
Children, Animals, and Leisure Settings

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Forty-eight children were interviewed on topics including the behavior of wild and captive animals. Half of the children toured a series of North American exhibits at a natural history museum and half toured a comparable series of exhibits at a zoo. Children demonstrated a high degree of recall about their visits and retained specific memories of the animals that interested them. Zoo children's remarks contained more references to behavior and were more positive in their assessment of what animals could do. Museum children made more references to environmental elements and issues such as human impact.

Science centers, museums, zoos, and aquariums are increasingly seen and funded as places of learning. As schools have come under attack for presenting science in ways that diminish the natural, exploratory behavior of children, these leisure settings have come into their own as providing settings where learning about the environment, ocean surfaces, or wildlife can be a fulfilling experience.

Although the tradition of conducting studies of visitor learning in these institutions was initiated as early as the 1930's, the field of visitor studies has grown in substance within the past 15 years. Studies which focus on the public understanding of wildlife and wildlife conservation fall into broad categories. First, public perceptions at the national level have been documented with specific analyses of those respondents who attend museums and zoos. Second, studies conducted at museums and zoos examine visitor learning at the adult level. Third, some studies examine the experience of children in leisure settings. Most studies are confined to one site.

This study addresses the issue of what children know about wildlife and whether their experience at a museum or zoo influences the kind of information they may acquire. In the past, heavy emphasis has been placed on the value of learning "scientific" information. In a national study of the American public, Kellert (1980) suggested that zoogoers have a humanistic orientation to animals rather than a scientific one. He also indicated that they scored low on formal tests

of knowledge. In a separate study, Westervelt and Kellert (1983) also suggested that ecological and scientific knowledge of wildlife is low in children.

Zoos and museums are complex settings in which children can observe both the structural and behavioral adaptations of animals. Osbourne's (1983) findings on museum children offer insight into Kellert's results. Osbourne found that children's scientific thinking tends to be human-centered, based on limited experience, provides specific explanations for specific events, and is phrased in everyday language.

The leisure setting itself matters. Falk, Martin, and Balling (1978) noted that children were better able to learn information if they had been oriented to the layout of a nature center ahead of time. Attending to new stimuli can distract children. The setting also influences the type of information acquired.

Studies of adult zoo visitors are consistent and show that adults actively seek information (Wolf & Tymitz, 1979) and have preconceptions about the habitat of wild animals which change after viewing an actual exhibit (Mask, 1994). Most importantly, attitude changes and knowledge gains due to variations in exhibit design are most likely to show up in adult visitors who are less educated or lack familiarity with the animal (Birney, 1982; Bitgood, 1992).

What about the influence of exhibit design on children? In a nonsystematic examination of the drawings of children who had been taken on zoo tours that varied according to exhibit design, Coe (1989) noted that the children projected emotions onto their drawn animals that reflected the design of the exhibit in which they were housed.

If children are studied in two leisure settings with very different exhibit presentation, will the information they acquire about wildlife differ in ways that reflect those settings? This study differed from quantitative tests of children's knowledge in that it probed children's experiences at a zoo versus a museum and sought to discover whether these experiences led them to talk about animals in different ways.

The following data were gathered as part of a five-part study comparing the experience of children who visited either a natural history museum or zoo (Birney, 1986). Forty-eight children were asked in depth about their expectations of museums and zoos, as well as perceptions of their social experience. Children's views on the interdependence of life forms and the impact of extinction were also explored. The responses of children exposed to museum exhibits were compared

to those exposed to zoo exhibits.

This paper focuses on findings related to how children's perceptions of captive and wild animals may differ depending on whether they viewed a series of North American exhibits at the Los Angeles Zoo or the Los Angeles County Museum of Natural History. The field sites were chosen with care. Both the museum and zoo exhibited many of the same species of North American mammals. Children viewed most species in common. At the time of the study, the Los Angeles Zoo's North American section had a series of somewhat visually sterile outdoor exhibits. Each enclosure contained a pool of water, a log or tree, and clean-swept ground. The exception was Wolf Woods, a large wooded and brush-filled area. Most viewing areas were open and had no bars or chain-link.

