone, do you think that person should be blamed for doing something wrong? Why?	113	–
23. Do you think it is all right or not all right to keep bats in a zoo? Why?	116	–
24. Do you think bats have rights? Why? Which ones?	101	–
25. Do bats have the right not to be killed by humans? Why?	89	61
26. Do bats have the right to be wild? Why?	101	71
27. Do bats have the right to live free? Why?	106	66
28. Does the zoo violate the rights of bats by keeping them in the Australia House? Why? (If "no" to this question, and "yes" to the previous question: "Just a minute ago you said that bats have the right to live free, and now you say that it's all right for zoos to violate that right. Can you help me understand what you are thinking about?")	97	–
29. Would it be better for the bats if zoos didn't keep them at all?	93	–
30. Do you think that keeping bats in the Australia House protects these bats from becoming extinct?	96	–

[1] "n" refers to the number of participants who provided responses for each of the questions that pertained to evaluations (Eval.) and justifications (Just). [2] A dash indicates that the question was not asked.

continued until we could satisfactorily code the initial pilot data and a set of 20 random interviews from our data set. At that point, we considered the coding manual completed, and we no longer modified it. The strength of this latter approach—where the coding manual is not derived from the entire data set—is that some initial distance is traveled within a single study toward internal replicability (cf. Thompson 1996; Kahn 1999). Three types of responses were coded: (1) evaluative responses (e.g., all right or not all right, yes or no), (2) justifications for the evaluations (e.g., an appeal to the intrinsic value of nature), and (3) content responses (e.g., "scared"). Multiple justifications were coded. Summary descriptions of the justification coding systems are presented in the results section.

A coder trained in the use of the coding manual coded 60% of the data (from the 100 interviews not used in coding manual development). A second coder trained in the coding system coded the remaining 40% of the data. A third reliability coder trained in the coding system re-coded 40% of the interviews (24 randomly selected from the 60 coded by the first coder and 16 randomly selected from the 40 coded by the second coder). Intercoder reliability was assessed using Cohen's kappa. For the evaluation questions, $k = 0.78$, and for the content questions, $k = 0.81$. For justifications at the level reported in Table 3 and in the text, $k = 0.63$. Two commonly referenced benchmarks that can assist one in interpreting the values of Cohen's kappa are Fleiss, Levin and Paik (2003) who rate any value of kappa over 0.75 as excellent agreement, between 0.40 and 0.75 as intermediate to good, and below 0.40 as poor, and Landis and Koch (1977) who rate a kappa of 0.81 to 1.00 as "almost perfect" and between 0.61 and 0.80 as "substantial" agreement.

Results

Nonparametric tests were used to test statistical significance of the categorical data at the $\alpha = 0.05$ significance level. In particular, Kendall's tau-b, a nonparametric correlation coefficient, was used to test for developmental trends, and the Fisher exact test was used to test for gender differences. Virtually no gender differences were found, thus the data were collapsed across gender. Age differences were found where reported. Actual sample sizes for each question are reported in Table 1.

Care for Bats

By and large, children brought forward a caring orientation toward bats. For example, 78% of the children said that they cared about bats. In addition, 80% said they liked bats, 64% said that they could love a bat as a pet, 73% said that they would care if there were no bats in the world, 84% said it mattered to them that they were able to see bats at the zoo, and 69% said it would matter to them if they lived their whole life without ever seeing a real live bat (in the zoo or in the wild).

We asked children to explain their reasons for two of the above questions: for why they cared about bats and why they would care if there were no bats in the world. From the resulting justification data, we developed a typology of care for bats, which is summarized in Table 2. We then coded all of the children's reasons based on this typology. Table 3 reports the percentage of participants that used each category. As shown in Table 3, across both questions the majority of children's justifications were anthropocentric (52% and 74%), including a focus on personal interests, human welfare, and aesthetics. To a lesser extent, children drew on justifications that were biocentric (30% and 9%), including a focus on the intrinsic value of nature and justice for nature. No developmental differences were found.

Table 2. Summary of justification coding categories for caring about bats.

