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Visitor Behavior in the National Zoo's Reptile House

Dale L. Marcellini and Thomas A. Jenssen

National Zoological Park, Smithsonian Institution, Washington, DC; Biology Department, Virginia Polytechnic Institute and State University, Blacksburg, Virginia

Visitor behavior was evaluated in the National Zoo's reptile house. Nearly 600 visitors were tracked; time spent in the house and time spent looking at exhibits were noted. These parameters were investigated by sex, age, and type of visitor grouping. The most looked-at exhibits were determined. For 573 visitors, the mean time in the reptile house was 14.7 minutes. Only about 8 minutes was spent looking at exhibits, and this time was strikingly similar for age, sex, and group type. Time spent looking at exhibits was negatively correlated with visitor density. Amphibians and lizards were looked at for less time than snakes and turtles. Crocodilians were looked at longer than the other taxonomic groups, while larger animals in all groups were looked at longer than smaller ones. This study and other similar studies imply that the public does not respond to exhibits with the expected interest and enthusiasm. It is hoped that with a better understanding of the public through research, zoo staff can improve visitor interest in the exhibits.

Key words: evaluation, exhibit attractiveness, reptile exhibit

INTRODUCTION

Exhibit evaluation is very important to all aspects of planning, from exhibit design to collection contents. One of the ways to get an objective idea of what the public is doing in the museum environment is to observe their behavior [Abrahamson et al., 1983; Brennan, 1978; Melton, 1972; Rosenfeld, 1980]. However, few of these studies have been done in zoos [Serrell, 1978]. Research results to date are intriguing because of the resultant insights into visitors' behavior [Hoff and Maple, 1982; Roper et al., 1986; Shettle-Neuber, 1985].

The purpose of this study was to evaluate visitor behavior in the National Zoo's reptile house. We determined how long people spent in the reptile house, how much time they spent looking at exhibits, and which exhibit animals they looked at the most. These parameters were investigated by sex, age, and type of visitor grouping. The results of this work are compared to similar research done in aquariums, museums, and zoos.

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Address reprint requests to Dale L. Marcellini, Curator of Herpetology, National Zoological Park, Washington, DC 20008.

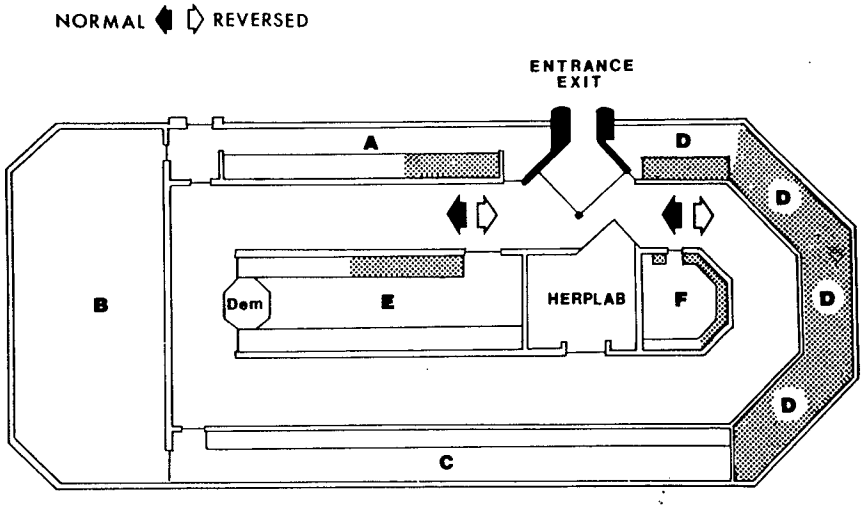

Fig. 1. Floor plan of the reptile house showing the location of exhibits for different types of reptiles and amphibians and the direction of normal and reversed visitor traffic flow: A=lizards; B=crocodiles; C=snakes; D=turtles and tortoises; E=large lizards and snakes; F=frog, toads, salamanders; Dem=Incubating eggs and young. Stippled areas indicated exhibits selected to determine the effects of reversed traffic flow on visitor behavior.

