From Reptile Houses to Reptile Discovery Centers

A Study of the Reptile Discovery Centers Project
at the National Zoological Park,
Zoo Atlanta and the Dallas Zoo

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Acknowledgments

Summary and Discussion

The study described in this report was initiated in 1990 by Judith White, former Chief, Office of Education, the National Zoological Park (NZP), and Dale Marcellini, Curator of Herpetology, NZP. Working collaboratively with colleagues at Zoo Atlanta (ZA) and the Dallas Zoo (DZ), they received a grant from the National Science Foundation (NSF) for a project in informal science education. The goal of the project was to develop interpretive components in Reptile Houses at the three zoos in order to improve the visitors' understanding of the collections. A key component of the project was evaluation, both to inform the development process and to determine what effect the changes in the Reptile Houses had on zoo visitors.

This report presents the results of surveys and observational studies conducted in 1991 at the Reptile Houses before they were changed and similar studies conducted in 1992 after they became Reptile Discovery Centers. The main goal of the research was to identify and measure changes in the visitor experience between the two years. The results have implications not only for zoological parks, but also for the broad range of cultural institutions striving to enrich the experience of visitors.

What Changed in the Reptile Houses between 1991 and 1992?

The project centered around the design and development of a set of twelve modules equipped with learning activities. These low-tech interactive stations were placed in the Reptile Houses at each of the three zoos. Topics included adaptation, anatomy, communication, feeding, reproduction, social behavior, and ecology/conservation. A conscious effort was made to include a variety of learning approaches in the modules, in order to accommodate the different ages and interests of visitors.

The Data

This report is based on almost 3,250 completed interviews and 1,000 observations of individuals selected from visitors to the three zoological parks in the fall of 1991 and in the fall of 1992. Interviews and observations were conducted at all three zoos simultaneously every day during two twenty-one-day periods (September 19 through October 12, 1991 and September 27 through October 17, 1992). Interviews in both years were conducted independently at exhibit entrances and exits.

Who Were the Visitors?

o   Visitors were divided fairly equally between men and women at all the zoos (overall, 48.7% men, 51.3% women).

o   Visitors aged 20 to 34 formed the largest segment of all visitors (38.9%).
    --On average, 22.7 percent of the audience was under the age of 12.

o Overall, 68.4 percent of visitors were attending as a group that included one or more adults and one or more children.

o The educational attainment for the 60.6 percent of the total audience, at all zoos, that was 25 years old or older, was relatively high: 51.8 percent had less than a bachelor's degree, 31.7 percent reported having received a college degree, and 16.6 percent completed an advanced or professional degree.

   -- Thus the zoo audience was considerably better educated than the general population (where only 20.3% of those 25 years old or older have a college, advanced or professional degree).

o An average 81.6 percent of respondents were Caucasian/White. The distribution among the other racial/ethnic categories reflects the composition of the areas from which the three different zoos draw their visitors.

What Background did Visitors bring with them?

o Approximately 60 percent of visitors had been to the zoos before.

   -- Repeat visitors were also frequent visitors -- overall, one-quarter of repeat visitors had been to the zoo once or twice in the last year.

o When asked to give their main reason for visiting the zoo, approximately half replied with a general expression of interest in seeing the zoo. Almost all of the rest indicated that they were on a social outing.

o While roughly one-third or more of them were at the reptile buildings simply as part of their zoo visit, most of them came either because of an interest in reptiles, because they wanted to see something specific, or because they were with someone interested.

o Visitors arriving at the reptile buildings in both years were asked to rate their like or dislike of reptiles on a one-to-ten scale from "extremely dislike" (score 1) to "like a lot" (score 10). Their response can be roughly divided into three groups: the one-third who generally liked them (scores 8-10, 33.8%), the almost one-half who were neutral (scores 4-7, 43.9%), and the nearly one-quarter who strongly disliked them (scores 1-3, 22.7%).

What Happened to Visitors in the Reptile Houses?

Changes in Observed Behavior (Tracking Study Results)

o Visitors spent an average of 17.2 minutes in the Reptile Houses in 1991 and 20.8 minutes in the Reptile Discovery Centers in 1992. Overall this represented a 20.5 percent increase in total visit time from 1991 to 1992.

o   Visitors in 1992 spent a higher proportion of their time engaged in the exhibits.
    -- On average the total time spent at stops increased by 3.4 minutes between
        1991 and 1992.
    -- The percentage of visit time that was spent at timed stops also increased from
        68.1 percent of the total visit time (in 1991) to 72.8 percent of total visit time
        (in 1992).

o   The number of stops that visitors made increased by one, from 23.9 in 1991 to
    24.9 in 1992.
    -- The presence of children in a group of visitors decreased the average number
        of stops. In 1991 groups with children made 2.5 fewer stops (23.0; 25.5 for
        those without children); in 1992 groups with children made 3 fewer stops
        (23.7; 26.7 for those without children).
    -- Only zoo location and the presence of children in a visitor's group had a
        significant effect on the number of stops.

o   An average stop in 1992 was over one-quarter longer (27.7%, 8.5 seconds longer,
    from 30.5 to 38.7 seconds) than one in 1991.
    -- Those visiting with children made fewer but longer stops in both years (in
        1991, 31.7 seconds vs. 28.6 seconds for those without children; in 1992, 39.4
        seconds vs. 37.7 seconds for those without children)
    -- Between 1991 and 1992 average stop time increased 7.8 seconds for visitors
        with children, compared to an increase of 9.1 seconds for visitors without
        children.

o   The activities of visitors changed between 1991 and 1992.
    -- In 1991 visitors just looked at reptiles -- they spent 99.5 percent of their stops
        looking at reptiles, and 0.5 percent watching a keeper or animal feeding.
    -- In 1992 they spent 29.2 percent of their stops at the interactive stations, 69.1
        percent of their stops looking at reptiles, and 1.7 percent watching a keeper or
        feeding.
    -- Visitors stopped 17 seconds longer on average at an interactive than they did
        to look at a reptile, although they also spent 2.3 seconds longer at a typical
        reptile stop in 1992 than they did in 1991.

o   The interactive stations had the greatest attraction for children, but visitors from
    all age groups are attracted to them.
    -- The difference due to age in the probability of making a stop at an interactive
        between the youngest visitors (under age 12) and the oldest (age 55 and over)
        is less than seven percent (6.7%).

<u>Changes in Reported Activities, Cognition and Affect</u>

As visitors left the exhibits they were asked which of a set of seven activities they had done and they were allowed up to five answers. They were also asked to give examples of what they had done for all activities except "Stopped and Looked at a Reptile" and "Read Information." The activities were:

1. Stopped and looked at an animal
2. Carefully examined the features of a reptile or amphibian
3. Discovered something about the animals in here I never knew before
4. Found the answer to something I always wondered about
5. Had a meaningful discussion with my group about something I saw or did here
6. Tried out an activity
7. Read information

o Significant changes in reported activities were found across the two years for all age groups except teenagers (age 12 to 17).
   -- The most common response in both years was "Stopped and looked at animals." For all age groups, between one-third and one-half of all activities cited were looking at animals.
   -- The second most common response varied by age. For example, in 1991 the second most common activity for children (i.e., those under age 12) was "Read information" (18.9%) and in 1992 it was "Tried out an activity" (13.8%).

o Activities reported on exit by adults over 25 varied significantly between 1991 and 1992 depending on whether they were visiting with or without children.
   -- Adults with children reported higher percentages of finding answers, discussing, and trying activities, while adults visiting alone or with other adults reported more reading, discovering, and examining.

o The degree of specificity of the examples visitors gave in describing their activities differed strikingly between 1991 and 1992.
   -- The much higher level of specificity in 1992 examples suggests that the respondents were considerably more involved in what they recalled doing. This result implies a higher quality of experience, as well as an increased acuity of observation and thought.

   o This heightened awareness of visitors can be directly linked to the interactive stations by comparing the subject matter of the activity examples that visitors reported.
      -- Examples of external morphology and behavior, the types of responses that are most obvious and general, were cut in half in 1992, while reproduction and feeding double.
      -- References to communication and internal anatomy rise from nearly nothing in 1991 to significant percentages in 1992.
      -- Visitors' attention in the Reptile Discovery Centers was clearly being shaped by the content of the interactive stations. Three modules dealt

with communication (Lizard Talk, Snake Talk, Frog Talk), one with
internal anatomy (What's Inside), and four with feeding (Lizard Feeding,
Snake Feeding, Turtle Feeding, Frog Feeding).

o   The interactive elements not only changed people's behavior in the exhibit and
    focused their attention on key ideas about reptiles, they also helped visitors to
    view reptiles more favorably.
    -- The average score on the Reptile Affect Scale was virtually unchanged by a
        visit to the Reptile House in 1991, while in 1992 there was a 5 percent increase
        between entrance and exit.
    -- For visitors who left the Reptile Discovery Centers in 1992, there is a slight
        drop in the percentage of lower scores and an appreciable increase in the
        percentage of respondents who said they liked reptiles a lot (score 10).

What Do These Results Imply?

Collectively, the substantive results of the study indicate that the addition of the
interactive modules had significant effects on visitors. *Behaviorally*, the interactive
stations slowed visitors down, made them more attentive, and lengthened their time in
the exhibit. *Emotionally*, the modules improved visitors' feelings about reptiles.
Intellectually, they communicated new ideas, especially about internal anatomy,
communication, and feeding.

Behavioral Effects. The behavioral results set the conditions for all the other results by
drawing and holding visitors' attention. During the planning process the zoo teams
indicated that, as one of their goals for the project, they wanted visitors to " Look at an
animal(s) carefully and for some time." The results show that visitors spent less total
time looking at animals in 1992 than they did in 1991, because of the time they spent
with the interactive stations. But an average reptile-looking stop in 1992 was a bit
longer than an average reptile-looking stop in 1991 (see Stop-time Regression Table,
Appendix E). The planning team also wanted visitors to "Discuss something related to
the experience with someone." We found that discussion activities are reported much
more frequently in 1992 than in 1991.

Emotional Effects. We found that the addition of the interactives into the Reptile
Houses significantly improved visitors' emotional responses to the reptiles. If, as we
believe, the emotional response is a central factor in the visitor's zoo experience, the fact
that this response was more positive indicates that the interactives provided a real
service for the visitor.

Nearly as interesting as the fact and direction of emotional change, however, may be the
suggested pattern of that change. In 1991 the two largest emotional effects of a visit to
the Reptile House were that most of the neutral population moved slightly downward,
and that the percentage of the population that expressed extreme dislike (score 1)
increased. In 1992 the two largest effects were that all those who disliked reptiles

(scores 1-3) decreased and that those who scored themselves at 10, the extreme positive end of the scale, increased. Through the addition of the interactive stations the reptile exhibits seem to have changed from reinforcers of fear and dislike to sites of positive experiences for a number of visitors.

Thus, there is some evidence that visitors met the planning teams' emotional goals for the exhibition. Visitors leaving in 1992 did "Think about something in a different way than before," and strong positive responses in 1992 to the question of what visitors would tell a friend imply that visitors may "Want to return to the Reptile Discovery Center." This readiness to return is logical, especially in view of the high percentage of repeat visitors among the zoo audience.

Cognitive Effects. The project articulated several cognitive goals for visitors. The first of these was to "Understand what they are seeing when looking at this animal." We found a slight increase in the accuracy of reptile descriptions, and a substantial increase in the specificity of examples in 1992, suggesting that visitors had a closer awareness of what they were seeing. There was no evidence in the study that the second cognitive goal, "Visually discover something new" was affected by the addition of the interactives. New subject matters among the 1992 activity results give clear indication that visitors were receiving new ideas from the interactives, but visitors were less inclined to refer to this new knowledge as "discovery." We believe that this is because more of visitors' learning resulted from the guided presentation of the interactives than from serendipitous realization.

While our measures did not precisely tap the planners' intended message that "reptiles and humans have certain things in common," the attractiveness of the three modules that employed direct comparisons between reptiles and humans imply that these connections were being made.

Informal Science Education

Although visitors were not seeking information and few were willing to spend enough time to significantly enhance their level of knowledge, the evidence of the study suggests that the interactives played an important motivational role. Learning is deepest when it parallels the emotional and intellectual interests of the individual.

The specific lessons for informal education in zoos that we draw from this study are that:

1. Low-tech interactives interest visitors of different ages, not just children. The assumption that interactives are attractive only to children is simply not supported by this study.

2. Visitors are not equally receptive to an exhibition subject. For example, the tendency of women and older visitors to dislike reptiles worked against the experience, while the favorable predisposition of young boys with pet reptiles offered them additional

incentives. Differences in attitude must be taken into account and incorporated into the educational design.

3. Within a zoo context, interactives can slow visitors down, improve the quality of the looking experience, and foster a more positive attitude towards animals.

4. When interactives incorporate parallels between humans and animals, they are most attractive.

Looking Ahead

Some of the results of this study, especially the effect of the interactives on emotional attitudes and their attractiveness to all ages, suggest that we need to know more about precisely what takes place in the use of an interactive. How does doing differ from looking? Why does it focus attention so well?

A deeper understanding of how interactives work must await further research, but as this study shows they can be used to increase learning opportunities by improving attitudes and strengthening attention. The interactives produced for the Reptile Discovery Centers offer a proven model for zoos.

Table of Contents

List of Tables and Figures

I. Introduction

Background

The project studied in this report was designed to provide interpretive components in Reptile Houses at the National Zoo, Zoo Atlanta and the Dallas Zoo that would improve visitors' experience in the Reptile Houses and their understanding of the collections. The underlying rationale for these changes was described by Judith White in the original grant proposal submitted to the National Science Foundation:[1]

> In transforming the houses into science centers, we will challenge a number of traditions of zoo display and interpretation which we think hamper the educational potential of a zoo visit. In their place we will build our project around what we know about how people learn. We suggest this approach is the logical one in creating any educationally effective zoo exhibit.
>
> The following are some of the features that characterize most zoo animal exhibit houses. These are the traditions we will challenge.
> • Traditional animal exhibit houses are designed around taxonomically arranged animal displays, and exhibit a large number of species.
> • Interpretation is primarily visual and verbal with exhibits to look at and signs and labels to read.
> • The experience is linear with rows and rows of exhibits, one way traffic flow, and few opportunities to stop or sit.
> • Visitors are primarily passive spectators. There is little interaction with exhibits, staff, or animals. People do not see what goes on behind the scenes, or become involved in it.
> • A visit has no structure. There is no orientation. Entrance is not limited; crowding is not controlled....
>
> Our plan is to transform the three reptile houses into science learning centers based around how people learn rather than traditional zoo design. The transformation will involve the design and development of new kinds of interpretive exhibits for the traditional halls, as well as experimenting with new ways to run the houses including a greater use of human interpreters.
>
> At all sites we will work toward finding ways to modify the visitor areas of the buildings to make them more conducive to learning. A primary vehicle for this change will be a set of portable *science study modules*[2] [emphasis added] equipped with learning activities....A core of biological concepts will form the basis for the science study modules' learning activities. Although we will be dealing with a collection of reptiles and amphibians at each site, it is not our intent to deal with

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[1]Judith White, "Reptile Science Centers: Integrating Informal Science Education into Traditional Zoo Exhibits," Proposal (#MDR 9050219) submitted to the National Science Foundation, 1990, p. 17-19.

[2] The terminology "science study modules" was later changed. In this report the modules are generally referred to as "interactive modules," or "interactive stations."

herpetology in a narrow sense. Rather we plan to use reptiles and amphibians to illustrate general concepts of biology which could relate to all zoo animals. Whenever possible we will try to relate these concepts to the zoo visitors themselves. Topics will include adaptation, anatomy, communication, reproduction, social behavior, and ecology/conservation.

We will also make a conscious attempt to include a variety of learning approaches in the...modules in an attempt to accommodate the different ages and interests of our visitors and to offer visitors choices....

Whenever possible we will try to develop activities that friends and families can do together...We also plan to give visitors experience trying out some of the skills that scientists employ....And finally, an emphasis will be placed on raising curiosity, encouraging people to ask questions, and pursue answers on their own, rather than simply providing information.

The NSF grant was awarded in September, 1990, and evaluation planning began almost immediately thereafter. The data analyzed and interpreted in this report were obtained from surveys and observational studies conducted in 1991 at the Reptile Houses before they were transformed, and identical studies conducted in 1992 after they became Reptile Discovery Centers.

The project was ambitious. While the enthusiasm of the collaborating teams was high, questions which permeated every discussion from the start were "Will it work?" "Will it succeed?" "How will we measure success?" From the inception of the project, and with the encouragement of NSF, the project team made a commitment to systematic evaluation and assessment. During the development phase, staff at the National Zoo used selected groups of visitors to try out activities and field-test prototypes before final fabrication. It was clear to the zoo staffs that an experiment of this magnitude could not be conducted without a formal assessment plan that extended beyond the utilization of assessment techniques in the development of the interactive activities and materials. This report is restricted to the formal assessment of the Reptile Discovery Centers (RDCs) undertaken by the three zoos and the Institutional Studies Office. In this introduction we present the framework within which the studies were developed and the key concepts which underlie the analysis.