In contrast, the museum contained a series of dioramas in a carpeted, darkened hall with special lighting that reflected the animal's environment. Extraordinary detail was provided: grasslands with butterflies, an occasional mouse, and a rich background mural. Usually there was a water element – lake, waterfall, stream – surrounded by thick or appropriate foliage. The field sites were chosen precisely because the museum contained visually complex dioramas with appropriately placed specimens and a highly detailed natural setting while the zoo contained live animals in simple enclosures.

Research Questions

Subjects were asked several questions intended to probe their general knowledge of an animal they had chosen to discuss. These questions focused on the following areas:

- What does the animal eat?
- How does it get its food?
- Who are the animal's enemies?
- How does it protect itself?
- Are there differences between captive and wild animals?

Subjects' responses were expected to vary depending upon the setting they had visited. Would the responses of zoo subjects who were exposed to live animals differ from those of museum subjects exposed to still representations of the same species?

Research Methods

Participants

A total of 115 sixth-grade students were randomly assigned to the museum while 128 sixth graders were assigned to the zoo. Of these, 48 were selected for 45-minute in-depth interviews. The schools chosen for participation represented a cross-section of wealthy, middle-class, and poor neighborhoods. An even number of Anglo, Hispanic, and African-American children were chosen. Children were drawn evenly from all three reading levels within their classes. This was done to ensure that students with varying abilities to articulate their thoughts and perceptions would be included.

Measures

Five types of questions were included in the guided interviews. These included questions that probed for the students' behavior, sensory experiences, feelings, knowledge, and opinions. Interviews were composed of questions covering three domains. These were institutional (e.g., Why do people go to museums?), social (e.g., What's the best kind of person to take with you to the zoo?), and topical (e.g., How does the pronghorn protect itself from its enemies?). Findings on the first two domains were presented in Birney (1988). The findings presented here focus only on the topical questions.

Procedure

Each sixth grade class was greeted by two docents at the field site and split into two groups. While one group toured the North American section, the second went on an unguided alternative tour. After 45 minutes, the two groups switched. Only half of the groups received docent instruction. Guided interviews were held with the subset of 48 students after their visits either to the museum or zoo. These interviews tend to yield data that are more systematic than informal conversation but less restrained than standardized interviews. Interviews began with a warm-up question to set the children at ease. They were free to mention any animal they had seen during their visit that had impressed them. All interviews were taped and transcribed verbatim for analysis.

Analysis

Interview data were analyzed inductively. That is, the data base itself guided the formation of categories, thematic issues, and patterns related to the students' comments. Typologies were developed whenever appropriate. Indigenous vocabulary used in the description of certain phenomena were sifted from the database. Categories were reviewed both for their internal consistency and the degree to which they were distinct from one another. Existing categories were reworked until all extraneous data items were taken into account. Once the data set was analyzed according to individual concepts, tables of related categories were drawn up and a χ^2 analysis was performed to test for location differences (museum versus zoo).

Results

As a warm-up question, children were asked which of the animals they found most memorable. Their responses (detailed in Birney, 1986) offer the first evidence that different settings impact children's recollections, reflecting both the North American exhibits they visited as well as exhibits on the alternative tour. North American predators were cited more often by museum children. Black, brown, and grizzly bears were cited exclusively by the museum group since the zoo had none on exhibit. However, the polar bears, which were swimming in their pool at the time the children were visiting the zoo, were cited four times as often by the zoo group. Koala were cited exclusively by the zoo group and primates were cited as memorable five times more often by the zoo group. (Both of the latter species were seen during the alternative tour.)

Table 1 shows that memorable features of exhibits fell into three categories – animals' structural adaptations, animals' behavior, and various items related to exhibit content. Various structural adaptations related to locomotion, display, defense, facial features, color, fur, and size were cited as being the most memorable by 77% of the interview sample (Example A). All of the museum subjects spontaneously mentioned a structural adaptation as most memorable while half of the zoo subjects did ($p < .001$).