MATERIALS AND METHODS

The reptile house at the National Zoological Park is a 58-year-old building renovated in 1980. The public area consists of a walkway approximately 5 m wide faced on both sides by exhibits. Traffic flow is one-way, with the entrance and exit of the building at the same location (Fig. 1). There are 74 individual exhibits varying in size from small (60 cm wide × 120 cm high) to very large (5 m wide × 3 m high), with about half being small. In addition, there is a large (5 × 3 m) "demonstration" exhibit area featuring incubating eggs and young animals.

During the renovation, considerable effort was made to decorate the exhibits to be more interesting to visitors, by using natural materials and a large variety of live plants and by varying the type of exhibit decorations. For example, a desert exhibit was followed by a tropical forest exhibit. The exhibit animals were grouped taxonomically so that the majority of lizards are together in one area (Fig. 1A), while snakes (C), turtles (D), and amphibians (F) are in others. The reptiles and amphibians in the exhibits are quite varied and reflect the many morphological and taxonomic types found in nature. Most of the animals are visible at all times.

The graphics in the building are limited to small (30 × 15 cm) identification labels at each exhibit. These signs provide information such as name, distribution, habitat, food in captivity, and natural food. HERPlab, a special education area for families, is located in the center of the house, but was not included in this study.

The study was conducted during June, July, and August of 1985 and 1986. All days of the week and every hour of the 1000–1800 day were sampled as equally as possible. Individuals to be observed were chosen at random as they entered the house. The sex and kind of group the subjects were a part of was recorded. Ages were

TABLE 1. Composition of visitor sample by sex, group type, and age

Category	No.	Percent
Sex		
Male	304	53
Female	269	47
Group types		
Solitary	58	10
Couples	122	22
Peers	134	23
Family	259	45
Age in years		
6–11	33	6
12–20	134	24
21–30	168	29
31–50	144	25
50+	94	16

estimated and individuals placed into one of five categories: 6–11, 12–20, 21–30, 31–50, and 50+ years. No visitors under 6 years of age were tracked. Four social groups were used: solitary, mixed sex couples of approximately the same age, peer groups of two or more individuals of approximately the same age, and family groups of one or more adults with children or teenagers.

The subjects were tracked through the reptile house; total time in the house and time spent at exhibits were recorded to the nearest second. The timing of exhibit stops was begun when the individual's attention appeared to be arrested by the exhibit and terminated when attention was directed elsewhere. When the subjects left the building, a relative measure of visitor density was immediately recorded by counting the visitors in a preselected part of the reptile house public area. All data were collected by two observers, one in 1985 and the other in 1986. Five trackings were discarded because of subject-observer interaction. In July of 1986, visitor traffic was reversed (Fig. 1) and trackings were done using methods identical with those used for normal traffic flow. The exhibits selected (Fig. 1) to evaluate the effects of reverse traffic flow were located at the beginning and end of the traffic path through the reptile house. The data for reversed traffic flow are reported separately below.

Quantitative analysis was performed on an IBM 3084 computer using the Statistical Analysis System software package [Barr et al., 1979].

RESULTS

The number of individuals tracked for normal traffic flow was 573 (Table 1). The sex ratio of the sample population was approximately 50:50, with only 35 more males than females. All five age classes were covered, but the bulk of the observations were of individuals between 12 and 50 years of age. The majority of subjects were in family groups. Peer groups and couples were the next most numerous groups, and nearly equal in number. Solitary individuals were rare, making up only 10% of the sample. The mean number of minutes spent in the building was 14.7 with a standard

TABLE 2. Descriptive statistics (in min) for time spent in reptile house, time spent looking at exhibits, and time traveling between exhibits for 573 visitors