Evaluation Framework

"Will the Reptile Discovery Centers be a success?" Clearly, everyone involved in the project wanted it to succeed. What does that mean? Does it mean that more people visit? Does it mean that our colleagues approve? Are there specific measures of effectiveness that can be used to see if, and to what degree, the development aims were achieved?

The project development team, in the spring of 1991, grappled with defining and refining the curatorial/educational goals for visitors to the centers. These goals drove the development of the science modules and, by definition, became the underpinnings of the evaluation activities.

The project development team prepared a list of what they hoped visitors would gain from the experience of the revised exhibits in general terms:[3]

1. <u>Look</u> at an animal(s) carefully and for some time.
2. <u>Understand</u> what they are seeing when looking at this animal.
3. Visually <u>discover</u> something new.
4. <u>Learn</u> something new.
5. <u>Think</u> about something in a different way than before.
6. <u>Discuss</u> something related to the experience with someone.
7. <u>Want to return</u> to the Reptile Discovery Center.

In addition there were four core messages that the new exhibits were meant to convey to visitors:[4]

1. Reptiles and humans have certain things in common.
2. Reptiles and amphibians are "important" animals.
3. Scientific method is something you can easily do to solve problems.
4. Reptiles are beautiful creatures.

These expected responses are *intellectual* (or cognitive), *emotional* and *behavioral*. In very general terms, included in the *intellectual* response were <u>understanding</u>, <u>discovering</u>, and <u>learning</u>, and the message that reptiles and humans have certain things in common. The *emotional* goals included <u>thinking differently</u> and <u>wanting to return</u>, and the messages that reptiles are important and beautiful. The *behavioral* goals included <u>looking</u> and <u>discussing</u>, and the message that scientific method is something you can do to solve problems.

<u>Study Design and Implementation</u>[5]

From the start, it was apparent that the formal study should focus on a comparison of the visitor experience both <u>before</u> and <u>after</u> visiting the RDCs. In order to determine the extent to which these differences, if any, could be attributed to the <u>changes</u> made in the Reptile Houses or simply to visiting the buildings, it was also necessary to compare the visitor experience both <u>before</u> and <u>after</u> the opening of the RDC's; in our case, one year before. Thus, our primary concern was to collect information with which to measure <u>differences</u> in the visitor experience. Further, as there was a possibility that the characteristics of individuals visiting would change between the two years, our data

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[3] Judith White to Zahava D, Doering, "RSC Topics II", memorandum, April 10, 1991.

[4] Judith White to Zahava D. Doering, untitled memorandum, May 13, 1991.

[5] See Appendix A for copies of all the questionnaires. Appendix B contains a detailed description of the study methodology.

allowed for an analysis of compositional differences. Based on previous research, we also assumed that there would be differences between results obtained from interview data and those obtained from observations. Thus, our design allowed for both types of data collection. Finally, recognizing differences in visitor composition at different times of the year, on different days of the week and at different times during the day, our approach was to collect information at the same time in all three locations.

Design. The zoo studies were designed to be conducted simultaneously at all three sites. The study called for personal interviews, from five to ten minutes in duration, with systematically selected samples of individuals over three consecutive weeks. The sample selection intervals ranged from intercepting every 3rd to every 25th visitor, based on previously collected information about visitor flows. The calendar dates were selected to be close to the scheduled opening in 1992. The 1991 schedule was set to be precisely one year earlier. To minimize possible changes in the characteristics of visitors resulting from publicity about the Reptile Discovery Centers in 1992, a decision was made to begin publicity after the data collection was completed.

Depending on the time of day and day of the week, interviewers intercepted visitors at predetermined intervals prior to entering the Reptile Houses (1991 or 1992 Zoo Entrance Survey) and as they exited (1991 or 1992 Zoo Exit Survey). In addition, another set of visitors were observed as they made their way through the Reptile Houses and the time they spent both in the building and in front of various exhibits was to be recorded (1991 or 1992 Zoo Tracking Study).

Implementation. The actual data collection extended from Sunday, September 19 through Sunday, October 12, 1991, and Sunday, September 27 through Sunday, October 17, 1992. Interviewing took place at all hours from 10:00 am through 6:00 PM and all seven days of the week. Zoo staff and contractors, and members of school groups making formal tours were excluded from the study. During the 21 survey days in 1991, we estimate that approximately 51,000 individuals passed our three interviewing locations during the hours in which interviewing was conducted. From these, 1,206 individuals were selected for the Entrance Survey, 1,287 for the Exit Survey and 536 were selected for the Tracking Study. Similarly, during the 21 survey days in 1992, we estimate that approximately 27,000 individuals passed our three interviewing locations during the hours in which interviewing was conducted. From these, 1,067 individuals were selected for the Entrance Survey, 773 for the Exit Survey and 480 were selected for the Tracking Study. Cooperation rates among intercepted visitors were quite high; for the Entrance Survey, 84.9 percent and 90.5 percent for 1991 and 1992, respectively; for the Exit Survey, 84.0 percent and 85.6 percent for the two years, respectively. Cooperation was not an issue in the Tracking Study, as the number of observations was a function of interviewer availability.

Personal Interviews. The initial portion of the questionnaire was designed to collect general information about the visit. Aside from the frequency of and reason for visits to the building, we also wanted to understand the visitors' main reasons for being at the zoo. After establishing some rapport with the visitor, we asked questions about their

first impressions of reptiles, descriptions of reptiles, interest in or experience with exhibit activities, attitudes towards reptiles, and background experience and knowledge. The interview ended with a set of questions requesting standard demographic characteristics: age, educational attainment, cultural/racial/ethnic identity, and gender. In appreciation for participating in the survey, interviewees received a colorful sticker.

The Tracking Study Form was designed to record entry and exit time in the building, the number of stops the visitor made at different exhibits, and the time (in seconds) spent at each exhibit. The observations ended with the interviewer's inference of standard demographic characteristics: age, cultural/racial/ethnic identity, gender and the social composition of the visiting group.

A single Training Manual prepared specifically for the study ensured uniformity of procedures, and training sessions enabled interviewers to conduct several "practice" interviews and observations before the study began. A total of 84 hours of personal interviewing and 42 hours of observation were conducted during the three weeks of the study, at each site, for a total of 126 hours of data collection at each site. Three interviewers were present during each interviewing hour: one person to systematically select visitors and two to conduct respondent interviews or track.

Report Contents and Structure

The overall format of this report differs somewhat from previous ISO studies because we have tried to make this single document accessible to a variety of audiences. In order to facilitate reading by non-specialists, we have used graphs to illustrate important statistical differences; and we have presented the relatively complex analyses underlying the central arguments in separate appendices. We have tried to avoid overburdening the main text with details regarding statistical tests of significance. Also, the text only reports significant difference or changes when the appropriate tests have been performed.[6] For readers within the zoological community, however, we have provided the principal quantitative results within the main body of the report, using footnotes or parenthetical references for necessary supplementary information.

Section II of the report describes the characteristics of the individuals who visited the three zoos. Section III of the report presents the background of visitors and their intentions for the visit. Section IV describes the changes that were made to transform the Reptile Houses into Reptile Discovery Centers. Section V reports on the cognitive, emotional, and behavioral changes that took place. Each of the three sections presenting the findings of the study, Sections II, III, and V, contains its own summary and can be read independently.

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[6] See technical notes in Appendix C.

The appendices include technical information about the studies. Appendix A contains copies of the questionnaires and observation forms; Appendix B discusses survey methods and response bias. Appendix C provides supplementary tabulations for Sections II, III, and V. Appendix D outlines the methods, results, and technical details of the tracking analyses. Finally, Appendix E presents the regression results of the Reptile Affect Scale.

As always, readers with questions about the statistics and models used in this report, as well as about the interpretations presented here, are encouraged to bring them to the attention of the authors.

II. <u>Demographic and Social Characteristics of Visitors</u>

<u>Who Were the Visitors?</u>

This section identifies the key features of the gender, age, social composition, educational attainment, geographic origins and racial/ethnic identity of the individuals who visited the Reptile Houses of the National Zoo (NZP), Zoo Atlanta (ZA) and the Dallas Zoo (DZ) during the fall of 1991 and the fall of 1992. For clarity, the demographic descriptions are given as aggregate values, combining the two years and both the entrance and the exit surveys.[1] Comparisons between the zoos and with findings from other studies show that these data provide reliable profiles of the general population of visitors[2] to those institutions.[3]

<u>Gender and Age.</u> As Figure 2.1 illustrates, visitors were divided fairly equally between men and women at all the zoos (overall, 48.7% men, 51.3% women).

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[1] For the complete data by zoo and by year, see Appendix C, Table C.2.1. Demographic data from the exit survey and the entrance survey at a particular zoo in a particular year are pooled in the tables as well. The samples were selected so as to minimize, if not eliminate altogether, the probability of an individual being included in both an entrance and an exit survey. In addition, the characteristics discussed in this section, as well as the behaviors and experiences presented in the next section of the report, are those which are not subject to change as a result of the visit. Comparisons between the characteristics of individuals interviewed on entrance and of those interviewed on exit confirmed that there were no significant differences between the composition of the entrance and exit samples.

[2] In most of the studies conducted by ISO, a distinction is made between "visits" and "visitors." "Visits" are discrete events, i.e., either entries into or exits from a building or a specific location in it. "Visitors" are unique individuals who make the visits, which may include more than one entry into or exit from a building or hall in a defined period of time. The smaller the interval for which data are reported, the less critical is this distinction. Thus, if we were reporting visits to an exhibition for a 15-minute period, the likelihood would be very high that visits and visitors would be identical. When examining annual data for a building, the figures include multiple visits within a calendar year, as well as multiple entries on a given day. Strictly speaking, these data are about visits to the zoos. However, we feel that our sampling procedures minimized the possibilities of an individual being counted more than once in a given day. Further, the fact that the survey period was limited to only 17 days probably minimized the possibility of an individual being counted more than once during the period. In this report, while we use the term "visitors" we are doing so with the recognition that technically it is somewhat an error.

[3] These data exclude zoo staff, contractors, or those who had professional appointments in the buildings. Also, as shown in Appendix B, the data slightly underrepresent the views of some visitor sub-groups at each of the zoos. Although none of these three zoos had conducted scientific surveys of their populations, conversations with staff indicated that the reptile houses were so popular that at each zoo all but a few visitors went to the reptile house. As a result these specific profiles can serve as approximations of the profiles of all zoo visitors.

Figure 2.1
Gender, by Location and Total
(1991 and 1992 Combined, in Percent)
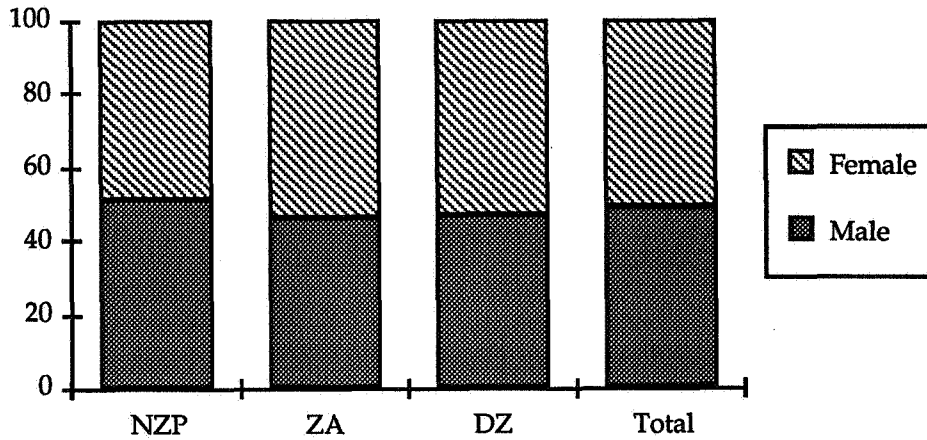
At all three zoos, 20-to-34-year-olds form the largest segment of visitors (overall, 38.9%). At the Dallas Zoo, they comprised almost half (48.5%) of all visitors. On average, 22.7 percent of the audience was under the age of 12. The very young were particularly numerous at the National Zoo, where those aged 5 and under comprised 16.2 percent of visitors (compared to 8.0% at Zoo Atlanta and 6.9% at the Dallas Zoo).[4] Figure 2.2 shows clearly that teenagers (ages 12-19, 7.1%) and those aged 55 and over (6.2%) form a similar and relatively small percentage of the audience at all three zoos.

Figure 2.2
Ages of Visitors, by Location and Total
(1991 and 1992 Combined, in Percent)

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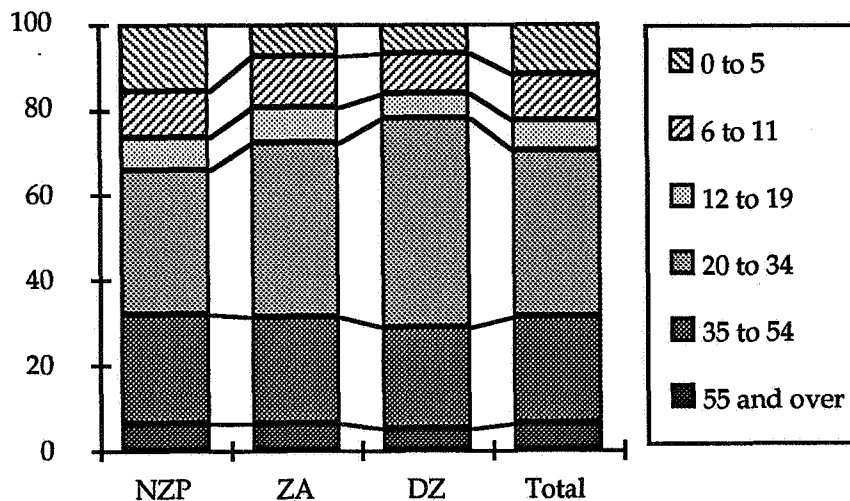
4   $X^2 = 80.484$, Df = 20, p < .001.

<u>Social Composition</u>. The adult-child group is obviously the major social dimension of these zoo-visiting populations (see Figure 2.3). Overall, 68.4 percent of visitors were attending as a group that included adults and children.

Figure 2.3
<u>Social Composition of Visitors, by Location and Total</u>
(1991 and 1992 Combined, in Percent)
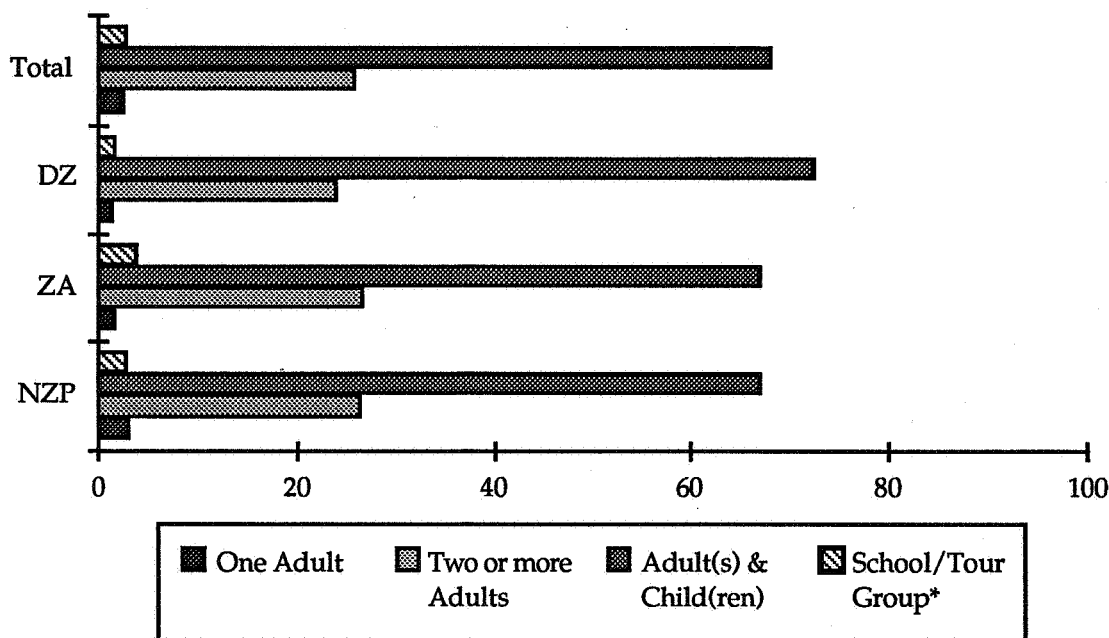
*Members of school or tour groups who were visiting independently of their group; formal school and tour groups were excluded. See Appendix B.

There are some clear gender differences in these visiting groups.[5] As illustrated in Figure 2.4, for example, those visiting alone were over 50 percent more likely to be male than female (61.3% male, 38.7% female), and single adults visiting with children were nearly twice as likely to be female as male (34.3% male, 65.7% female). The other groups were more evenly divided between male and female.