Category	Definition (with Example)
1. Welfare of Nature	An appeal to effects on nature, including animals, vegetation, non-living parts of nature, species, and natural processes, without specifying whether those effects led to anthropocentric or biocentric considerations (e.g., "[I care about bats] because I think they're important; they keep the insect population down like mosquitoes").
2. Anthropocentric	An appeal based on considerations of effects on humans.
2.1. Personal	An appeal based on personal predilections, interests, and projects of self and others (e.g., "[I care about bats] because I just like animals and I like nature").
2.2. Welfare	An appeal based on an others' physical, material, psychological, and educational welfare (e.g., "instead of [people] being bit by spiders and mosquitoes and stuff, the bats will eat them").
2.3. Aesthetic	An appeal based on the preservation of the environment for the viewing or, more broadly, sensorial pleasure of humans (e.g., "[I care about bats because] they're beautiful animals and I just like them around").
3. Biocentric	An appeal to the moral standing of nature at least partly independent of its value to humans.
3.1. Intrinsic Value of Nature	An appeal that nature has value, including a focus on biological life (e.g., "because it's a living thing"), natural processes (e.g., "because they're part of the earth"), and telos of nature (e.g., "because every creature has a certain role in life").
3.2. Justice	An appeal that nature has rights, deserves respect or fair treatment, or merits freedom (e.g., "they should be out in the wild and actually have a lot of freedom").

Note: To be clear, the overarching categories are Welfare of Nature, Anthropocentric, and Biocentric. Subcategories are then presented for both Anthropocentric and Biocentric (with reliability of coding established at that level).

Table 3. Percentage of anthropocentric and biocentric justifications in response to questions about caring for bats and the rights of bats.

	Why Do/Would You Care…		Why Do Bats Have the Right…		
Justification Category	**About Bats? (*n* = 74)**	**If There Were No Bats in the World? (*n* = 55)**	**Not to Be Killed? (*n* = 61)**	**To Be Wild? (*n* = 69)**	**To Live Free? (*n* = 64)**
1. Welfare of Nature	12	18	20	17	22
2. Anthropocentric	52	74	16	0	0
2.1. Personal	26	44	3	0	0
2.2. Welfare	18	24	11	0	0
2.3. Aesthetic	8	6	2	0	0
3. Biocentric	30	9	64	83	78
3.1. Intrinsic Value	23	7	26	59	45
3.2. Justice	7	2	38	23	33

Note: Percentages may not sum to 100, due to rounding.

We also asked children more generally "What does it mean to care?" From the resulting justification data, we developed a typology comprising five overarching categories: (1) *Personal Predilections*, a conception based on the personal likes and dislikes of the child (e.g., "[What caring means is] to like them"); (2) *Physical Assistance*, a conception based on beneficial action (or the negation of harmful action) to an individual or species (e.g., "What does it mean [to care]? I deposit money and stuff for the animals; it means you try to help it out");

(3) *Psychological*, a conception based on according psychological attributes, interest, vulnerability, and emotional attachment ("[Caring means] when you're emotionally attached to a pet or something"); (4) *Generalized*, a conception based on the integration of personalized caring with other moral constructs (such as justice) that leads to principles that govern interpersonal relationships ("[Caring means] to take responsibility over that thing"); and (5) *Ecological*, a conception based on the integration of generalized caring within an ecological system of which humans may be a part ("[Caring means] to not want them to be extinct and want them to be wild, but also be able to see them, too").

Quantitative results showed the following pattern of use: Personal Predilections (10%), Physical Assistance (48%), Psychological (33%), Generalized (5%), and Ecological (3%). No developmental differences were found.

Fear of Bats

Some of the children expressed fear of bats. For example, 83% of the children said that they would prefer not to sleep in a place where bats were able to fly around; and, in such a context, 57% of the children said that they would feel fearful or slightly fearful. When asked how they felt with bats flying around them in the exhibit, 32% of the children said they were scared or nervous. Twelve percent thought the bats would hurt them in the exhibit. When asked if it would be harmful to pet a bat, 29% of the children thought it would be harmful in a zoo context, while 92% thought it would be harmful in the wild, with 19% of children specifically citing fear of attack or fear of disease in a zoo context and 42% citing fear of attack or disease in the wild. Also, 27% of the children said they would have liked it better if the bats had been separated from them in the exhibit with a wire mesh.

We then investigated the quality of that fear by comparing it to the fear children might feel when walking down a dark city street at night (Question 14). A total of 27 children said that they felt scared or nervous with the bats flying around the exhibit in response to Question 8 and also provided a valid response to Question 14. Of these children, 15 (56%) said that the two types of fear felt similar. We next provided children with an alternative account of the fear (Question 15): "Another person I talked with said that the fear she feels with bats is very different form the fear in the city. Rather, she said she kind of likes the fear she feels with bats. Do you feel this way?" A total of 29 children said that they were scared or nervous with the bats flying around and also provided a valid response to Question 15. Of these children, 13 (45%) said that they "kind of liked" the fear they felt with bats.