Activity	Mean	Standard error	Range
House	14.7	0.3	0.4–55
Exhibit	8.1	0.2	0.0–32.9
Travel	6.6	0.2	0.4–29.6

TABLE 3. Mean time in minutes (±S.E.) spent looking at exhibits by sex and age classes for 573 visitors

	Age in years				
Sex	6–11	12–20	21–30	31–50	50+
Male	8.0 ± 1.1	7.9 ± .6	8.7 ± .8	8.5 ± .6	8.5 ± .8
Female	7.1 ± .9	7.5 ± .5	7.9 ± .5	7.7 ± .8	8.3 ± .9

TABLE 4. Correlation of visitor density and age against time in reptile house, time looking at exhibits, and time traveling between exhibits (*P* is the probability for the correlation and r is the Spearman correlation coefficient)

	Density		Age	
Activity	r	*P*	r	*P*
House	.0211	.0965	.1897	.0550
Exhibit	−.5799	.0233*	.7193	.0151*
Travel	.0001	.2322	.0075	.1118*

*Significant correlation.

error of 0.3 min (Table 2). Time spent looking at exhibits was significantly greater than travel time ($t = 5.36$; $P < .001$). A few people spent considerable time looking at exhibits (32.9 min), but some individuals did not stop at any exhibits.

Time spent traveling and looking at exhibits was strikingly similar for age, sex, and group type. Table 3, for example, shows the time spent looking at exhibits by age and sex; the data are remarkable in their homogeneity. All means are very similar and variation is small. There are no significant differences in this data set nor are there any when group type is considered.

If the data for time spent looking at exhibits and time spent traveling are correlated with density and age, some significant correlations emerge (Table 4). Time spent looking at exhibits has a significant negative correlation with density; i.e., as the building became more crowded time spent looking at exhibits went down. There was no significant correlation between density and either time in the house or travel time. Age is significantly correlated with time spent looking at exhibits; i.e., the older the person, the more time they spent looking. The age difference in time spent looking

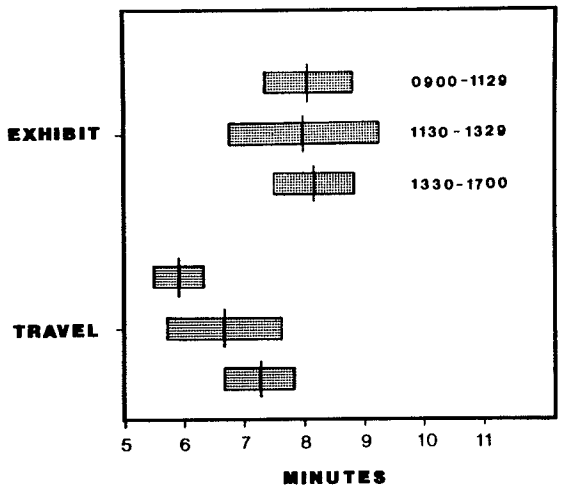

Fig. 2. Time spent looking at exhibits and travel time for morning (N=243), midday (N=112), and afternoon (N=218). Vertical line is the mean; stippled rectangle indicated confidence limits.