<u>Educational Attainment</u>. Figure 2.5 shows the educational attainment of all visitors, irrespective of age. The substantial percentage with a high school education or less reflects the large number of young people.[6] For the 60.6 percent of the total audience, at all zoos, that was 25 years old or older (and thus assumed to have completed their formal education) 51.8 percent had less than a bachelor's degree, 31.7 percent reported having received a college degree, and 16.6 percent completed an advanced or professional degree. The educational differences between zoos observed here are not as dramatic as the differences between these zoo-going adults and the general population. According to the 1990 U.S. Census, 79.7 percent of adults over age 25 have less than a bachelor's degree, 13.1 percent have a college degree, and 7.2 percent completed an

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5 $X^2 = 32.213$, Df = 6, p < .001.
6 Differences between zoos are clearly seen in Appendix C, Table C.2.1.

Figure 2.4
Gender and Social Composition, All Zoos
(1991 and 1992 Combined, in Percent)
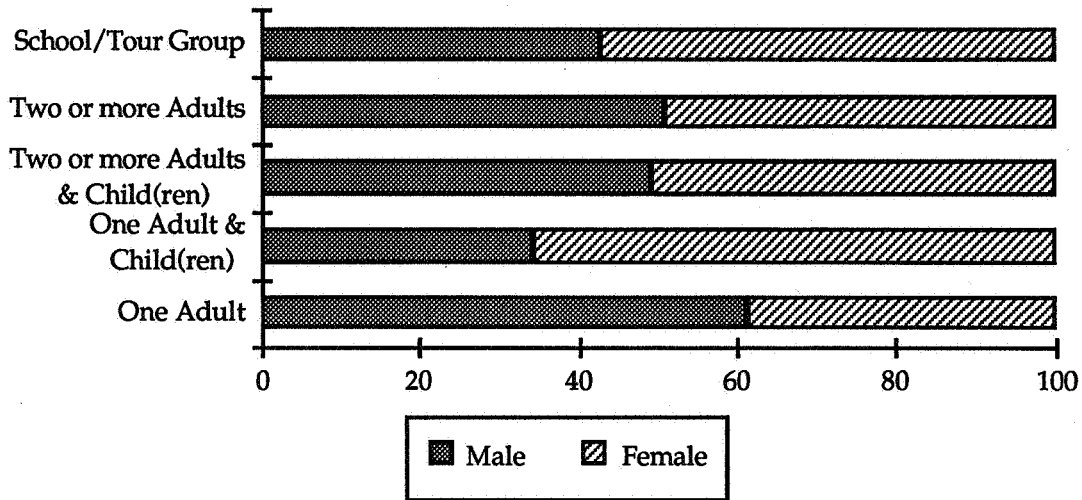
Figure 2.5
Educational Attainment, by Location and Total
(1991 and 1992 Combined, in Percent)
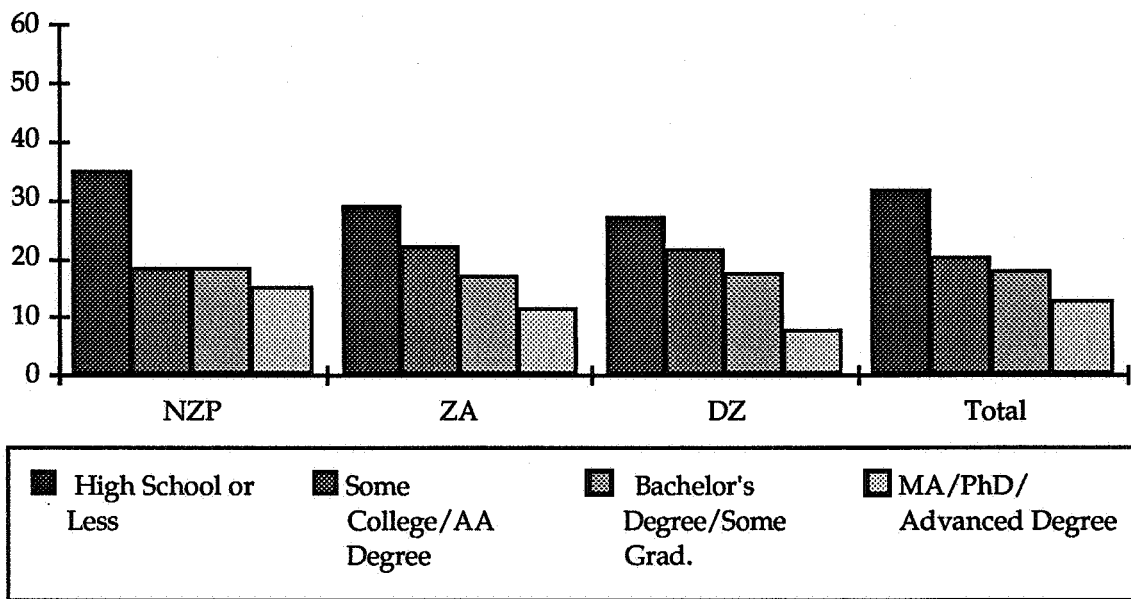
advanced or professional degree (see Figure 2.6). In other words, adults with high educational attainment are over-represented in the zoo audiences by a factor of more than two. Adults with a high school education or less are the most under-represented group.[7]

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[7] See Appendix C, Table C.2.2.

Figure 2.6
Educational Attainment, Adults Over age 25
Zoo Visitors and US Population
(In Percent)

| | High School or Less | Some College/AA Degree | Bachelor's Degree/Some Grad. | MA/PhD/ Advanced Degree |
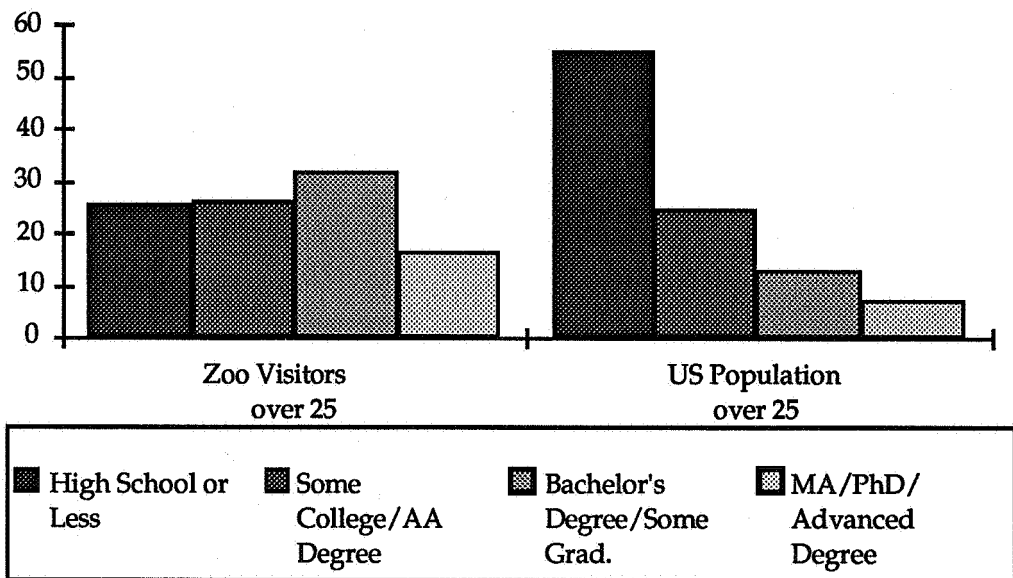
Geographic Origins As shown in Figure 2.7, the distribution of visitors according to their geographic origins varies markedly. Only 7.3 percent of the National Zoo visitors, but 73.2 percent of Dallas Zoo visitors come from their respective cities. The figure also shows that the percentage of Zoo Atlanta visitors from out-of-state is more than twice the percentage of out-of-state visitors at the Dallas Zoo.

Figure 2.7
Residence of Visitors, by Location and Total
(1991 and 1992 Combined, in Percent)
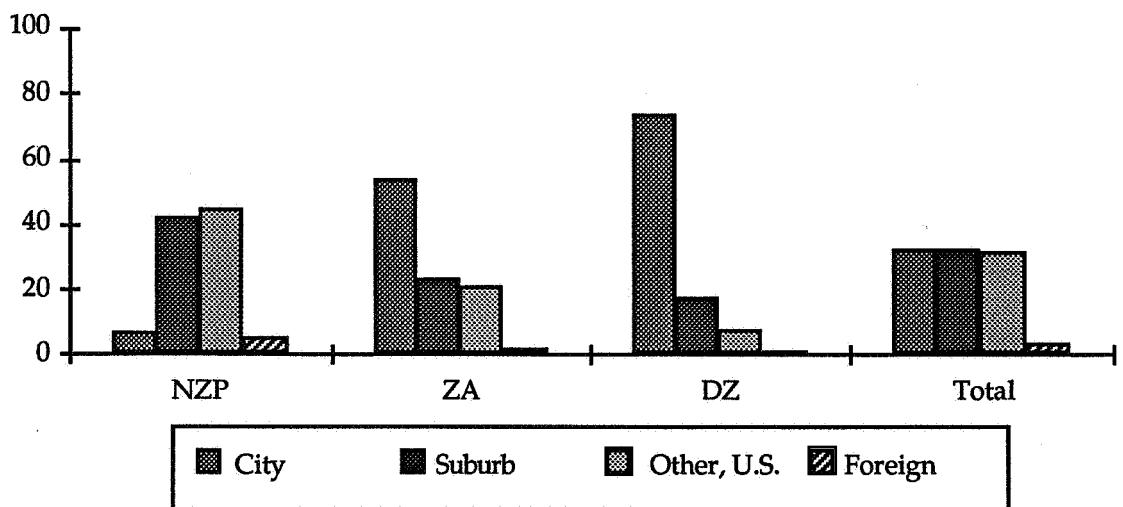
| | City | Suburb | Other, U.S. | Foreign |

NZP: City = Washington, D.C.; Suburbs = MD/VA Suburbs
ZA: City = Metro Atlanta; Suburbs = Georgia, excluding Metro Atlanta
DZ: City = Dallas/Ft. Worth Metro; Suburbs = Texas, excluding Dallas/Ft. Worth

Racial/Ethnic Identification. As Figure 2.8 shows, at all three zoos visitors were predominantly Caucasian/White, comprising on average 81.6 percent of respondents. The distribution among the other racial/ethnic categories reflects the composition of the areas from which the zoos draw their visitors, as shown in Figure 2.9. (In Figure 2.9, the minority column from Figure 2.8 is further divided into the various racial/ethnic groups.)

Figure 2.8
Racial/Ethnic Composition, by Location and Total
(1991 and 1992 Combined, in Percent)
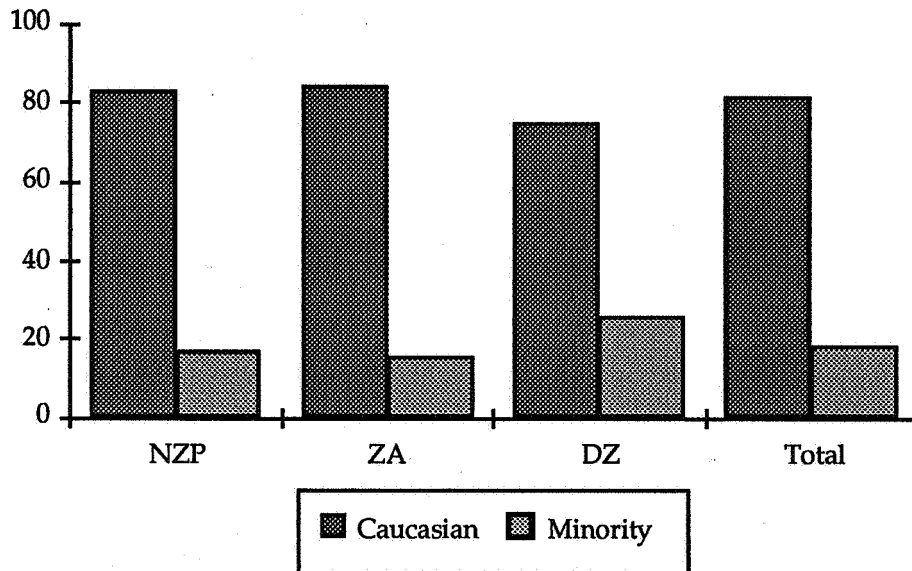
Figure 2.9
Racial/Ethnic Composition of Minorities, by Location and Total
(1991 and 1992 Combined, in Percent)
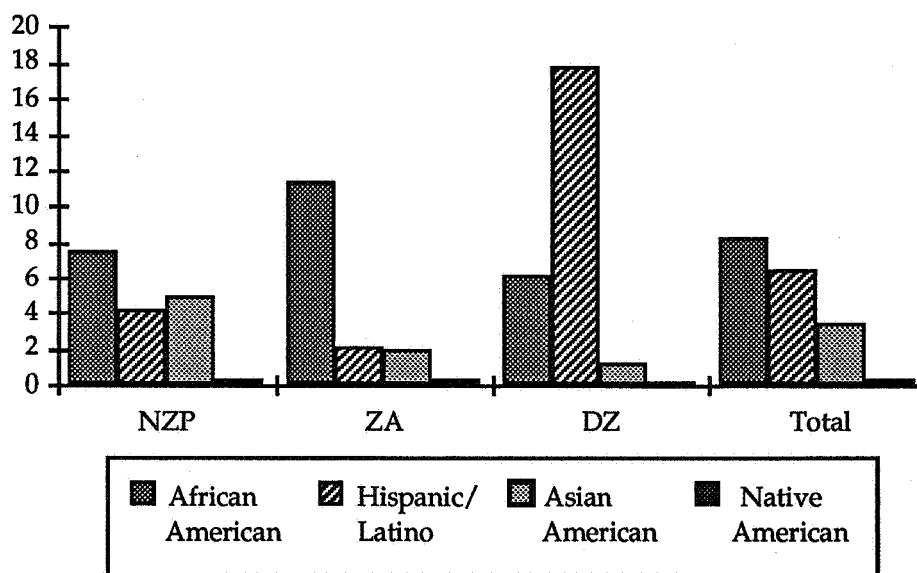
Summary

Visitors were divided fairly equally between men and women at all the zoos. Visitors aged 20 to 34 formed the largest segment of all visitors (38.9%). On average, nearly one-fourth of the audience was under the age of 12. The adult-child group was the major social dimension of these zoo-visiting populations. Overall, nearly 7 out of 10 visitors were attending as a group that included one or more adults and one or more children.

The educational attainment for those 25 years old or older (and thus assumed to have completed their formal education), shows that about half had less than a bachelor's degree, and about half reported having received a college degree or an advanced or professional degree. Thus the zoo audience was considerably better educated than the general population (where only one-fifth of those 25 years old or older have a college, advanced or professional degree).

Eight out of ten respondents were Caucasian/White. The distribution among the other racial/ethnic categories reflects the composition of the areas from which the zoos draw their visitors.

<div align="center">

*   *   *

</div>

Now, as we stand by the Reptile Houses in our imagination, we begin to observe some patterns in this crowd of visitors. We are struck first by the number of children in what seem to be family groups with several adults. About half of the children are pre-school age, many in strollers. We notice only a few people, mostly men, who seem to be alone, and only a few single parents, mostly women. The stream of visitors is overwhelmingly White, and, in general, better educated than the American average. Most of them seem to be local visitors. As they open the door to the Reptile House, we wonder what has brought them here. Do they come often? Do they actually like reptiles? What are they expecting to do in there? These are the questions addressed in the next section.

III. Visitor Background, Experience and Desires

What Background Did Visitors Bring With Them?

This section addresses the experiences and attitudes that might have influenced visitors' responses to the Reptile Houses (in 1991) or to the Reptile Discovery Centers (in 1992). We examine previous visits to the same zoo, to other zoos, and to natural history museums and aquaria, as well as visitors' relationships with reptiles and their intentions for the visit.[1]

Previous Visits. Approximately 60 percent of visitors had been to the zoos before (Figure 3.1). This result was remarkably uniform across all three zoos.