A developmental trend was found. As shown in Table 4, compared with the younger children, the older children were less fearful of bats, welcomed greater contact with bats, and said that they felt more alert while in the presence of bats.

Table 4. Percentage of children by age who experienced aspects of fear with bats.

Judgments about Bats in the Exhibit	6–7 Years	9–10 Years	12–13 Years	15–16 Years	*p* value (Kendall tau-b)
1. Felt scared of bats	37	37	24	10	0.006
2. Thought bats would hurt them	22	14	7	3	0.021
3. Would like physical separation from bats	35	37	28	11	0.031
4. Felt more alert in the presence of bats	54	69	73	86	0.008

We then examined the potential coexistence of fear and caring. To assess this, we looked at the question that had the largest number of children expressing fear (about sleeping in a place where bats were able to fly around) and compared it with the question concerning whether children cared about bats. A total of 94 children provided valid responses to both questions. Within this group, 54 children (57%) indicated that they would feel some fear. Even among this group who indicated that they would feel fear, 72% still said that they cared about bats. This large overlap between these two groups indicates that a fear orientation toward bats existed alongside a caring orientation. In fact, based on a Pearson chi-square test, there was no significant difference in the percentage of caring between the children who indicated fear of bats and those who did not (72% vs. 85%, $p = 0.141$). Thus, based on these two questions analyzed, not only do fear and caring coexist, but children who indicated fear of bats were just as likely to care about bats as children who did not indicate fear of bats.

We also pursued two other questions: First, was fear or caring associated with attribution of thoughts and feelings to bats? The answer was no for fear, and yes for caring. Children who indicated that they cared about bats were more likely ($p < 0.005$, Fisher exact test) to believe that bats have thoughts (94%) and feelings (93%) than children who said that they did not care about bats (64% thoughts, 65% feelings). Second, were children who reported more fear of bats more likely to use anthropocentric justifications for keeping them in captivity? The answer was no, they were not.

Moral Basis for Keeping or Not Keeping Bats in Captivity

Toward first assessing the potential underpinnings of moral judgment, results showed that the majority of children said that bats in the exhibit have feelings (88%) and thoughts (88%). About half (48%) viewed the bats as capable of being blamed for bad behavior toward another bat, although such attributions decreased with age: 6–7-year-olds (63%), 9–10-year-olds (63%), 12–13-year-olds (43%), and 15–16-year-olds (23%) ($p = 0.001$). Similarly, about half (53%%) viewed the bats as capable of being blamed for bad behavior toward a person; and again such attributions decreased with age: 6–7-year-olds (73%), 9–10-year-olds (59%), 12–13-year-olds (48%), and 15–16-year-olds (31%) ($p = 0.001$). In contrast, virtually all (97%) of the children said that if a person mistreated a bat, the person should be blamed.

Eighty-six percent of the children believed that bats had rights, including the right to live (32%), and to their autonomy (25%). Developmentally, the older children asserted that bats had rights to a greater extent than the younger children (6–7, 58%; 9–10, 89%; 12–13, 89%; 15–16, 100%; $p = 0.0005$). When asked about specific rights, 97% of the children said that bats have the right not to be killed by humans, 95% said that bats have the right to be wild, and 93% said that bats have the right to live free.

We asked children to explain their reasons for why bats had the right not to be killed by humans, to be wild, and to live free. We coded their reasons by means of the typology summarized in Table 2. Table 3 reports the percentage of participants that used each category. As shown in Table 3, across all three questions the majority of children's justifications were biocentric (64%, 83%, and 78%, respectively) with use of anthropocentric reasoning only in the first question (16%, 0%, and 0% respectively). Developmental differences were found on the third question (why bats have the right to live free): Compared with the younger children, the older children provided more biocentric justifications (6–7, 33%; 9–10, 76%; 12–13, 89%; and 15–16, 93%; $p = 0.002$).

While the large majority of children asserted that bats had the right to be wild and to live free, it was also the case that 85% of the children said it was all right to keep bats in zoos, and

72% said that zoos did not violate the rights of bats by keeping them in the Australia house. Even among the children who said that bats have the right to be wild, only 5% said that it was not all right to keep bats in a zoo, and only 12% said that the zoo violated the rights of bats by keeping them in the Australia House. Similarly, of the children who said that bats have the right to live free, only 6% said that it was not all right to keep bats in a zoo, and 14% said that the zoo violated the rights of bats by keeping them in the Australia House.