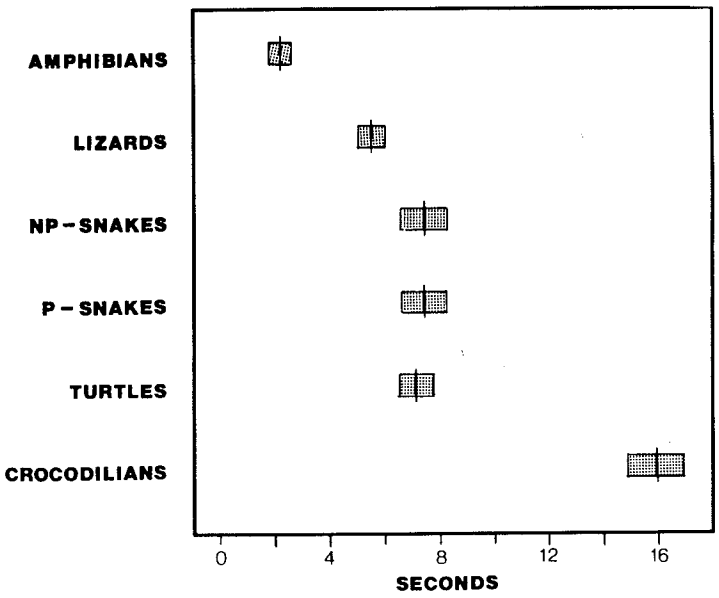

Fig. 3. Mean time spent looking at different type of exhibit animals. Vertical line is the mean; stippled rectangle indicates confidence limits (N=573).

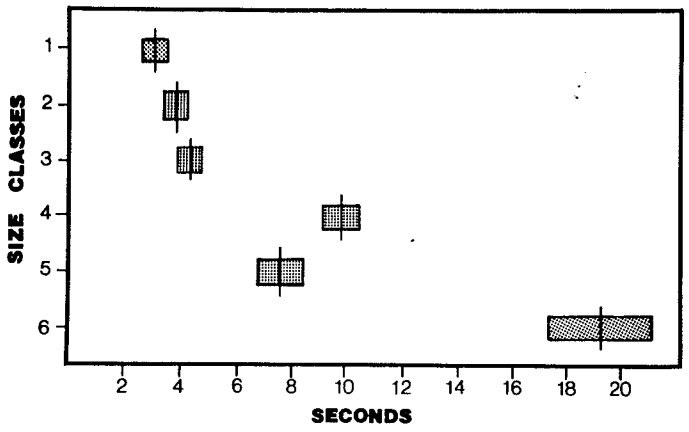

Fig. 4. Mean time spent looking at different size classes of exhibit animals (1 = <20 cm; 2 = 20–49; 3 = 50–99; 4 = 100–199; 5 = 200–300; 6 = >300 cm). Vertical line is the mean; stippled rectangle indicates confidence limits (N=573).

was reflected in more time being spent in the house by older people; this correlation, although not significant, is also high. These correlations do not reflect a large time difference, however, because of the narrow variance. The time spent looking at exhibits was virtually identical for morning, midday, and afternoon (Fig. 2). However, travel time became greater as the day passed, with a significantly slower travel time in the afternoon as compared with the morning (nonoverlapping confidence limits, $P<.05$).

The kind of animal also had a significant effect on time spent looking at exhibits. The nonoverlapping confidence limits in Figure 3 demonstrate a clear visitor preference for certain taxons. Amphibians and lizards were looked at for significantly less time ($P<.05$) than were nonvenomous snakes, venomous snakes, and turtles. Crocodiles, however, were looked at for a significantly ($P<.05$) longer time than were any of the other groups.

Five size classes of animals were established (Fig. 4) and examined for their effect upon time spent looking at exhibits. The nonoverlapping confidence limits show that there is a significant difference between the time spent looking at the three smaller size classes and the middle size classes, and another significant jump ($P<.05$) to the largest size class.

Time spent looking at different types of animal exhibits by visitors according to group type, sex, and age showed very little variation except for three significant differences involving venomous snakes and the "demonstration" exhibit (Table 5). Overall, visitors viewed the "demonstration" exhibit for a longer time than other exhibits, but females and couples spent significantly ($P<.05$) more time looking at this exhibit than males and other group types. Venomous snakes were looked at significantly ($P<.05$) longer by males than females, although nonvenomous snakes were looked at equally long by males and females.