Figure 3.1
First Visit, by Location and Total
(1991 and 1992 Combined, in Percent)
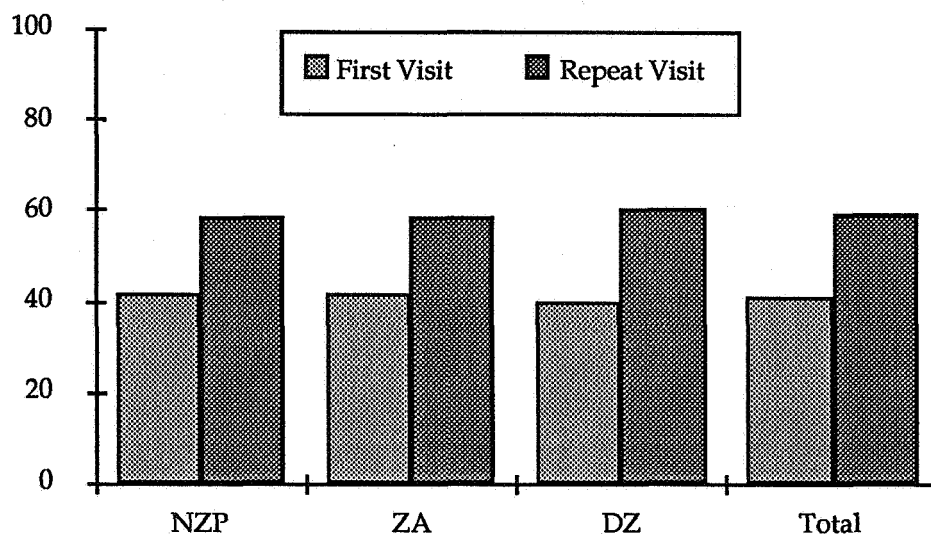
These repeat visitors were also frequent visitors -- overall, one-quarter of repeat visitors had been to the zoo once or twice in the last year (Figure 3.2), 13.3 percent of them had been to the zoo 3-9 times in the last year, and 2.4 percent had been to the zoo 10 or more times in the last year. Almost all of the remaining repeat visitors had been to the zoo at least once in the past three years.

In general, nearly half of those visiting the National Zoo, Zoo Atlanta, or the Dallas Zoo for the first time had been to another zoo elsewhere within the last year. Only about one-quarter of all visitors (22.5%) had not been to a zoo at all in the twelve months before this visit (see Appendix C, Table C.3.3.c).

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[1] Supplementary data are in Appendix C, Table C.3.1-C.3.4.

Figure 3.2
Frequency of Visits, Repeat Visitors Only, by Location and Total
(1991 and 1992 Combined, in Percent)

Legend:
- 3+ yrs ago
- 2-3 yrs ago
- 1-2 yrs ago
- Over 10 in last yr
- 3-9 in last yr
- 1-2 in last yr

Categories: NZP, ZA, DZ, Total
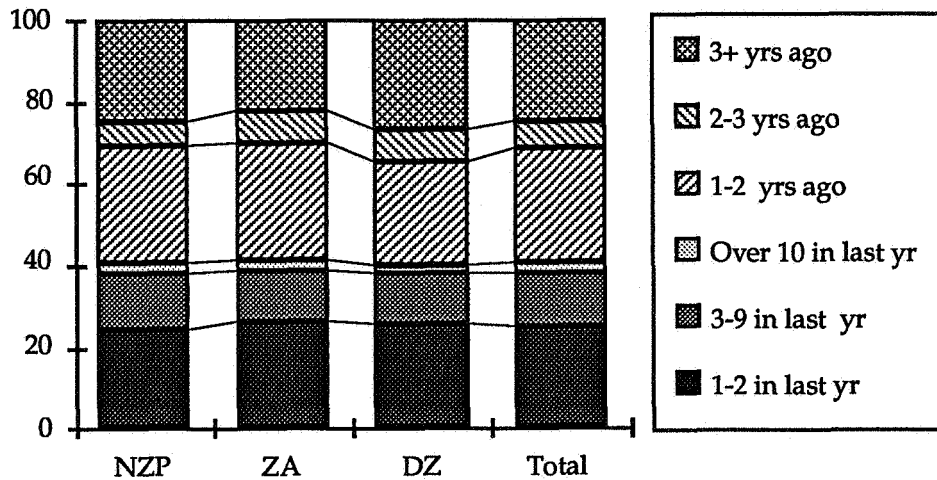
On average, a high percentage of visitors had also been to natural history museums (46.1%) or aquaria (51.2%) in the year before their visit to the Reptile House. This suggests that zoo, natural history museum, and aquarium audiences overlap. The extent of these related experiences varies considerably among the zoos. Only about 25 percent of Zoo Atlanta visitors had been to a natural history museum within the last year, for example, but nearly 60 percent of National Zoo visitors had (Figure 3.3).

Figure 3.3
Visits to Other Natural Science Institutions in Last Year, by Location and Total*
(1991 and 1992 Combined, in Percent)

Legend:
- Other Zoos
- Natural History Museums
- Aquaria

Categories: NZP, ZA, DZ, Total
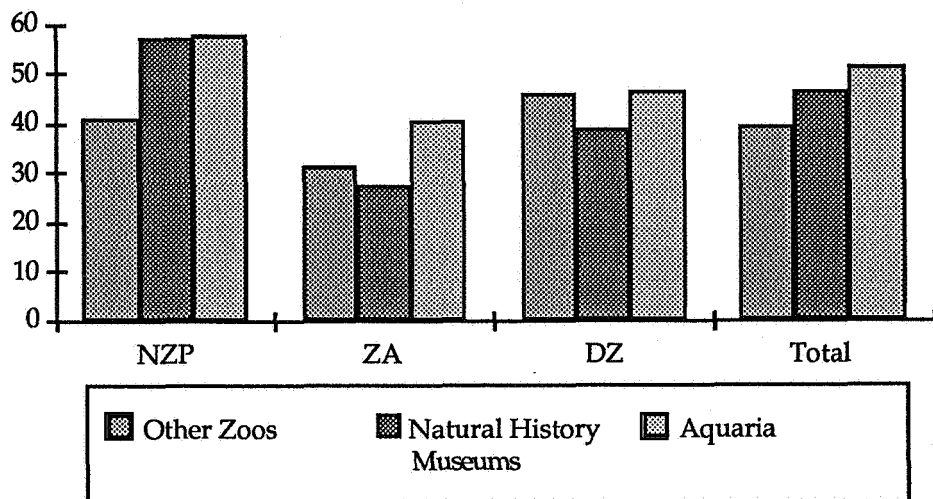
*Each column in the Figure represents the percentage of visitors at that zoo who reported one or more visits to other zoos, natural history museums or aquaria in the last year.

This large difference in experience is obviously influenced by the availability of such institutions in the surrounding region, and by the proportion of the audience that is

non-resident. As we saw in the previous section, each zoo draws its visitor population from a distinctive residential base (Figure 2.7).

On the basis of their degree of experience visiting the zoo where they were interviewed, as well as other zoos, natural history museums and aquaria, visitors were divided into five categories: New Visitors, Infrequent Visitors, Moderate Visitors, Frequent Visitors, and Regular Visitors.[2] The New Visitors reported virtually no experience at another zoo or related institution within the last year, while the Regular Visitors, at the other end of the scale, had been to each of these types of institutions at least several times in the last year. The distribution of these five categories of visitors is shown in Figure 3.4.

Figure 3.4
Visitation Categories, All Zoos
(1991 and 1992 Combined, in Percent)

☒ New/Seldom   ☒ Infrequent   ☒ Moderate   ☐ Frequent   ■ Regular
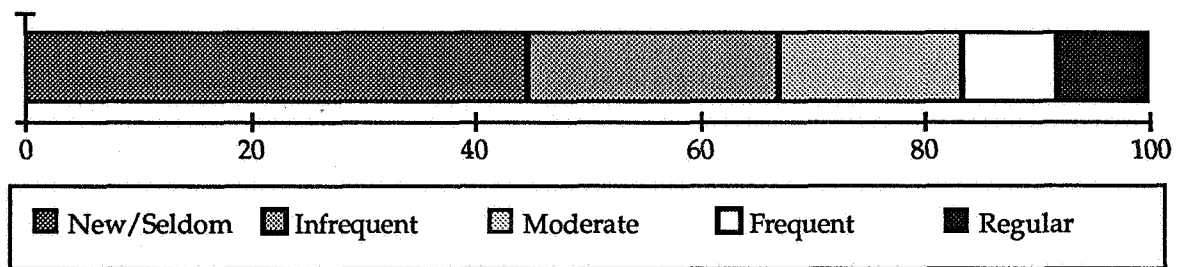
The only demographic characteristics that relate significantly to these categories are racial/ethnic identity and residence in Washington[3] and Dallas.[4] Among D.C. residents interviewed at the National Zoo, over half (53.3%) of the minority group members were New Visitors, compared with about one-fifth (20.5%) of non-minority visitors. Conversely, 6.2 percent of minority visitors were Regular Visitors, compared to 20.8 percent of non-minority visitors. Similarly, at the Dallas Zoo 66.0 percent of minority visitors and 43.8 percent of non-minority visitors living in the Dallas/Fort Worth Metroplex were New Visitors, compared to the 3.2 percent of minority visitors and 11.4 percent of non-minority visitors who were in the Regular Visitor category. (Visitors to Zoo Atlanta did not show statistically significant differences in visitation patterns with respect to any of the demographic characteristics.)

Reason for Visiting. Although our respondents report considerable experience in visiting zoos and similar educational settings, relatively few of them (9.2%) said that they were visiting the zoo because of a specific interest in natural history (Figure 3.5). Approximately half replied with a general expression of interest when asked to give their main reason for visiting the zoo. Almost all of the rest indicated that they were on a social outing.

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[2] For the details of the classification method and a discussion of results, see Appendix C and Table C.3.2.

[3] $X^2 = 13.99$, Df = 4, p<.01

[4] $X^2 = 30.34$, Df = 4, p<.001.

Figure 3.5
Main Reason for Zoo Visit, by Location and Total*
(1991 and 1992 Combined, in Percent)

■ Natural History

▨ Social Outing
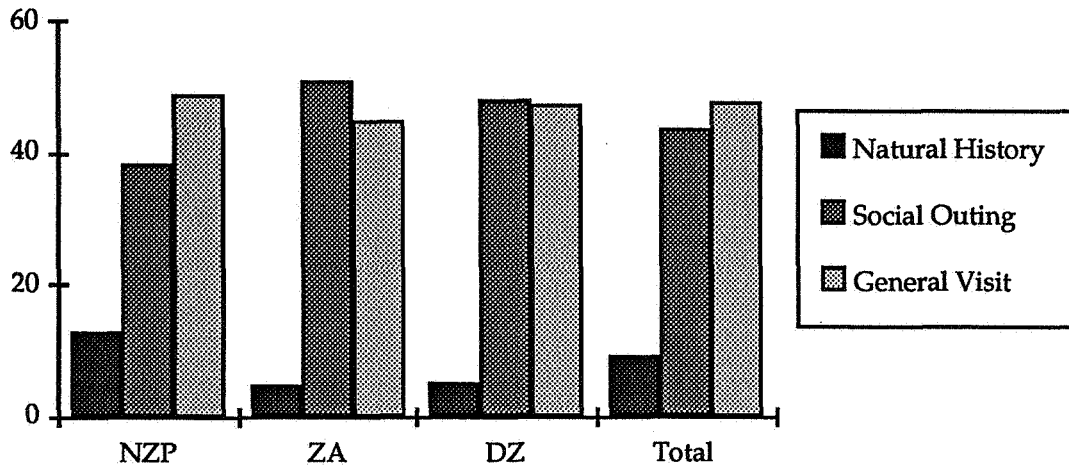
▦ General Visit

*Social outing includes the 2.2 percent of visitors who reported that they had brought someone to show them something, the 3.0 percent who were on a tour, and the 4.2 percent who were at the zoo for a special event. General Visit includes the 1.2 percent who said they had come because of the reputation of the zoo.

Looking at the reason for visiting the zoo by visitation patterns,[5] a higher proportion of Regular and Frequent Visitors came because of an interest in natural history (12.7% of Regular Visitors and 13.1% of Frequent Visitors compared to between 8.3% and 8.8% of other visitors).

However, visitors gave more specific reasons for coming to see the reptiles. While on average roughly one-third or more of them were at the Reptile House simply as part of their zoo visit, most of them came either because of an interest in reptiles, because they wanted to see a particular animal, or because they were with someone interested (Figure 3.6).

Unlike the other characteristics that we have considered up to this point, the reasons for visiting the Reptile Houses differ markedly between the two years of the study.[6] Between 1991 and 1992 the percentage of visitors who came to the Reptile Houses because of an interest in reptiles increased significantly at all three zoos. At the National Zoo the percentage nearly doubled (from 26.1% in 1991 to 49.7% in 1992); at Zoo Atlanta it increased from 27.6 percent to 38.5 percent; at the Dallas Zoo it grew from 30.4 percent to 47.4 percent. The increase in the percentage who said they came because of an interest in reptiles was offset by the decrease in the percentage of those who said they came to see a specific animal (see Figure 3.7).

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5   $X^2 = 28.50$, Df = 8, p<.001.
6   $X^2 = 119.20$, Df = 3, p<.001.

Figure 3.6
Main Reason for Visiting Reptile House, by Location and Total*
(1991 and 1992 Combined, in Percent)
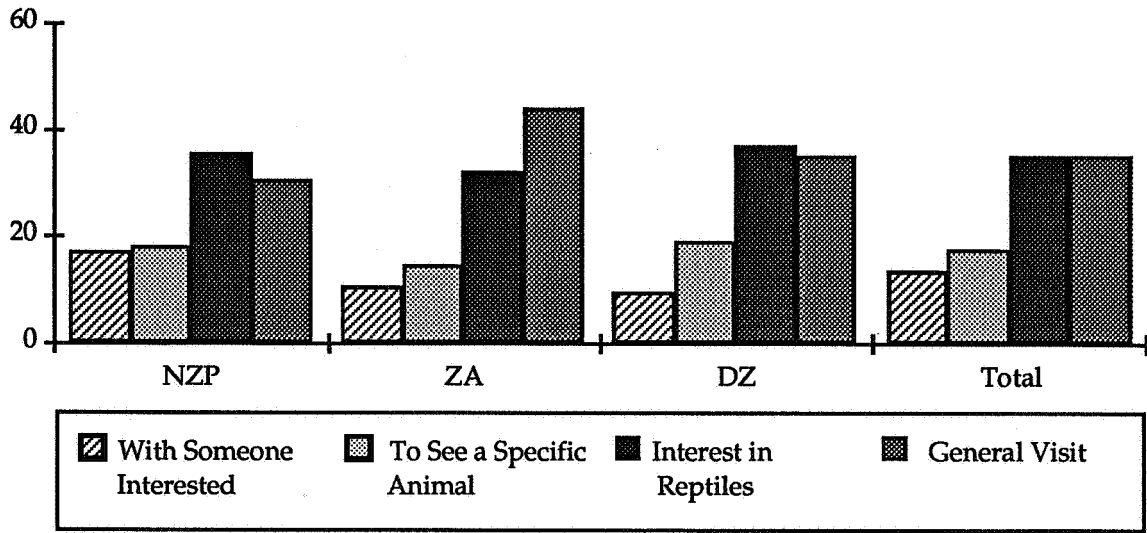
*With Someone Interested includes 0.6% Other; To See a Specific Animal includes 2.9% at the Dallas Zoo who came to see birds; General Visit includes 5.4% who wandered by, and 0.6% who saw signs or read about the reptile exhibits.

Figure 3.7
Main Reason for Visiting Reptile House, by Location, Total and Year
(In Percent)
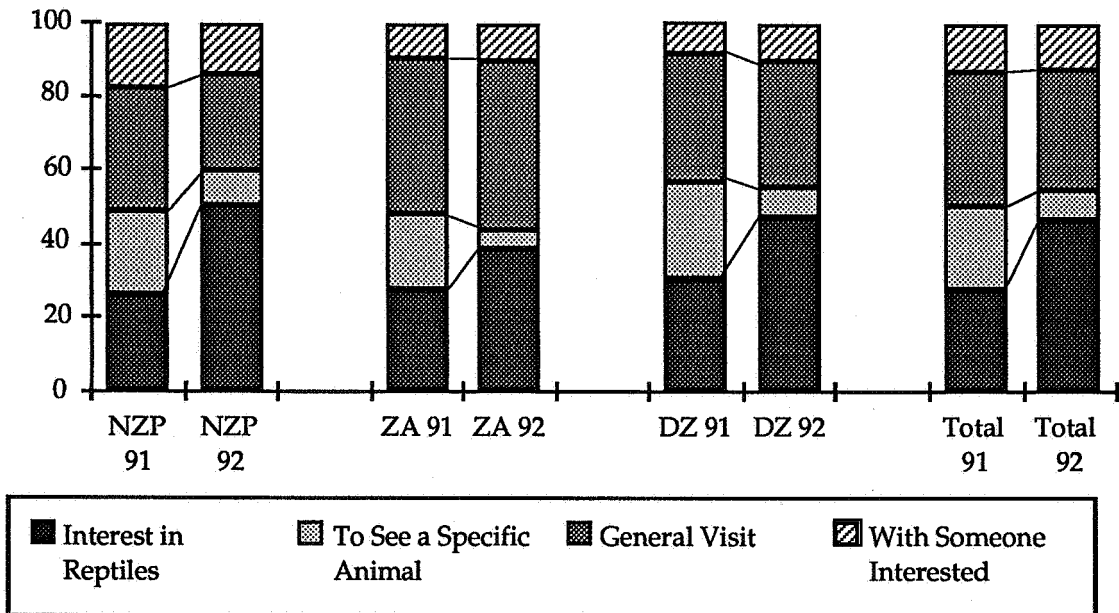
This marked increase in the proportion of all visitors interested in reptiles does not necessarily imply a sudden shift in visitor interest. We believe that this question is probably being answered somewhat differently in 1992 as a result of changes in the outward appearance of the buildings in that year. While in 1991 the facades were

unadorned, in 1992 large banners proclaimed the existence of Reptile Discovery Centers. We had anticipated that publicity surrounding the opening of the Reptile Discovery Centers might alter the composition of the audience to these facilities and consciously suppressed all publicity until after the study was completed. Thus, while visitors did not come specifically to the zoos to visit the Reptile Discovery Centers, banners may have led those less familiar with reptiles to think of their visit more in terms of reptiles in general than in terms of their interest in seeing a specific reptile.