The justification data go some initial distance to help explain how many of the children could maintain what might seem contradictory positions (e.g., that bats have the right to be wild and to live free, but that the zoo does not violate the rights of bats by keeping them in the Australia House). For this group of children, 27% reasoned that the environment within the zoo was congruent enough with the wild environment, such that there was no contradiction. For example, one child said "because if they recreate the environment so the bat thinks it is in the wild, then it's okay; but if you just put it in a little glass box then that's not right." Twenty-five percent said that the welfare of individual bats or of the species trumped the specific rights. For example, one child said "not really [it doesn't violate rights] because…they get taken care of, they get fed and everything." Another child said, "Yes, they have the right to live but like I said before the disease part; even though they might think it's not fair if they were to talk to us, it's really for their own good." Moreover, out of the children who said that bats have the right to be wild, 44% said that it was better for bats in the zoo, and 81% said that the zoo helps protect the bats from becoming extinct.

Discussion

Our results showed that most of the children brought forward a caring orientation toward bats. The majority of children, for example, said that they cared about bats, liked bats, would care if there were no bats in the world, and that it would matter to them personally if they lived their whole life without ever seeing a live bat, in the zoo or in the wild. That said, some of the children also indicated that they were somewhat scared of bats. For example, almost three quarters of the children said that they would prefer not to sleep in a place where bats were able to fly around, and about half said that in such a context they would have some fear. Moreover, we were able to establish that in the same children a fear orientation toward bats existed alongside of a caring orientation. Compared with the younger children, the older children were less fearful of bats, welcomed greater contact with bats, and said that they felt more alert while in the presence of bats. Taken together, these findings provide empirical support for the proposition that children can affiliate positively with—and bring a moral relationship to—an aspect of nature that they simultaneously fear.

One limitation of this study is that the bats in the exhibit were Rodrigues fruit bats, which have diminutive noses, large heads with conspicuous eyes, and other features that probably elicit less fear than many other species of bats. Thus, a future study could investigate similar issues but with another, more frightening, species of bats. In that context, an interesting question is whether children would care about the bats less than we found in this current study. More generally, future studies could investigate whether, and if so how, children care about other types of frightening animals (e.g., poisonous snakes and spiders).

Not only did the children we interviewed care about bats, but the large majority of children accorded bats the right to live free and to be wild. Yet most of the same children also said that it was all right to keep bats in a zoo, and that a zoo does not violate the rights of bats by keeping them in captivity. How could this be? There are three parts to our provisional answer. First, our results showed that while the majority of children accorded bats feelings and thoughts, only

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about half believed that bats could be morally responsible for bad behavior to either other bats or toward a person, while virtually all of the children said that if a person mistreated a bat, the person was morally responsible. Thus, it may be that when children accord bats (or other animals) rights, the rights are constrained in scope and considered less stringent as compared with human rights. Second, at least some of the children provided reasons that addressed the seeming contradiction. For example, some children said that the environment within the zoo was congruent enough with the environment in the wild (e.g., "like the wild and this is the same cause its got trees and water") such that the bats experienced little or no difference. Some children also said that the bats in the zoo were well taken care of, and were even better off in the zoo than in the wild (e.g., "if the bats got sick, they here might be able to take care of it but in the wild maybe they might not"). Third, some children appeared to simply hold seemingly contradictory positions: one that bats had rights to live free and to be wild, and another that the zoo did not violate those rights by keeping them in captivity. As one child said: "[It is both all right and not all right to keep bats in the zoo.] Yes because people learn that there are different types of bats in the world and different species; and no because I still believe that they should be free and in natural habitats."

All three answers may characterize how different types of children conceptualize these difficult issues. Nonetheless, the answers seem troubling to us, particularly given the ecological mission of many zoos today. According to Rabb (2004), a century ago the primary focus of zoos was to display "a wide variety of exotic animals solely for the recreation of the public" (p. 237). Today, however, zoos have become conservation centers, and among their responsibilities they "strive to help society achieve a more sustainable and harmonious relationship with nature…[by] contributing to the careful management of the earth's biological resources, which includes captive and wild animal populations and viable ecosystems, and…inspiring others to celebrate and conserve nature" (p. 237). With this mission laid out, it is a plus that so many children we interviewed at the zoo cared about bats insofar as such caring may go some distance to promoting conservation at large (Myers and Saunders 2002; Myers and Russell 2004). But if the same children really believe that the zoo environment is largely congruent with the wild environment, then a question for future research is whether such commitments bode poorly for a wider conservation ethic. Similarly, while it may be true that life is more hazardous to animals living in the wild compared with a zoo, such hazards are fundamental to what it means for an animal or ecosystem to be wild. If children miss this point in a zoo context, then here again it is worth investigating whether the zoo's mission will come up short.

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