Some form of animal behavior was cited as memorable by 64% of these children (Example B). Significantly more zoo children than museum children spontaneously mentioned animal behavior as a salient event ($p < .01$).

Table 1. Most Memorable Exhibit Features Cited by Children

Category		Total	Museum	Zoo
Mentioned Feature		47	24	23
Structural Adaptation		36	24 *	12
	%	(77)	(100)	(52)
Specific Animal Behavior		30	10	20 **
	%	(64)	(42)	(87)
Portrayed Environment		19	14 ***	5
	%	(40)	(58)	(22)
Realism of Animal		7	7	0
	%	(15)	(29)	

* ($\chi^2 = 14.99$; $df = 1$; $p < .001$)

** ($\chi^2 = 7.88$; $df = 1$; $p < .01$)

*** ($\chi^2 = 6.53$; $df = 1$; $p < .05$)

Example A:

A: It was real fast and real big with small claws. It looks exactly like a seal except that a seal is smaller and a sea lion is real big the way it has to survive. It blends – on a cold day – eyes and ears are small. And the way they just get to their fish and they're real big. I like to see them in the water.

Example B:

A: [The polar bear] would go up to the shore but not all of the way out of the water and he would like push off and go back.

Finally, 40% of the sample mentioned the portrayed environment of the exhibit as memorable (Examples C and D) and 15% noted the realism of the animal. Significantly more museum subjects than zoo subjects mentioned the portrayed environment in the exhibit ($p < .05$) and all comments related to how realistic the animals seemed came from museum subjects (not surprising since realism would not be an issue with living collections).

Example C:

A: Most of them live on the plains, on mountains, have different climates. Like one with the polar bear – it was all snowy. And with the grizzly bear it was warm and hot. With the elephants...it wasn't really a change, it was like a little hotter.

Example D:

A: [The polar bear] was white. The exhibit was like ice and mountains and snow. It was outstanding. It was bright and you could see it from anywhere.

Children were asked to choose a favorite animal for all subsequent discussions of wildlife biology. The intent was to allow children to discuss this topic animal that was familiar to them rather than test their knowledge of animals selected by the researcher. This addressed the key issue of predetermining knowledge items. It was not always the case, however, that children had a lot of scientific knowledge about the topic animals that they chose.

Children stated what they thought the animal under discussion ate. A wide range of animals were selected, including North American small mammals, mountain lions, African large mammals, North American hoofed animals, reptiles, sea lions, koala, primates, bears, birds, and fish.

Of the 45 subjects who responded, 66% chose to discuss predators and 37% chose herbivores. When asked what their animal ate, specific prey were cited by 44% of the subjects, most frequently rodents or fish. Trees, grass, and other foliage comprised 27% of the responses. The general term "plants" was only used twice. The term "meat" was used by 15% of the children and another 15% simply said "animals." Seventeen percent of the children said they did not know what the animal ate. Twice as many museum children identified foliage as did the zoo group.

Thirty-two children offered descriptions of their animal's feeding behavior. Half of the subjects' statements about the feeding behavior of wild animals were general in nature and phrased in simple terms – wild animals "get" or "hunt for" their own food (Example E). Another 14 children gave lengthy descriptions of the hunting strategy of their animal (Example F). Finally, a third of the children interviewed included structural adaptations (which can conceivably be seen and abstracted from any exhibit) used by animals to obtain food. There were no significant differences between the museum and zoo treatment groups in these discussions.

Example E:

Q: How do elephants get their food?

A: I don't know. By the trunk.

Example F:

A: It hides and makes itself small like it gets down on the grass and hides and as the animal gets closer it starts to look out and jump on its back and bite it.

Twenty children gave comprehensive responses which included the type of food eaten, method of obtaining it, and the structural adaptations the animal may have used. Of these children's responses, 93% were scientifically accurate even though the sophistication of their responses was highly varied.

Seven of the 32 children specifically noted that the content of the animal exhibit was the source of their answer on how animals obtain food (Example G). Six museum respondents spontaneously cited exhibits while one zoo subject did.