TABLE 5. Mean time (in ss) spent looking at different types of exhibit animals by sex and group type for 573 individuals

	Group type				Sex	
Exhibit	Single	Couples	Peers	Family	Male	Female
Frogs	2.8	4.0	3.0	3.1	3.0	3.5
Lizards	6.2	5.8	5.0	4.7	5.2	5.1
Snakes	6.8	6.7	7.7	6.1	7.1	6.2
Snakes, venomous	6.3	7.7	7.8	7.4	8.5*	6.3
Turtles	6.0	7.5	6.6	7.5	7.3	6.9
Crocodiles	11.9	16.4	14.3	17.4	16.8	14.9
Demo	11.1	22.2*	13.6	13.5	11.5	18.4*

*Significant at the .05 level.

TABLE 6. Top ten exhibits by percent of 573 visitors who stopped (attractiveness) and average time exhibit was viewed by those who stopped (holding power)

Exhibit	Attractiveness %	Holding power (ss)	Animal's total length (cm)
Burmese python	80	38	450
Gharial	77	31	180
Cuban crocodile	77	23	220
Water monitor	71	20	180
Yellow anaconda	67	30	350
Alligator snapping turtle	66	31	130
Gaboon viper	66	24	120
African soft-shelled turtle	61	24	150
False water cobra	56	22	200
Black tegu lizard	56	18	80
Mean	68	25	206
Demonstration room	50	32	Eggs and young

The top-ranked exhibits in the reptile house by percentage of visitors who stopped (attractiveness) and by time spent looking by those who stopped (holding power) are exhibits of relatively large animals (Table 6). All major taxons except amphibians are represented. Although the rank order is not the same for both criteria, the same exhibits rank in the top ten for attractiveness and holding power. The Burmese python is top-ranked for both criteria. The demonstration room exhibit is unusual in that it did not rank in the top ten in attractiveness but was the second highest in holding power. The lowest-ranked exhibits were mostly small animals, primarily amphibians (Table 7). Except for the smoky jungle frog, no exhibit is in the bottom five for both attractiveness and holding power.

The demography of the reverse-flow sample (N = 51) was similar to that for normal flow; mean times spent looking and traveling were not significantly different

TABLE 7. Bottom five exhibits by percentage of 573 visitors who stopped (attractiveness) and average time exhibit was viewed by those who stopped (holding power)

Exhibit	Attractiveness (%)	Holding power (ss)	Animals's total length (cm)
Yellow-headed gecko	14	13	4
Oriental fire-bellied toad	17	11	5
European glass lizard	17	15	80
Pickerel frog	17	19	16
Smoky jungle frog	17	8	15
Mean	16	13	24
Blue tongue skink	23	7	35
Rainbow boa	28	8	200
African plated lizard	27	8	60
Eastern kingsnake	22	8	80
Smoky jungle frog	17	8	15
Mean	23	8	78

from normal flow. In normal flow, exhibits A–E (Fig. 5) were more attractive and held visitors significantly longer than area D–F (nonoverlapping confidence limits; $P < .05$). However, reversing the traffic flow dramatically reversed the situation. Area D–F became more attractive and held visitors significantly longer than A–E ($P < .05$).

DISCUSSION

The demographics of the sample population in this study were comparable to the demographic characteristics of zoo visitors in other studies [Hill, 1971; Kuehl, 1976; Serrell, 1978; Wolf and Tymnitz, 1979]. These studies identified families as the predominate visitor group with a population that is characterized by a nearly equal number of males and females and a majority of people between 20 and 50 years of age.

Tracking studies similar to this work are scarce in the literature. The holding power of exhibits (how long people look at an exhibit) has been measured by some investigators [Abrahamson et al., 1983; Bitgood et al., 1985; Brennan, 1978; Peart, 1984; Roper et al., 1986; Serrell, 1978]. Although types of exhibits and methods differ greatly in these studies, the mean time spent looking at individual exhibits was similar in all studies and remarkably short: from 10 s in some aquarium exhibits [Serrell, 1978] to 2 min in lion and gorilla exhibits [Brennan, 1978]. The latter study is especially remarkable because large predator and primate species are thought to be of high visitor interest. Bitgood et al. [1985] reported an average viewing time of 16.6 s at the Birmingham (Alabama) Zoo's reptile house, with the most popular exhibits being that of boas (22 s) and pythons (21 s).