Knowledge of Reptiles. Visitors were asked what was the first thing they thought of when the interviewer said "reptiles," and how they would describe a reptile to someone who did not know what it was. On average, over half of the respondents answered the first question with "snakes." Most of the rest mentioned other groups or examples of reptiles, either along with "snakes" or independent of them. The residual "other" category includes expressions of affect (negative and positive) as well as accurate and inaccurate descriptions.[7]

When visitors were asked to describe reptiles, approximately 40 percent of respondents gave an accurate description, but nearly the same percentage gave a description that was inaccurate in whole or in part. The responses do not differ substantially between years or zoos. Responses to both questions are illustrated in Figures 3.8 and Figure 3.9, respectively.

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[7]   See Appendix C, Table C.3.1. Inaccurate answers ranged from a low of 2.2 percent at Zoo Atlanta in 1992 to a high of 7.9 percent at the Dallas Zoo in 1991. The only consistent differences between visitors entering in 1991 and those arriving in 1992, as Table C.2.1 shows, are an increase in the small percentages of those who give emotionally negative responses and accurate descriptions, and a slight decrease in the percentages of those who give inaccurate descriptions.

Figure 3.8
When I say the word *reptiles,*
what is the first thing you think of?
(Categories of Responses by Location, Total and Year, Entrance Survey Only, in Percent)

■ Says Snake/Snakes   ▨ Mentions Other Reptiles or Amphibians   ▨ Gives Species Name   ▨ Other*
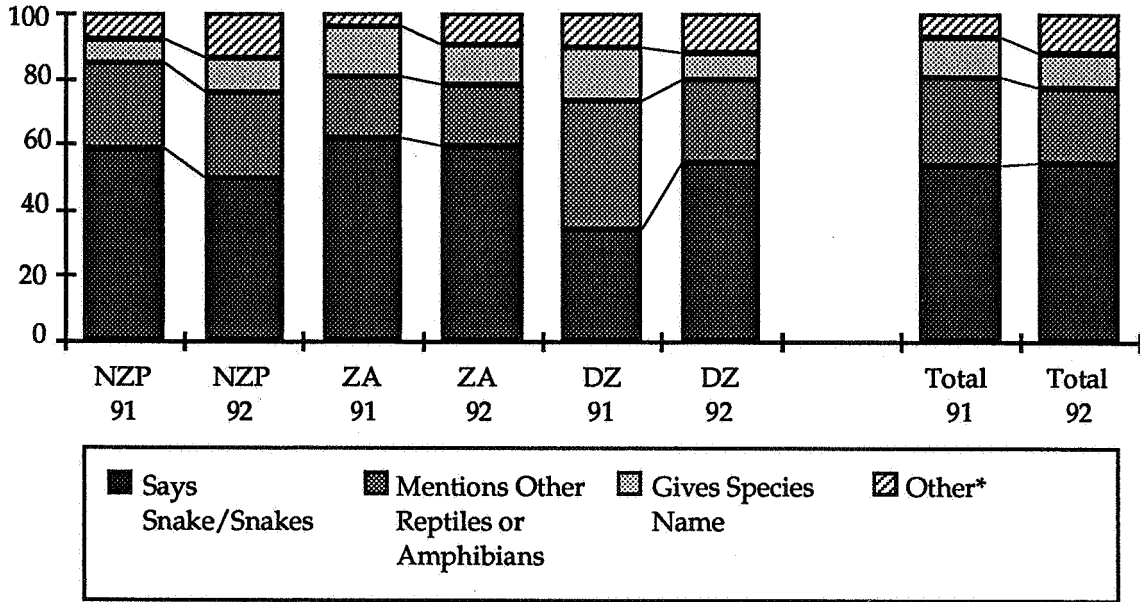
*Includes Negative and Positive Affect and Accurate and Inaccurate descriptions.
See Table C.3.1.

Figure 3.9
How would you describe a reptile
to someone who did not know what it was?
(Categories of Responses by Location, Total and Year, Entrance Survey Only, in Percent)

▨ Accurate Description   ▨ Inaccurate Description   ■ Uses Word Snake(s)*   ▨ Negative Affect   ▨ Other**
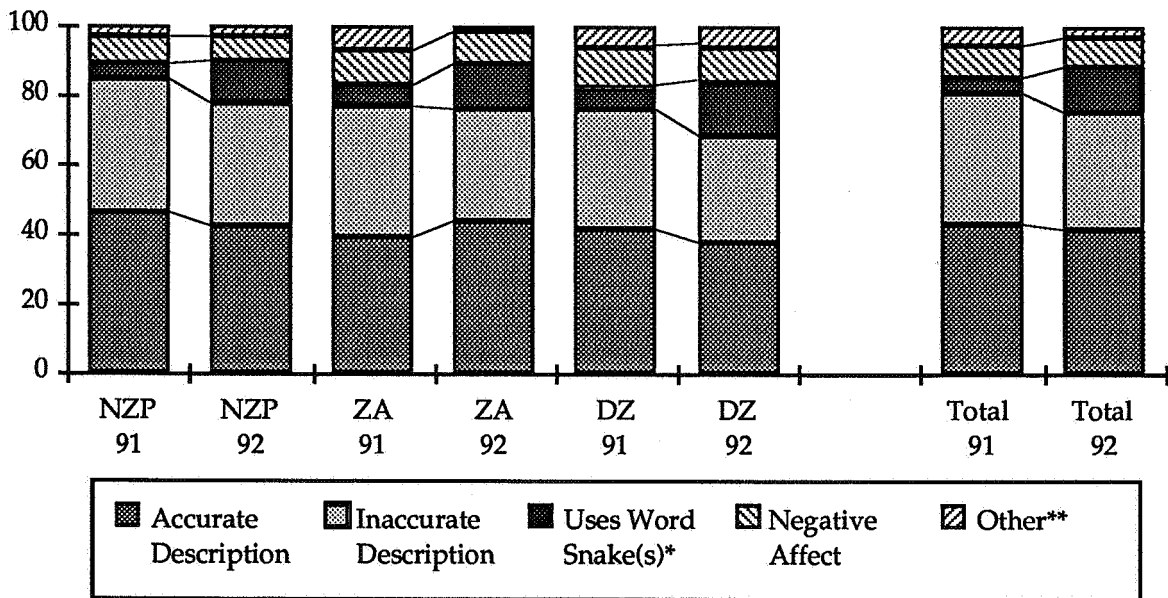
* Includes Mentions Other Reptiles or Amphibians and Gives Species Name. See Table C.3.1.
* *Includes Positive Affect and Other. See Table C.3.1.

-20-

This relatively low level of knowledge is not surprising. An extensive 1980 national study of attitudes, knowledge and behaviors regarding wildlife concluded that "zoo visitors had knowledge scores not significantly different from non-visitors, and substantially below all other activity groups, with the exception of livestock producers and anti-hunters."[8]

Experiences with Reptiles. Prior involvement with reptiles, either in person or in other media, may have influenced visitors to come to the Reptile House. One-third of all visitors (33.8%) said that they had a pet reptile, and one-half currently subscribed to or read natural history or science magazines (43.9%). Most visitors had seen a nature program on reptiles (82.8%) and had viewed a horror film with reptiles (75.5%).[9]

But reports of such background and experience alone do not convey the texture of people's feelings towards reptiles. Visitors were asked to rate their like or dislike of reptiles on a one-to-ten scale from "extremely dislike" (score 1) to "like a lot" (score 10). The responses of entering visitors roughly divided them into three groups: the one-third who generally liked reptiles (scores 8-10, 33.8%), the almost one-half who were neutral (scores 4-7, 43.9%), and the nearly one-quarter who strongly disliked reptiles (scores 1-3, 22.7%). (The complete distribution is shown in Figure 3.10.)

Figure 3.10
Reptile Affect Scale Scores, All Zoos
(1991 and 1992 Combined, Entrance Survey Only, in Percent)

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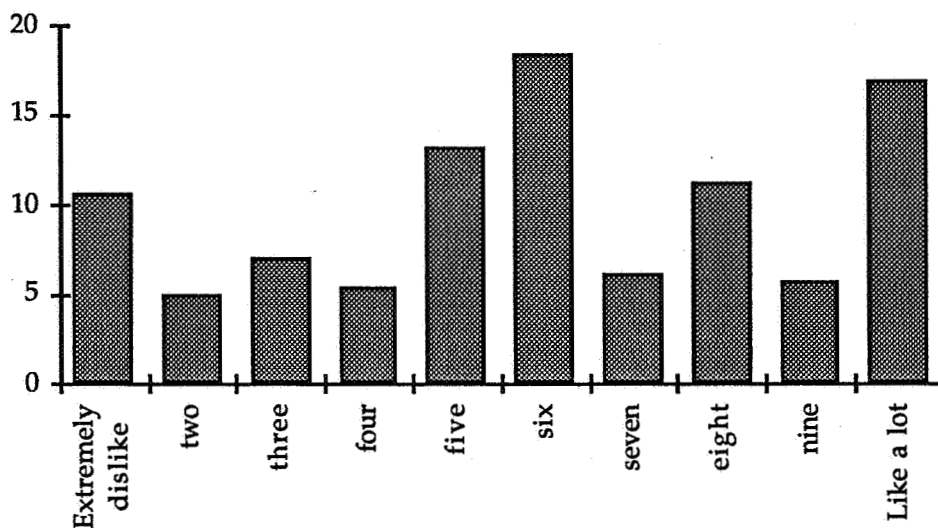
8   Stephen R. Kellert, *Activities of the American Public Relating to Animals. Phase II.* (Washington, DC: U.S. Fish and Wildlife Service, 1980. National Technical Information Service No. PB80-194525), p. 50-64.

9   See data, by year and location, in Appendix C, Table C.3.1.

The level of attraction individuals felt towards reptiles differed by four background factors: age, gender, having owned a pet reptile, and reading natural history magazines. These factors were remarkably consistent across all the zoos.[10]

First was age.[11] Visitors between the ages of 6 and 19 comprised 20.9 percent of all entering respondents. The line in Figure 3.11 divides the visitors proportionately. If all those aged 6 to 19 were the same percentage of the sample at each point on the ten-point scale, we would illustrate that situation with Figure 3.11. The line, as drawn, indicates that at each value of the scale, 20.9 percent of the respondents would be 6 to 19 and 79.1 percent would be age 20 or older. In fact, as Figure 3.12A shows, young people represent a higher percentage of the high end scale scores and older people are proportionately more numerous at the lower end. Children under twelve who came to the reptile exhibits were especially fond of reptiles.

Figure 3.11
Equal Proportions of Age at Each Point of a Ten-point Scale
(In Percent)

79.1% of Total
20.9% of Total
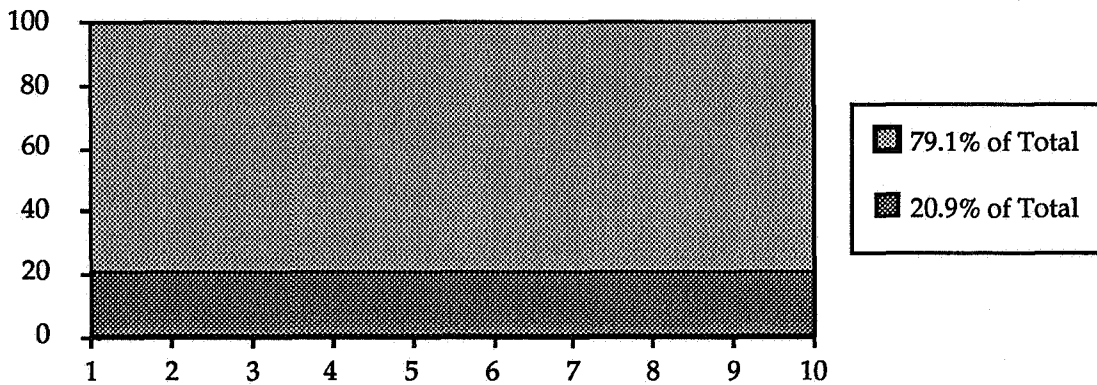
Figure 3.12A
Reptile Affect Scale Scores, by Age, All Zoos
(1991 and 1992 Combined, Entrance Survey Only, in Percent)

20 and over
6 to 19

---
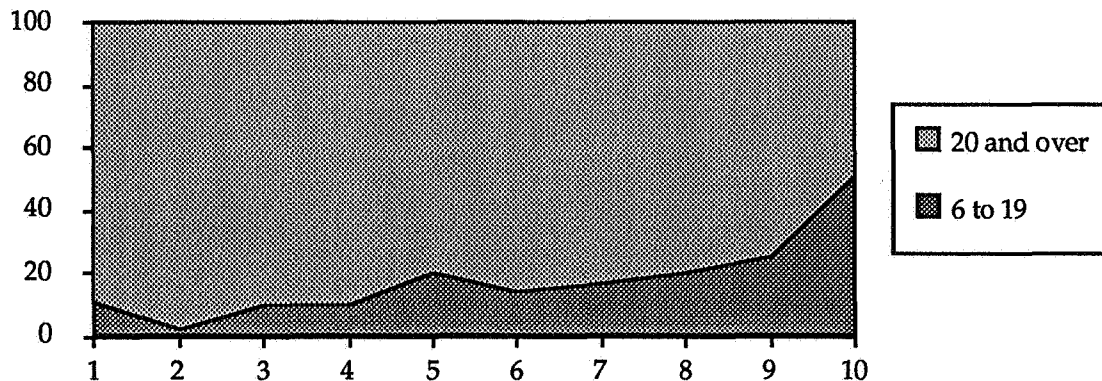
10 See Table C.3.4 and the discussion of regression models in Appendix E and associated tables.
11 $F = 49.32$, $Df = (4, 2823)$, $p<.001$.

In order to help visualize the degree to which the actual distribution of scale values differs from a proportional distribution, we have included the line which divided our sample into those aged 6 to 19 and those 20 and over in Figure 3.12B. Subsequent figures discussing the scale will use this format.

Figure 3.12B
Reptile Affect Scale Scores, by Age, All Zoos
(1991 and 1992 Combined, Entrance Survey Only, in Percent)
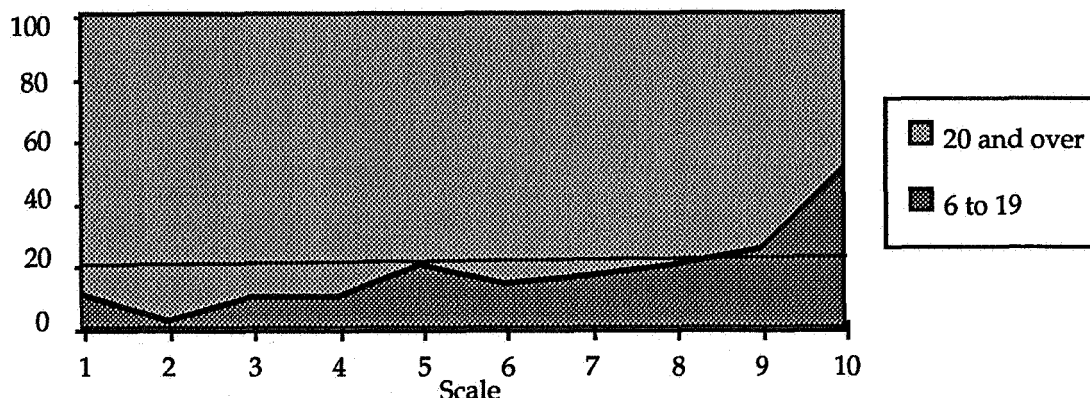
Gender was the second factor that significantly influenced scores on the scale of liking reptiles.[12] Women in the reptile exhibits were definitely less fond of reptiles than men. Figure 3.13 shows clearly that the higher the score, the greater was the proportion of men to women. (45.7% of those who answered this question were men, the location of the proportional-distribution line in Figure 13.3.)[13]

Figure 3.13
Reptile Affect Scale Scores, by Gender, All Zoos
(1991 and 1992 Combined, Entrance Survey Only, in Percent)

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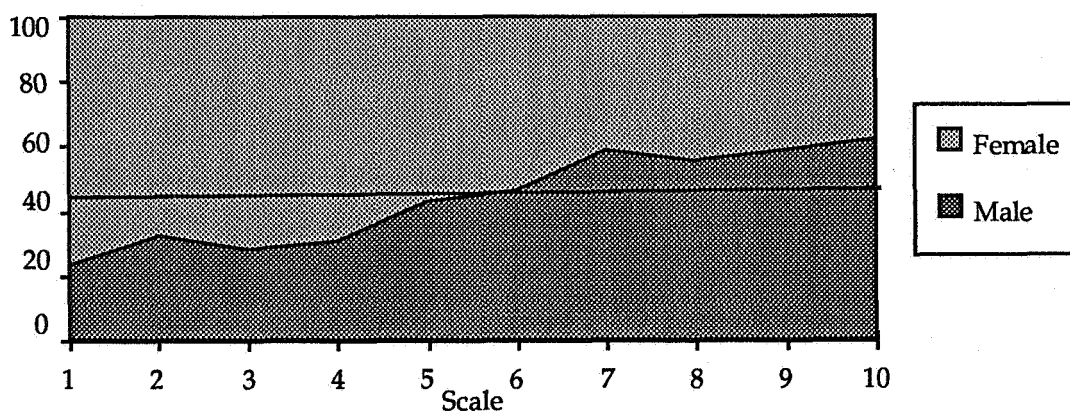
[12] $t = 14.42$, Df = 2800, p<.001.
[13] See Appendix C, Table C.3.4.