Example G:

A: There was one on the cliff he was like that, standing and I was wondering if they can really stand that way. Yeah, cause he was going to jump on prey. I didn't know they could really stand like that.

All of the children were asked to describe those animals they felt posed a threat to the survival of their topic animal. "Man" was cited as a predator of their animal by 35% of the group. Table 2 shows that while half of the museum subjects mentioned "man," less than one fifth of the zoo subjects did ($p < .01$). While 29% of the children correctly identified a specific species that posed a threat to their topic animal, an additional 24% said they didn't know. Table 2 shows four types of incorrect examples children gave including the wrong predator, animals of the same species, "bigger" animals, and "no predators."

Thirty children talked about the defensive behavior of their animal, most (66%) offering a simple description (Example H). Of these children, a third used verbs that imply the use of structural adaptations. An additional 23% of the sample were able to describe defensive behavior in detail (Example I). Erroneous statements were made by 17% of the subjects.

Example H:

A: River otters swim away fast in the water.

Table 2. Children's Identification of Threats to their Topic Animal

Category	Total	Museum	Zoo
Threat Mentioned	45	22	23
Correct Responses			
Man	16	12 *	4
Specific Correct Animal	13	9	4
Don't Know	11	38	
Incorrect Responses			
Specific Animal	7	3	4
Same Species	5	2	3
Bigger/Stronger	3	0	3
No Enemies	4	3	1

* ($\chi^2=6.80$; $df=1$; $p<.01$)

Example I:

A: Well, the octopus, when it's attacked by enemies, it puts out a black ink and then it can get away without the enemy seeing.

For a discussion on captive and wild animals, it was made clear to the museum group that live animals were under discussion, not the animals shown in the dioramas. Of the 41 children, over a third (37%) distinguished captive animals by their dependency upon people for food. This was often tied to other aspects of the animal's behavior such as its lack of desire to hunt or behavior perceived as "lazy." There were no differences between museum and zoo groups.

The 41 children generated a total of 74 comments related to captive animal behavior. Of these comments, most (60%) came from the zoo subjects. Children's responses related to captive animal behavior were phrased in two fundamentally different ways – those that consisted of statements about what the animals "could do/were" and statements reflecting what animals "could not do/were not."

There were five categories of responses. Animals are seen as engaging in "low activity" behaviors (e.g., stand, sit, rest, walk, sleep), or "regular activity"

behaviors (e.g., jump, swing, swim, fly, hunt, vocalizations, drink, mate, play). They are perceived as being restricted in some way (e.g., feeding schedules, space restrictions), as having changed their behavior due to the presence of people, and as reflecting affective traits (e.g., being calm).

Forty-one children commented on the different types of behaviors captive animals could engage in. While 17 of the children stated that captive animals "can do" low activity behaviors, only one said they "cannot." While 12 children mentioned that animals "can do" regular activity behaviors, 10 said they "could not."

Table 3 shows that when describing captive animal behavior, children are three times as likely (29 descriptors) to mention what animals "can do" as what they "cannot do" (11 descriptors). Children visiting the zoo were significantly more likely to mention regular activity (e.g., jumping, playing) as something animals "can do." The reverse is true for the museum group ($p < .01$).

Table 3. Children's Perceptions of Captive Animals' Behavior

Category	Total	Museum	Zoo
Number of Children	41	20	21
Low Activity (sleep, rest)			
Animal can do	17	6	11
Animal cannot do	1	1	0
Regular Activity (jump, play)			
Animal can do	12	3	9 *
Animal cannot do	10	8	2
Both Activity Levels			
Animals can do	29	9	20 **
Animals cannot do	11	9	2
* ($\chi^2=6.600$; $df=1$; $p<.01$)			
** ($\chi^2=8.317$; $df=1$; $p<.01$)			

Both treatment groups talk about the low activity behaviors animals “can do.” The qualitative difference in how children discuss animal behavior arises when regular activity is under discussion. When discussing both low and regular activity in animals, zoo children were significantly more likely than museum children to state that animals could engage in these activities ($p < .01$).