The homogeneity in zoo visitor behavior documented in this paper has been mentioned by other workers. Time looking at exhibits seems nearly independent of age, sex, and group type [Brennan, 1978; Serrell, 1980]. Hoff and Maple [1982], however, reported a significant age and sex difference on time spent in reptile

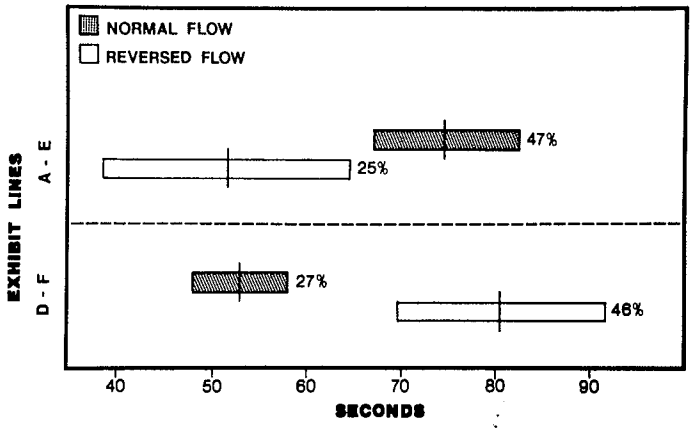

Fig. 5. Mean time spent looking (holding power) and percentage of visitors stopping at selected exhibits (attractiveness) by direction of visitor traffic flow.

exhibits. In their study, teens spent more time in the reptile house than adults, and males spent more time than females.

The remarkable lack of variation around mean viewing times in the present study has not been reported elsewhere. Times spent looking, by age, sex, and group type, are all sharply unimodal, with standard errors of usually less than a second. Time spent in the building, travel time, and viewing time also show a surprising lack of variation, with standard errors of <30 s.

The short time spent by visitors looking at exhibits documented in the literature and in this paper is very different from the time spent by visitors in our family learning center, HERPlab. This interactive facility in our reptile house held visitors for a mean time of 27.5 min (range 1.0–145 min) [White and Barry, 1984].

The results of the reverse traffic flow experiments have been duplicated elsewhere. Bitgood et al. [1986] and Falk et al. [1985] found similar effects that they called object satiation or exhibit satiation.

The short time our visitors spend in the reptile house, the minimal time spent viewing individual exhibits, the homogeneity of the data, and the lack of variation around mean viewing times all indicate that our visitors may not be interested in the exhibits. In addition, the results of the reverse traffic flow experiment are further evidence that the content of the exhibits may have very little to do with the time spent looking at an exhibit. The majority of visitors to the reptile house do not appear to be showing as much interest in our exhibits as we would like them to.

Kellert has reported [1979] that the zoo public scores well below other groups on biological and ecological understanding of animals. Surveys of zoo visitors [Cheek and Brennan 1976; Wolf and Tymnitz, 1979] have documented that the stated purpose of a zoo visit nearly always stresses intragroup social interactions. The exhibits and the animals are apparently used by the visitor as background for the social event.

Although understanding visitor behavior is a complex process influenced by many factors, the present study and similar work by other researchers demonstrate that there may be a disparity between how zoo, museum, and aquarium professionals

would like the public to respond to exhibits and how it is responding. A great deal of thought, time, and money is being expended in developing beautiful naturalistic exhibits in zoos, museums, and aquariums. However, it may be that our customers are paying minimal attention to these wonderful creations. Future studies at NZP will concentrate on visitor attitudes concerning exhibits using qualitative techniques such as interviews. It is hoped that a better understanding of our public will allow us to improve the interaction between the visitor and the exhibit.

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