Third was pets.[14] Reptile pet owners understandably viewed reptiles more favorably. As the regression results demonstrate (Appendix E, Table E.1), if all other variables were equal, a visitor who had ever owned a pet reptile was likely to score himself or herself over one point higher. Figure 3.14 illustrates that this relationship between reptile-pet ownership and the scale was nearly as direct as that of gender. (Among the total entering audience 31.6% reported owning a pet reptile -- from those who named childhood turtles to current mamba owners.)

Figure 3.14
Reptile Affect Scale Scores, by Reptile Pet Ownership, All Zoos
(1991 and 1992 Combined, Entrance Survey Only, in Percent)
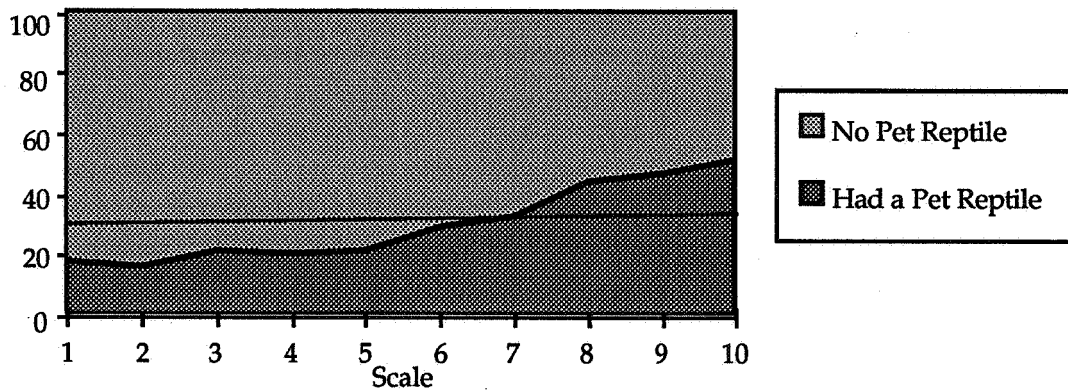
Fourth, and to a lesser extent than any of these other factors, was reading.[15] Subscribing to or reading natural history or science magazines was associated with liking reptiles slightly more (see Figure 3.15). (Overall, as the line on Figure 3.15 shows, 50.2% reported subscribing to or reading natural history or science magazines -- from youngsters who received *Ranger Rick* regularly to adult readers of *Science*.)

Figure 3.15
Reptile Affect Scale Scores, by Magazine Readership, All Zoos
(1991 and 1992 Combined, Entrance Survey Only, in Percent)
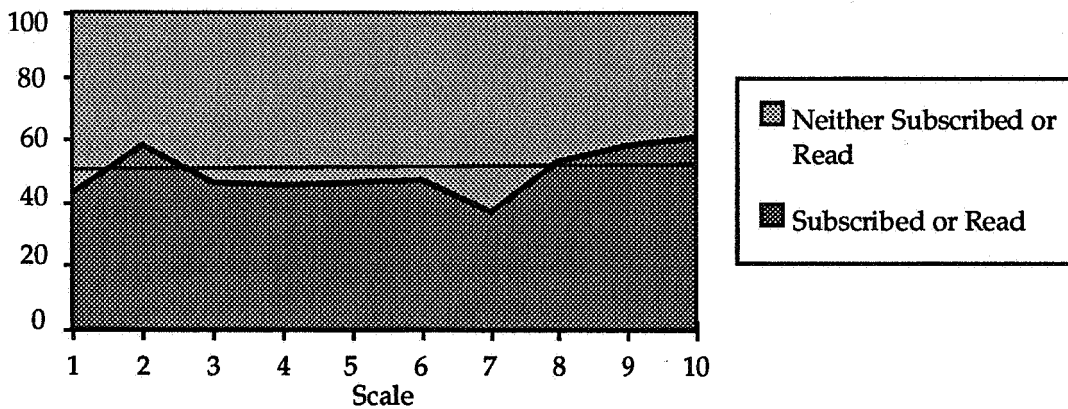
[14] $t = 13.14$, Df = 1971, p<.001.

[15] $t = 4.30$, Df = 2156, p<.001. See Appendix C, Table C.3.4. Statistically significant in the 1991 regression models only. (See Appendix E).

Not surprisingly, those who liked reptiles the most tended to say that they had come to the Reptile House because of an interest in reptiles. But what motivated those at the opposite end of the scale? Why would someone with a strong dislike of reptiles go to a reptile exhibit in the first place? When we compare visitors' feelings towards reptiles to their reasons for visiting the Reptile House, we find that those at the dislike-reptiles end of the scale (score 1) were more likely to say that they came as part of their general zoo visit, or because they were with someone else who wanted to come. Those at the like-reptiles end of the scale were more likely to have an interest in reptiles or to have come to see a specific animal. See Figure 3.16. (Of the total audience, 46.8% reported that they were visiting because of an interest in reptiles or to see a specific animal.) Nonetheless, as Figure 3.16 shows, over 20% of those who scored themselves as extremely disliking reptiles still said that they came to the reptile exhibit out of an interest in reptiles. Fear is interest, too.[16]

Figure 3.16
Reptile Affect Scale Scores, by Main Reason for Visiting Reptile House, All Zoos
(1991 and 1992 Combined, Entrance Survey Only, in Percent)
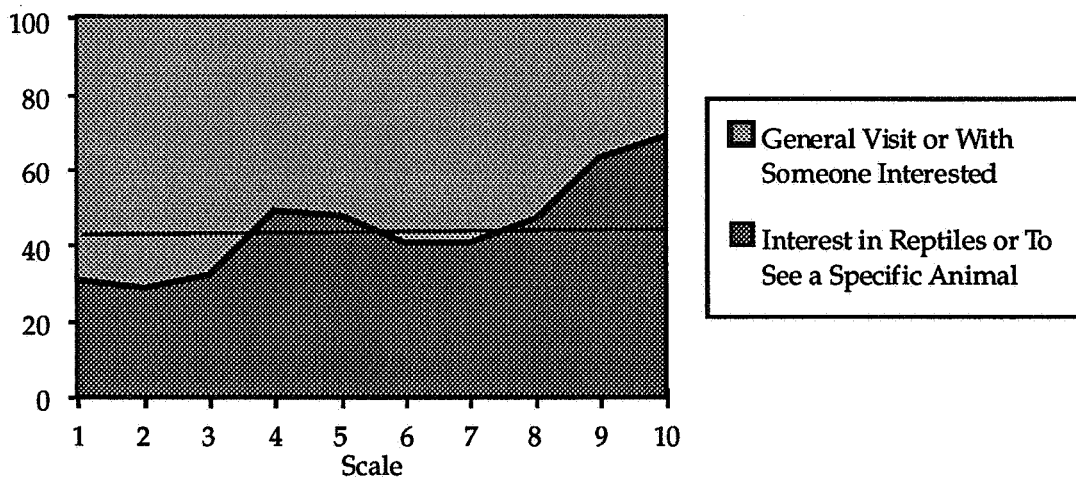
The data in this study indicate that there is no relationship between visitors' levels of education and their attitudes towards reptiles.

Visitor Intentions and Desires. Entering visitors were shown a card and asked which of the seven listed activities they would like to do in the Reptile House:

1. Stop and look at an animal
2. Carefully examine the features of a reptile or amphibian
3. Discover something about the animals in here I never knew before
4. Find the answer to something I always wondered about

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[16] It should be remembered that those with a real revulsion towards reptiles did not enter at all. In fact, interviewers encountered a few visitors who sent their children into the buildings but remained outside.

5. Have a meaningful discussion with my group about something I saw or did here
6. Try out an activity
7. Read information

Visitors were allowed to choose up to five of the seven. The two possibilities, understandably, that received the strongest responses were: 1. Stop and look, and 3. Discover something. The distribution of all the replies, across all entering visitors, is shown in Figure 3.17.

Figure 3.17
Activities of Interest, All Zoos,
(1991 and 1992 Combined, Entrance Survey Only, in Percent of All Responses)
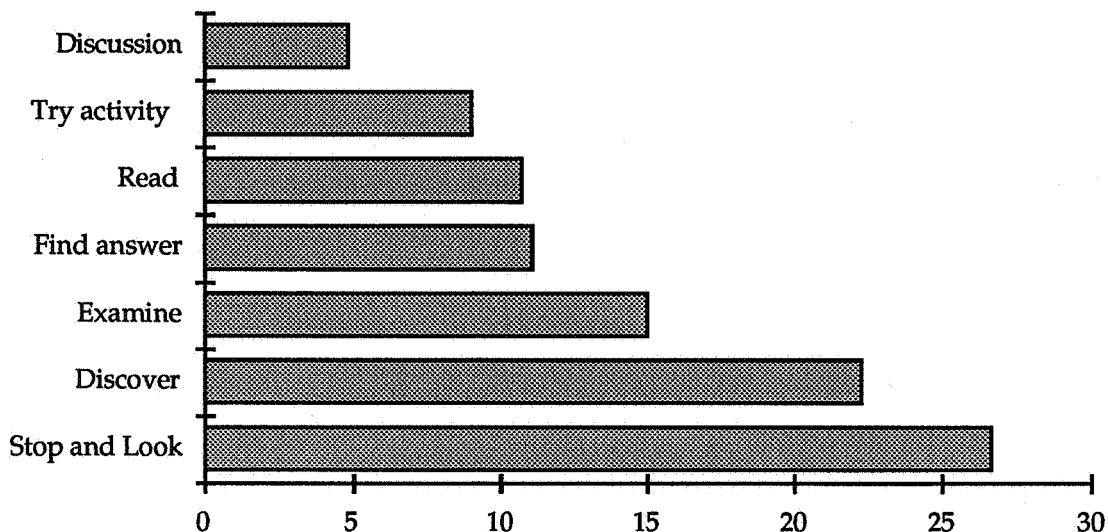
In a traditional zoo, as in the Reptile Houses in 1991, visitors have many opportunities for stopping and looking at animals. The interactive elements that, when added to the Reptile Houses, changed them into Reptile Discovery Centers, were designed to expand visitors' opportunities for informal learning. In the next section we describe those interactive modules that were added to the Reptile Houses between the 1991 and 1992 study.

Summary

Approximately three out of five visitors had been to the same zoo before. These repeat visitors were also frequent visitors -- overall, one-quarter of them had been to the zoo once or twice in the last year. Respondents also reported considerable experience in visiting other zoos and similar educational settings. Approximately half replied with a general expression of interest when asked to give their main reason for visiting the zoo. Almost all of the rest indicated that they were on a social outing.

Visitors were asked what is the first thing they thought of when the interviewer said "reptiles," and how they would describe a reptile to someone who did not know what it was. On

average, over half of the entering respondents in both years answered the first question with "snakes." Most of the rest mentioned other groups or examples of reptiles, either along with snakes or independent of them.

When asked to describe reptiles, approximately 40 percent of respondents gave an accurate description, but nearly the same percentage gave a description that was inaccurate in whole or in part.

Visitors were asked to rate their like or dislike of reptiles on a one-to-ten scale from "extremely dislike" (score 1) to "like a lot" (score 10). The responses of entering visitors in both years can be roughly divided into three groups: the one-third who generally liked them, the almost one-half who were neutral, and the nearly one-quarter who strongly disliked them.

The study identified four main background factors that related to the degree of attraction individuals felt towards reptiles, when all else is equal: age (younger people express a higher attraction), gender (females are more negative), pet-reptile (pet-reptile ownership increases positive feelings), reading (those who subscribed to or read natural history or science magazines scored themselves higher (1991 only)).[17]

<p style="text-align:center">*   *   *</p>

Now we have a sense of what brought these families to the Reptile House. For half of them this is a familiar environment. They have either been here before or have been to similar institutions in the last year. They are not particularly knowledgeable about reptiles. Most associate reptiles primarily with snakes, and less than half can describe one accurately. They are not especially fond of reptiles, either. For every three people in the Reptile House, one likes them, one doesn't, and one is neutral. Boys who have pet reptiles like them the most. Mothers who have never had a pet reptile like them least. But no matter how these families feel about the animals, everyone is expecting to stop and look at them and is hoping to discover something about them that they never knew before.

As we join these families in front of the exhibits and observe what they do and how it changes them in 1991 and in 1992, we will see clearly what kind of difference was made by the interactive modules when they were added to the traditional displays.

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[17] See regression results in Appendix E, Table E.1.

IV. Changes in the Reptile Houses from 1991 to 1992

Introduction

The initiator of the Reptile Discovery Center project, Judith White, outlined the project in a recent address:

> The reptile houses at the three sites were similar in style and size. The National Zoo's Reptile House, built in 1931, contains about 80 glassed animal enclosures arranged linearly on both sides of a hallway that takes visitors around the four sides of the House. The floorplan of the Reptile House at Zoo Atlanta, built in 1961, is almost identical to the National Zoo's, except for a greater width of hallways. At Atlanta, glass enclosures are double stacked allowing them to exhibit an even greater number of animals than at the National Zoo. The floorplan of the Dallas Zoo, built in 1966, differs from the other two: there is a central hallway with three smaller halls branching off it. However, animals are displayed similarly to the other two sites in glass-fronted enclosures. There are approximately 98 reptile and amphibian enclosures. (One difference at Dallas: one of the halls displays birds.)[1]

The primary change that transformed these traditional Reptile Houses into Reptile Discovery Centers was the addition of low-tech interactive interpretive modules, i.e. with minor exceptions, no physical changes were made.[2] In the initial planning stages of the project, educators and curators from the three sites met with outside advisors to determine the content of these modules. After initial experimentation with fourteen topics, twelve were eventually chosen and developed.

Descriptions

Following is a description of the twelve modules, as described in the 1992 progress report to the project's funder, the National Science Foundation:[3]

Attitudes

This unit is about humans' attitudes toward reptiles and the notions on which these attitudes might be based. There are four separate free-standing modules. Towering over each is an illustration of a reptile

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[1]   Judith White, "From Reptile Houses to Reptile Discovery Centers", Panel, "Integrating Informal Science Education into Traditional Zoo Exhibits: Lessons from the Reptile Discovery Centers." Visitor Studies Association 1993 Annual Conference, unpaginated.

[2]   The National Zoo removed railings in front of cages, sprayed the barrel-vaulted ceiling with acoustical material to deaden sound, took several animals off display and moved some others around. Atlanta improved the lighting, and removed some railings in the center of the halls. Dallas made no changes.

[3]   Judith White, "Reptile Science Center Project: Progress Report 1992," submitted to the National Science Foundation, p. 6-10.

which poses a question: "Are you bothered by my long, thin shape?" (snake); "Does my scaled skin disturb you?" (lizard); "Does my face look unfriendly to you?" (snake); "Where did you get your attitudes toward reptiles?" (a human). Each module poses additional questions related to the main one. These are answered by simple interactive devices (lift-up doors, spinning wheel, skin sample) coupled with humorous illustrations and text.

Lizard Feeding

This module covers feeding adaptations in lizards. The unit features two lizard skulls (meat-eating beaded lizard and vegetarian iguana). The skulls are enclosed in Plexiglas boxes but can be rotated 360 degrees with a turning knob. There are accompanying hand-held magnifiers to encourage close-up viewing. An activity challenges visitors to match the skulls with correct food items. Answers and further text are displayed beneath lift-up doors. A PVC viewing tube (with no lenses) is mounted on the module to encourage visitors to view the adjacent live lizards (one carnivorous; one vegetarian).