There were no differences between zoo and museum groups when the descriptors that children apply to captive animals were analyzed (Examples J-K). These urban children indicate that captive animals are safe, are trained not to attack and are easier to teach and control (41%). Responses also included the idea that captive animals are more calm and happy than wild animals (17%). Some children reason, however, that being exposed to people and not being in a natural environment may make an animal more nervous (12%) rather than less. Notably, only two of the children indicate that the animal is still “wild” and capable of harming a person. Finally, seven gave miscellaneous answers, one observing that captive animals were safe from harm they might be subject to in the wild.

Example J:

Q: Are captive elephants the same as wild elephants?

A: Well, in a way. If you’re captured for the first time you’re not going to like listen to anything. You’re going to act like a wild elephant. But if they train you to do something later, your whole attitude towards things change cause you’re taken from the environment which you’ve been born in and switched over to another that is a controllable one. When you’re first caught, you’re out of hand...

Q: How is the captive environment controlled?

A: Well, some, well there are trainers. There are people there to tell you what to do but if you’re in a wild environment you can do anything you want to. You can feel like smushing a tree, go ahead and do it! If you’re captive sometimes they limit you to certain things that you weren’t limited to when you were wild.

Example K:

A: Captive elephants are somewhat more calmer than wild elephants. Wild elephants, you go to someplace like Africa, you see them running around all over the place, but captive elephants just seem more controlled and more, just, they don’t necessarily run around, just lazy.

Thirty-five children described what their topic animal did in its natural environment. According to 71% of these, wild animals "act crazy," are "uncontrolled," and attack humans viciously or in defense (Example L). Another 29% simply state that wild animals "run free" or "run wild." There were no treatment differences.

Example L:

A: Well, the wild polar bears are a lot viciouser. Like they would bite more and eat people more than the captive ones.

Descriptions of wild animal behavior related to reproduction were offered by 20% of the children (Example M). These were found to have highly specific origins. Most comments came from museum subjects who had been permitted to enter a marine life exhibit after their tour. There was a six-window exhibit showing the different stages of egg-laying and incubation in sea turtles. Children demonstrated a detailed mastery of this one exhibit. One of the zoo groups had seen a pair of badgers mating which became a salient event.

Example M:

A: I'd pick a boy. Lady sea lions back here protecting themselves when the male sea lion is getting rid of his opponent. But one thing I don't understand is that if the sea lion wants the women and mates with them, why he just leaves them? I forgot to ask the lady [docent].

At some point during the interviews, 51% of the children mentioned the behavior of wild animals in the context of their physical (Example N) or their social environment (e.g., running in groups). There were no differences between museum and zoo children in these discussions. Sources for some of the comments were gathered. Children cited TV, parents, personal experiences, museum exhibits, encyclopedias, and docents as sources of information.

Example N:

A: Well, the seals when they're on a beach and it's real windy, they bury themselves in the sand.

To sum up, these children used information they acquired from exhibits throughout their discussions of their topic animals. The presence of differences between children from museum and zoo groups suggests that their field trips impact

their experience in specific ways. Zoo children made more references to animal behavior as memorable while museum children made more references to structural adaptations, realism, and exhibit content. Zoo children were also more likely to perceive captive animals as engaging in normal behavior.

Discussion

Museums are perceived as social institutions that disseminate information in a way that is enjoyable and entertaining. Elsewhere, it has been previously reported that children who visit the zoo use positive emotional terms to describe their visit and expectations of zoo personnel (Birney, 1988) implying that the presence of live animals and their caretakers influences the tenor of their responses. Learning is affected not only by these expectations and social influences, but by the physical environment as well.

The present data support Osbourne's (1983) observations that children's thinking is characterized by a high level of specificity, limited experience, everyday language, and human-centeredness. Children's specific experience is revealed when museum subjects mention ethnographic collections and zoo subjects do not; when zoo children use affective descriptors and museum children do not; when zoo children report feeling the most negative about fatigue and museum children report feeling the most negative about crowding – both factors that hamper one's ability to see the exhibits.

The impact of the physical environment is revealed in at least two ways. First, the content of children's remarks can be scrutinized for evidence that they are using information acquired during the field trip. In many instances, children are able to single out the source of information. Second, one may contrast the comments of museum and zoo groups to infer how exhibits specific to those locations had an effect.

Certainly variations in the children's field trip experiences affected their choice of an animal to discuss. The polar bears were particularly active in the water during the zoo visits and many children picked that animal as their topic animal. Although both groups saw North American hoofed animals, only the museum subjects used them in discussion. This might be because of the exhibit content. This zoo's hoofed animal exhibits tend to be large, dusty compounds where animals cluster in a shaded corner some distance away. Museum exhibits have appropriately grouped animals in dioramas that portray vast plains with rolling hills. The

mounted animals themselves are close to the viewer, their dramatic size and color easily apparent. Hoofed animals may be shown alert or defending themselves against predators.

While the museum group showed more variability in their recall, the zoo group focused on the salient characteristics of behavior. Significantly more zoo children recalled animal behavior as a salient memory while museum children recalled specific adaptations (e.g., shaggy fur), realism of a posed animal, and environmental elements (e.g., grasslands). This zoo had a series of North American exhibits containing a minimum of environmental information. Most enclosures contained a pool, some foliage, and dry ground. This was in stark contrast to the detailed dioramas of the museum used in this study – the white-tailed deer exhibit contained 15,000 hand-painted leaves in brilliant fall tones. This also suggests that the movement to produce highly naturalistic zoo exhibits is a step in the right direction.

This study supports both Kellert's (1979) assertion that visitors' scientific knowledge of animals is low as well as Wolf and Tymitz's (1979) assertion that information of some type is acquired in zoos. While only about one-fifth of the interview sample showed in-depth knowledge, the data clearly show children make a wide variety of observations during their visits.

Sommer's (1972) contention that zoos generate misperceptions may not be valid. Children appeared to have a realistic understanding of captive animal behavior although the idea expressed by some children that captive animals are "safe" is erroneous. The reality is that most animals are not safe. Also, the perception of captive animals as calm and tame are true of some species but by no means applicable to all. Still, children seem to have a realistic understanding of how changes in diet and other restrictions could result in changes in animal behavior.

Children's perception of these animals as confined is nothing more than the truth. Finlay (1989) found similar results when he looked at how captive and wild animals were rated on various polar terms (e.g., free versus confined). However, terms such as "wild" and "free" should be treated with caution when interpreting public perceptions. It may seem to natural history experts as though the term "free" simply suggests that wild animals are free of any relationship to or dependence on humans. With children, "free" or "wild" can carry the cultural connotation that one no longer has to adhere to any rules or form of discipline. Wild animals, such as elephants born into matriarchal societies, do indeed meet social as well as environmental demands.

Independent of their field trips, these urban children suggested that "wild" animals do "crazy" and uncontrolled things. Since urban children do not witness these actions on a regular basis, perhaps the most prevalent tools for communication in this culture – film and television – offer some explanation. While the use of animals in film as icons of terror is undoubtedly the most provocative source of misconceptions (e.g., the Nazi hyena culture in *The Lion King*), television contributes its share of sustained portrayals of animals engaged in struggle. To capture and maintain attention, TV shows present frequent antagonistic behaviors between wild animals. While daily survival is an issue, most wild animals do not engage in constant conflict. Many daily activities are mundane but important (e.g., grooming). These findings were confirmed further in a baseline study on visitors' knowledge of African animals at the Brookfield Zoo (Birney, 1989). Visitors' responses suggested high levels of conflict in the daily routine of animals such as zebra. Time spent grazing, raising young, and resting were underestimated.

These data suggest that children acquire information about wildlife on visits to museums and zoos which may not be revealed through formal tests of scientific knowledge. These findings also reveal that the exhibits viewed will influence how children subsequently discuss an animal's behavior and habitat.

Note

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