Lizard Talk: Looking Tough

This module introduces the topic of visual communication, focusing on reptiles. It features an activity in which visitors move an over-sized model of an anolis lizard (complete with movable red dewlap and crest, two mechanisms for communicating visually) along a series of four squares toward an image of a large tree in which another lizard sits. As the model lizard crosses into a square, a back-lit illustration of the rival lizard appears in the tree with instructions for how the visitor should make his model lizard respond. "You are crossing into his territory. Pull out your dewlap." Or, "You are getting too close. Do push ups to intimidate him." Accompanying humorous illustrations and text show how both humans and lizards use visual means to communicate.

Reptiles Hot and Cold

This module is about thermoregulation. It features an activity in which visitors warm up a plastic lizard attached to a digital thermometer, and try to keep the lizard at a constant temperature. A series of illustrations show a day in the life of a bird, a human, and a lizard to illustrate how different temperature regulation methods affect how these different kinds of beings spend their time.

Eggs and Babies

This module covers reptile and amphibian reproduction, incubation of eggs and care of young animals. A series of illustrated flip-doors answer questions visitors are frequently curious about. Specimens of

developing frogs embedded in plastic illustrate a key difference between amphibian and reptile reproduction. This module (which is only at the National Zoo) is placed in front of an exhibit area that houses incubators, eggs and young hatchling reptiles, and information about herpetological husbandry practices.

What's Inside

This module compares the anatomy of reptiles and amphibians to that of humans, emphasizing similarities. One area of the module features a life-sized illustration of a figure half human and half lizard mounted on Plexiglas doors. The doors open to reveal major organs, and then bones of the lizard-woman. Nearby a snake cut-out with liftable puzzle parts reveal organ placement in snakes; a dissected specimen of a snake shows the real thing. Another area of the module focusing on bones includes x-rays of human, lizard and frog hands to be viewed over a light box; xeroradiographs; and real bones. A third area, featuring a sound recording of blood pulsing in frog, snake and human, compares the heart rate of these three animals.

Snake Feeding

This module, about feeding adaptations in venomous and non-venomous snakes, is similar to Lizard Feeding, with skulls in Plexiglas boxes, magnifiers and a matching activity. In addition, there is a human skull model that has been altered so that jaws expand in a similar way to snake jaws, allowing it to accommodate an entire loaf of bread in one gulp. Next to the human skull, for comparison, is the skull of a snake consuming a mouse.

Snake Talk: Smelling

The topic for Snake Talk is olfactory communication, focusing on snakes. The module features a smelling maze activity in which visitors follow a scent trail representing the way a male snake would locate a female by scent. Accompanying humorous illustrations and text explain how both snakes and humans use scent to communicate.

Read an Animal

Read an Animal allows visitors to look closely at a snake, a frog or a lizard and learn about their external anatomical features. The module features three tables, each with magnifiers, an animal exhibited in a special viewing box and a series of observation cards to help visitors find features and learn about them. This activity is based on the successful animal viewing boxes that were used in the National Zoo's HERPlab for almost ten years, so problems of husbandry had been previously worked

out (animals on display are rotated on a regulated basis to prevent stress).

Turtle Feeding

This module introduces the topic of feeding adaptations in turtles. It features the skull of a snapping turtle mounted in a Plexiglas box, a magnifier to examine it closely and additional information on turtle feeding adaptations.

Frog Feeding

This module points out two features of frogs that enable them to catch and swallow prey: a trap-like mouth and a tongue that attaches at the front of the mouth. Skulls mounted in Plexiglas boxes and a large frog's head cut-out with a flip-out tongue help make these points. Accompanying humorous illustrations and text compare frogs and humans.

Frog Talk: Listening

Frog Talk introduces the topic of vocal communication, focusing on frogs. The module features sound recordings of different species of frogs and an activity which challenges visitors to find a mate for a female barking tree frog by selecting the correct male's call. Accompanying humorous illustrations and text show how both humans and frogs use sound to communicate.

These modules were constructed of wood with plastic laminate in low-key beige and brown tones. They were 20 inches deep and varied in length from three feet to six feet. All modules were 34.5 inches tall, sloping up to 38.5 inches to meet the exhibit. The modules at all sites were built identically except that backs were added to modules going to Dallas and Atlanta to give them the option of standing apart from the animal exhibits.

Along with these modules, there were seven free-standing photo panels (approximately three feet wide by eight feet tall) which were designed to be space dividers. On one side of the panel was a large black and white photo of a reptile or an amphibian. On the back of each panel a small Plexiglas vitrine displayed a replica of an art object based on a reptile or an amphibian. These objects represented a variety of cultures. Three additional photo panels showed close-up scenes of humans and reptiles involved in activities in the Reptile Discovery Center.

The design and content of these modules were refined through informal evaluation. As reported in Judith White's 1992 Progress Report to NSF:[4]

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4   Judith White, 1992, p. 11.

All development was done on flat full-scale mock-ups of the surface of each module. These working mock-ups, made of foam core and paper, were a key ingredient in module development.

As the text and illustrations evolved, changes were added to or subtracted from the modules. New versions were informally tried out with visitors or Zoo staff unfamiliar with herpetology. These working mock-ups were then sent to the designer as the basis for the final blueprints. The designer also took photos of the mock-ups with him when he visited Dallas and Atlanta to check final measurements and discuss placement of modules with RDC project staff at these two sites. After the final blueprints were completed the mock-ups came into use again. They were sent to the fabricator to use as guides, in addition to the blueprints, for the construction of the modules.

In her address to the Visitor Studies Association members, Ms. White pointed out the importance of variety in the modules:

A key objective for the development of the modules was to include a variety of different sensory and learning approaches, including sound, smell, touch and vision, since we believed that variety and choice may encourage visitor participation in learning. We also tried, whenever possible, to incorporate activities that could be done by more than one person, or could be enjoyed vicariously by accompanying friends, because we know that our visitors travel in groups of family and friends...Each module features one or more activity, humorous illustrations, and text. A "For More Information" clipboard which elaborates on the basic module text, hangs beside each module for visitors who want to know more about the subject.

Each zoo used their modules slightly differently. In Washington and Atlanta, they were designed to complement a live animal exhibit. At the National Zoo they were installed flush to the enclosures. At Zoo Atlanta, they were placed against the railings, about two feet in front of the enclosures. Dallas set up most of their modules as free-standing units in the middle of the building, rather than next to the animals.

*   *   *

Families coming to the Reptile Houses in 1991 entered "traditional" buildings with glass animal enclosures along the walls. While in various way the zoos tried to provide activities for visitors, these were intermittent and not an integral part of the experience. Those who arrived in 1992, in contrast, found a range of modules providing them with the opportunity to engage in interactive experiences, free-standing photo panels, and (at various times) demonstrations by zoo staff. What was the result of the changes on the visitor experience? Did the introduction of the modules alter visitor behavior? These are some of the questions which will be answered in the next section.

V. <u>Visiting and Its Effects</u>

<u>What Happened to Visitors in the Reptile Discovery Centers?</u>

This section examines the differences between visitors' experiences in the Reptile Houses in 1991 and the Reptile Discovery Centers in 1992. By comparing behaviors, statements, and attitudes from one year to the next, we can infer the impact of the interactive modules.

<u>Behavior in the Exhibition</u>

To find out how visitors were using their time in the buildings with reptile exhibits, an observational (tracking) study was conducted. Following schedules and selection procedures comparable to those of the surveys, observers recorded how long an individual was in the building; how many times the visitor stopped (only stops over 5 seconds long were counted); the length of time of each stop; and whether the visitor was watching birds (in Dallas only), an animal being fed, a keeper doing something in the exhibit, or, in 1992, using an interactive or watching a demonstration. Observers also recorded who the visitor was with, and the visitor's gender, and estimated the visitor's age and racial/ethnic identity.[1]

<u>Time and the Number of Stops.</u>[2] As Figure 5.1 illustrates, visitors spent an average of 17.2 minutes in the Reptile Houses in 1991 and 20.8 minutes in the Reptile Discovery Centers in 1992. Overall this represents a 20.5 percent increase in total visit time from 1991 to 1992.[3]

There were wide variations among the three zoos. In 1991, average visit times ranged from 15.2 minutes at the National Zoo to 19.3 minutes at the Dallas Zoo.[4] In 1992 they varied from 18.4 minutes at Zoo Atlanta to 24.5 minutes at the Dallas Zoo.[5] Between 1991 and 1992 the average length of visit increased by 5.9 minutes at the National Zoo, followed by an increase of 5.2 minutes at the Dallas Zoo and 0.6 minutes at Zoo Atlanta. National Zoo visit time thus increased by an impressive 38.8 percent in 1992, while Dallas Zoo visit time increased 27.2 percent and Zoo Atlanta visit time remained essentially the same (an increase of 3.0 percent). Besides location, visit time did not vary significantly by any demographic factors for the three sites.[6]

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[1] See Appendix D for a discussion of procedures.
[2] See Appendix D, Tables D.1-D.4
[3] $t = 5.48$, $Df = 879$, $p < .001$.
[4] In 1991, $F = 5.00$, $Df = (2, 532)$, $p < .001$.
[5] In 1992, $F = 12.19$, $Df = (2, 474)$, $p < .001$.
[6] Data on file, ISO.

The observational data allows us to divide the total visit time into two components, the time spent at stops (each of which was at least five seconds long) and the time between stops. As Figure 5.1 also indicates, most of the visit was spent at timed stops. In 1991, the total time stopped ranged from 10.0 minutes at the National Zoo to 13.2 minutes at Dallas.[7] In 1992, the total time stopped at Atlanta was significantly less than the other zoos -- 12.7 minutes, versus 16.3 minutes at the National Zoo and 17.3 minutes at Dallas.[8] On average the total time stopped increased by 3.4 minutes between 1991 and 1992.

Figure 5.1

<u>Length of Visit in the Exhibits, Total Time Divided into Sum of Timed Stops and Time Between Stops, by Year, Total and Location</u>

(In Minutes)
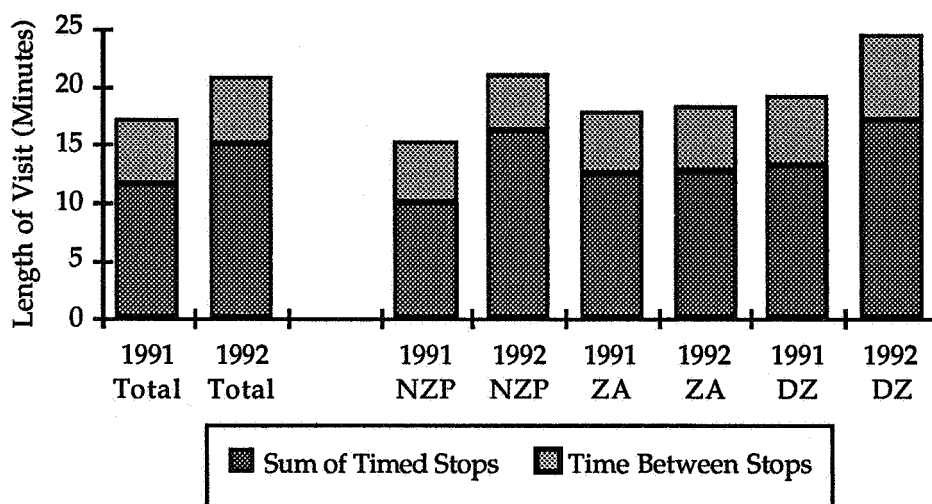
In addition to the overall increases in visit time and total time stopped from 1991 to 1992, the percentage of visit time that was spent at timed stops also increased. In 1991, the time spent at stops was 68.1 percent of the total visit time, while in 1992 it was 72.8 percent of total visit time. So visitors were not only staying somewhat longer in 1992, they were also spending a higher proportion of their time engaged in the exhibit, especially at the National Zoo and Dallas Zoo.

Figure 5.2, the distribution of the total visit times, shows the changes from 1991 to 1992 and suggests that the 1992 increase in the average length of visit was due in part to the fact that nearly twice as many visitors were staying 30 minutes or longer (13.5% in 1992; 7.0% in 1991).[9]

The visitors themselves consistently overestimated the amount of time they spent in the exhibition. In the Exit Survey, visitors in 1991 estimated that they spent an average time of 22.3 minutes in the exhibition (5 minutes more than what was observed in the

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[7] $F = 8.28$, Df = (2, 532), $p < .001$.

[8] $F = 8.98$, Df = (2, 474), $p < .001$.

[9] See Appendix D, Table D.2.

Tracking Study), and in 1992 they estimated 26.7 minutes (7 minutes more than observed).[10]

Number of Stops. In general, the number of stops that visitors made in the exhibit also increased from 23.9 in 1991 to 24.9 in 1992. In 1991, visitors to the National Zoo made the fewest number of stops (21.3, compared with about 25 at the other two zoos).

In 1992, however, at the Dallas Zoo the average number of stops made by visitors increased by 5.1, to an average of 31.0 stops.[11] At the National Zoo and at Zoo Atlanta, the changes were less striking. The average number of stops increased by 2.5 from 1991 to 1992 at National Zoo; at Zoo Atlanta, the average number of stops decreased by 2.6 stops.

Figure 5.2
Distribution of Total Visit Length, by Year
(In Minutes)
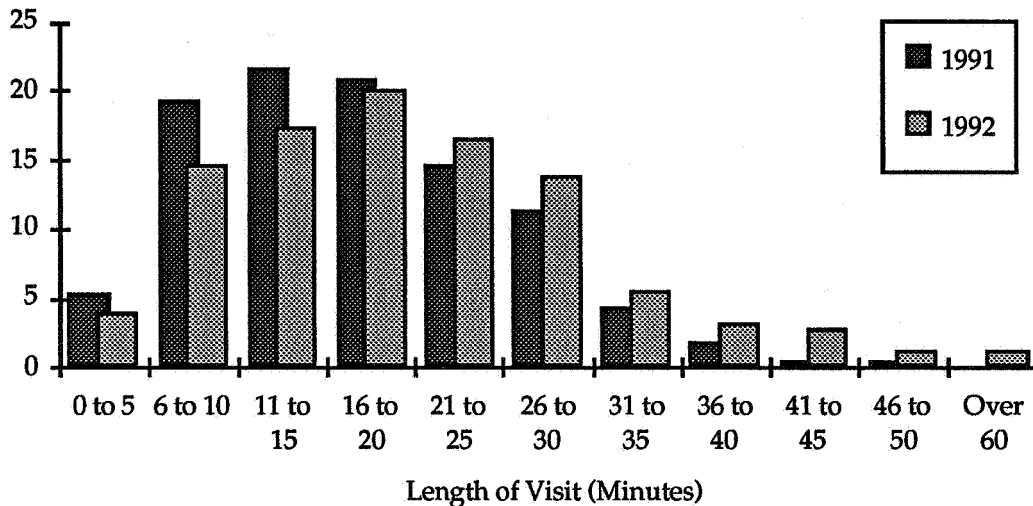
Length of Visit (Minutes)

In both years, the presence of children in a group of visitors decreased the average number of stops, but in 1992 the difference was larger. In 1991, groups with children made 2.5 fewer stops (23.0; 25.5 for those without children); in 1992 groups with children made 3 fewer stops (23.8; 26.7 for those without children).[12] No other demographic factors besides location and the presence of children had a significant relationship to the number of stops.[13]

Length of Stops. Since an individual typically made twenty-five to thirty stops within a fifteen to twenty minute visit, the average length of each stop was quite short, as shown in Figure 5.3.

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[10] Data on file, ISO. 1991: Mean = 22.3 min., Std. Dev. = 12.5 min. 1992: Mean = 26.7 min., Std. Dev. = 13.6 min.

[11] $F = 12.19$, Df = $(2, 474)$, $p < .001$.

[12] $F = 4.65$, Df = $(2, 1008)$, $p < .001$.

[13] See Appendix D, and Table D.4.

Once again the 1992 results show a significant increase over 1991.[14] An average stop in 1992 was 8.5 seconds longer, an increase of 27.7 percent (from 30.5 to 39.0 seconds) from 1991. The largest increase, 14.1 seconds, was at the National Zoo (from 28.9 to 43.0 seconds). At Zoo Atlanta, the average length of stops increased by 7.3 seconds and at the Dallas Zoo they increased by 1.2 second.

Figure 5.3
Average Length of Stops, by Year, Total and Location
(In Seconds)
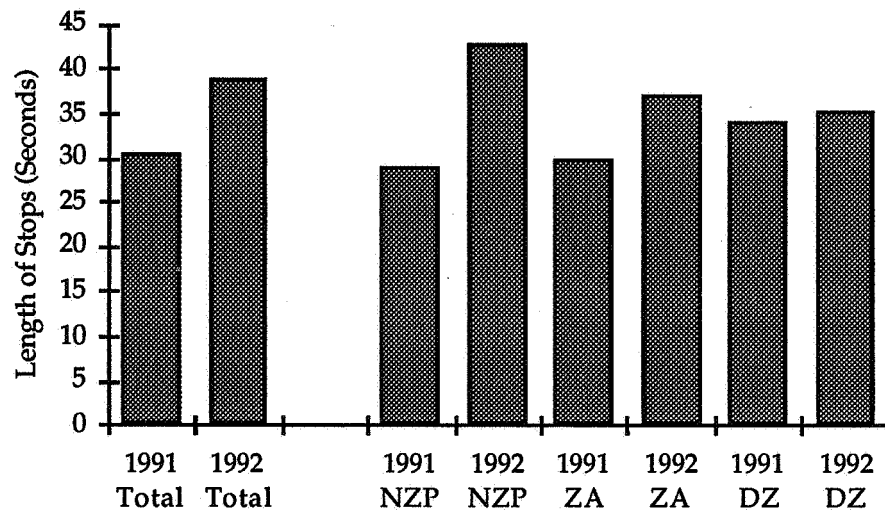
In both 1991 and 1992, visitors with children made longer stops than those without children (Figure 5.4),[15] but most of the increase in average stop time between 1991 and 1992 was due to the visitors who came without children. Between 1991 and 1992, average stop time increased 9.1 seconds for visitors without children compared to an increase of 7.8 seconds for visitors with children. (Note that at the National Zoo average time increased for both visitors with and without children, so that in 1992 the averages were the same.)

These results indicate that, on average, all visitors, but especially those without children, were spending more time in the Reptile Discovery Centers than they had in the Reptile Houses, because of the presence of the interactive elements.

Observed Activities in the Exhibit. Observers in the Tracking Study noted how visitors were using their time when stopped. In 1991, visitors just looked at reptiles -- they spent 99.5 percent of their stops looking at reptiles, and 0.5 percent watching a keeper or an animal feeding. In 1992, they spent 29.2 percent of their stops at the interactive stations, 69.1 percent of their stops looking at reptiles, and 1.7 percent watching a keeper or feeding. Figure 5.5 shows few differences among the three zoos.[16]

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[14] See Appendix D, Table D.1.
[15] In 1991, 31.7 seconds vs. 28.6 seconds for those without children. See Appendix D, Table D.4.
[16] See Appendix D, Table D.3.

Figure 5.4
Average Length of Stops, With and Without Children, by Year, Total and Location
(In Seconds)
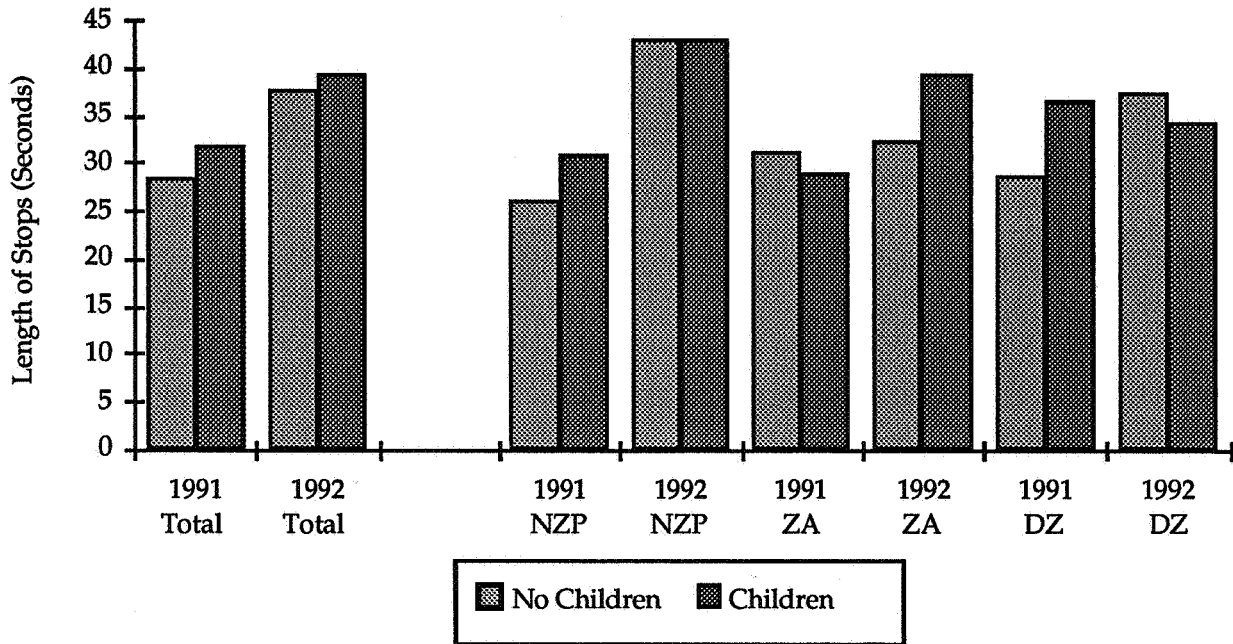
Figure 5.5
Distribution of Types of Stops, 1992, by Total and Location
(In Percent)
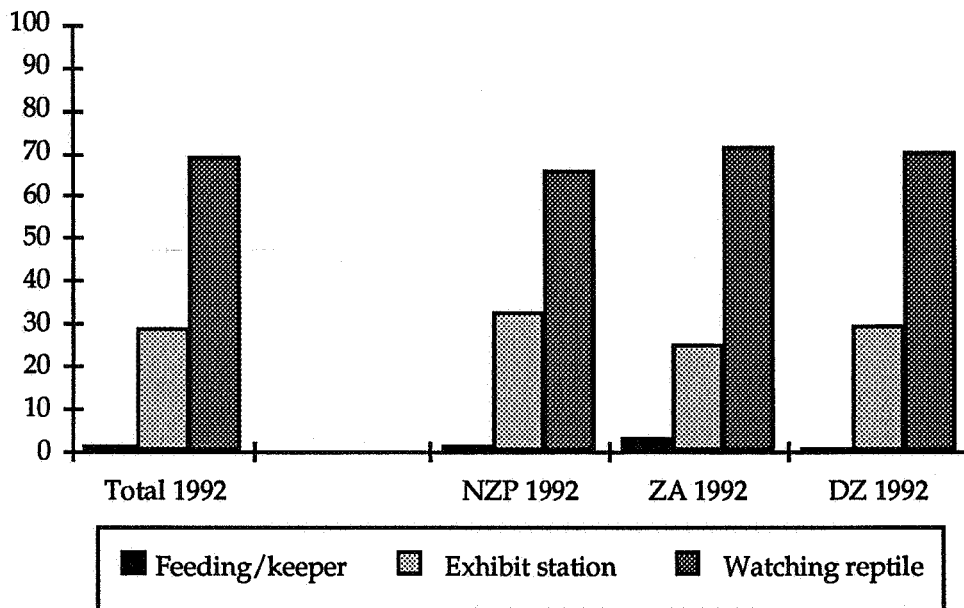
The interactive stations attracted a fairly broad cross section of visitors. (In the Tracking Study, as noted above, observers recorded gender, social composition of group, and estimated age and ethnicity.) We find very small differences in the gender, racial/ethnic identification, and the social composition of the visiting groups stopping

at the interactive stations. Being a women slightly increased the probability of stopping at an interactive station, being a member of a racial or ethnic minority and visiting the RDC with another adult (compared to other group configurations) slightly reduced the probability (all else being equal).[17] (These effects are less than two percent.)

Age made the biggest difference, but it, too, was relatively small. The interactive stations had the greatest attraction for children, but visitors from all age groups were attracted to the RDC interactives. This is an important finding of the study. Although it is generally assumed that interactives are for children, this study demonstrates that they are used by all ages.[18] The difference due to age in the probability of making a stop at an interactive between the youngest visitors (under age 12) and the oldest (age 55 and over) is less than seven percent (6.7%).

Visitors made about the same number of stops in 1991 and 1992, but in 1992 almost one-third of those stops were made at the interactive stations. Visitors also spent more time on average at an interactive stop than they did at a reptile-viewing stop, although keepers or feedings held their attention longest, as shown in Figure 5.6.[19]

Figure 5.6
<u>Average Length of Stops by Type of Stop, by Year, Total and Location</u>
(In Seconds)

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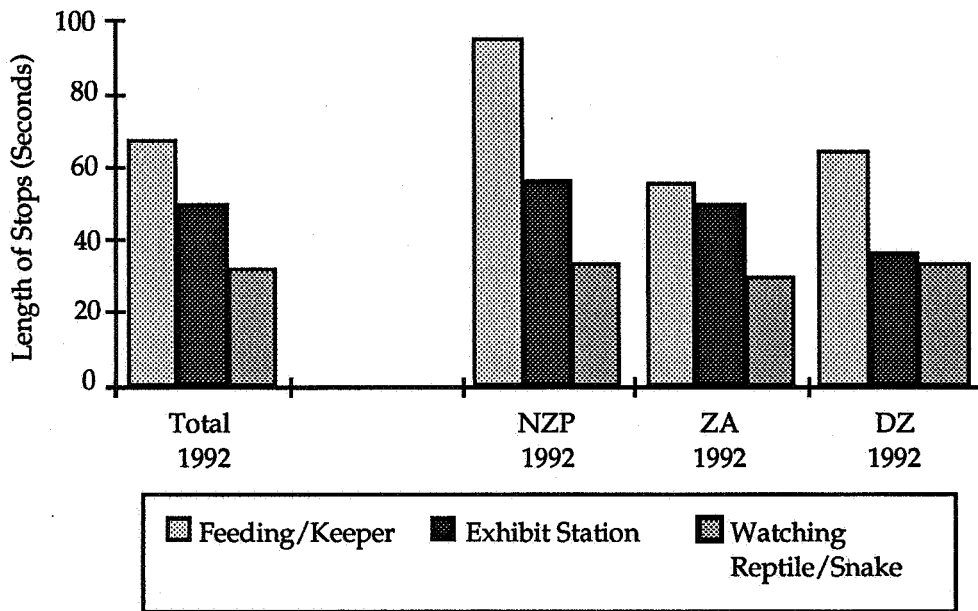
[17] See Appendix D, Table D. 7 (Gender = 1.63%, minority = -1.80%, and visiting the RDC with another adult reduces it -1.00%).

[18] See Appendix D, Table D.7. The percentage change in the probability of making a stop at an interactive station (compared to other stops) is 6.70% for children under age 12, 2.21% for those 12-19, 3.37% for those 20-34, and 2.18% for those 35-54, compared to the oldest group (55 and over). In addition to background characteristics, the model shows an effect, albeit small, of the particular zoo visited. In all likelihood, this effect results from a combination of the placement of the interactive stations and technical difficulties encountered in their operation during the study period.

[19] See Appendix D, Table D.5.

In 1992, visitors stopped 17 seconds longer on average at the interactive exhibit stations, and 34.8 seconds longer to watch a keeper or feeding than they did to look at reptiles. The longer stops in front of interactive stations explains why visitors' overall visit time in the buildings increased in 1992.[20]

Of all the visitors observed in the Tracking Study, the longest stop that anyone made while watching a keeper or feeding was 13.2 minutes, while the longest stop made at an interactive was 16.0 minutes, and the longest stop spent viewing reptiles was 15.7 minutes.[21]

The ability of the interactive modules to hold visitors' attention for longer periods than the reptiles differed across the three zoos. Figure 5.7, based on the stop-time regression model, compares the additional holding power of the interactives at the three zoos. The values represent how much longer visitors spent with an interactive than watching reptiles, after all other significant effects are controlled for.

Figure 5.7
Additional Stop Time at Interactive Modules, 1992, Net of all Other Factors
(In Seconds)
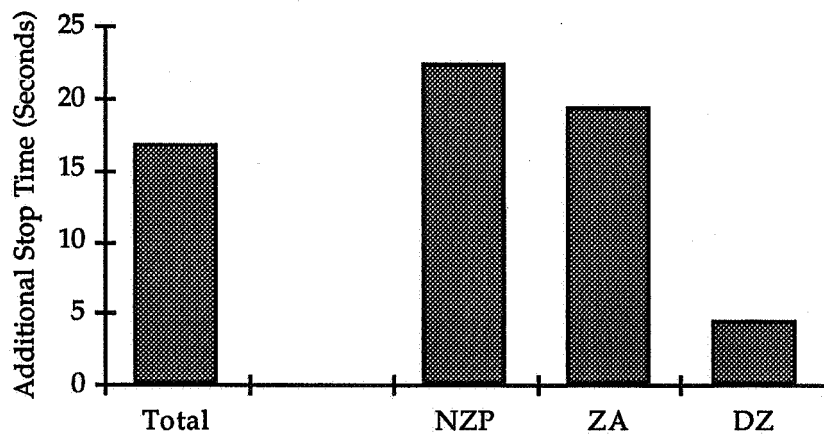
The interactives held visitors at the National Zoo 87.2 percent longer than a reptile, at Zoo Atlanta 66.1 percent longer, at the Dallas Zoo 14.4 percent longer, and overall 59.8 percent longer.[22]

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[20] Our analyses show that, in addition to the effects of type of stop on the length of the time stopped, there were a number of small effects due to other variables that were measured. These effects added between 1.3 and 2.3 seconds to the average stop time, and are relatively unimportant. For example, the average stop for visitors with children was 1.3 seconds longer than for visitors without children, for visitors at the National Zoo the average stop time was 1.5 seconds longer than visitors to the other zoos being studied, and in 1992 the average stop time was 2.3 seconds longer than in 1991. See Appendix D, Table D.6 for regression models.

[21] See Appendix D, Table D.5.

[22] This is the exhibition station coefficient as a percentage of the regression model intercept. See Appendix D, Table D.6.

<u>Reported Activities in the Exhibit.</u> As visitors left the buildings, they were asked which of a set of seven activities they had done. Each visitor was allowed up to five answers:

1. Stopped and looked at an animal
2. Carefully examined the features of a reptile or amphibian
3. Discovered something about the animals in here I never knew before
4. Found the answer to something I always wondered about
5. Had a meaningful discussion with my group about something I saw or did here
6. Tried out an activity
7. Read information

The set of seven paralleled the list of activities shown to entering visitors when they were asked what they would like to do. Figure 5.8 shows the distribution of responses in 1991 and 1992 for those age 12 and over.[23]

Figure 5.8
<u>Reported Activities, 1991 and 1992 Exit Survey, Ages 12 and above,</u>
(In Percent of Total Responses)
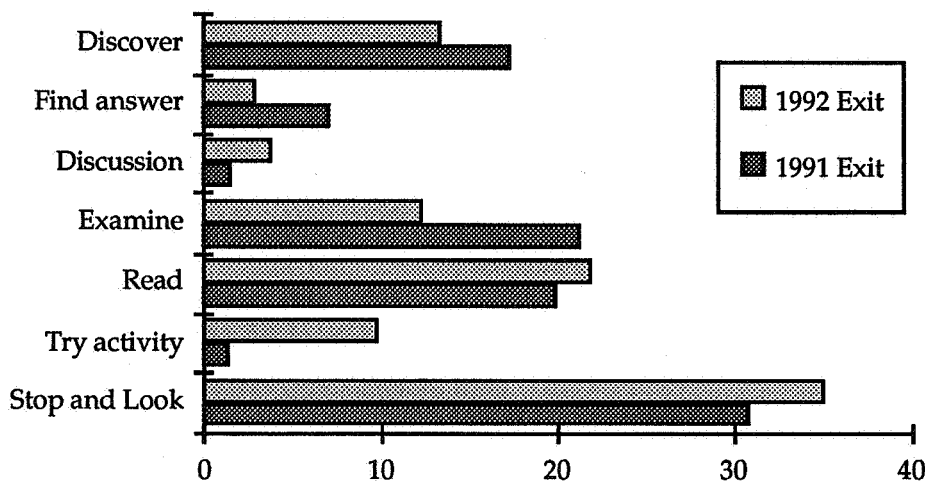
If we compare the changes across the two years, we find that they are significant for all age groups except teenagers (age 12 to 17).[24] The most common response in both years was "Stopped and looked at animals." For all age groups, between one-third and one-half of all activities cited were looking at animals. The second most common response varied by age. For example, in 1991 the second most common activity for children (i.e., those under age 12) was "Read information" (18.9%) and in 1992 it was "Tried out an activity" (13.8%) (see Figure 5.9).

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[23] See Appendix C, Table C.5.1. X^2 = 96.515, Df = 6, p <.0001.
[24] See Chi-Square values in Appendix C, Table C.5.2.

Understandably, in 1992 the percentage of "Tried out an activity" responses increased substantially from its 1991 level, suggesting that visitors recognized the interactive stations as "activities." The increases in the proportion of "tried an activity" responses ranged between 3.5 percent for young adults (age 18 to 24) to 11.4 percent for children (age 0-11). It seems that as visitors tried out more interactive modules they may have spent less time reading, since the proportion of "Read information" responses fell by 7.4 percentage points for children age (0-11) and by about 3.0 to 7.0 percent for all other age groups.

The activities reported by adults over 25 also varied significantly between 1991 and 1992 depending on whether they were visiting with or without children. Adults with children reported higher percentages of finding answers, discussing, and trying activities, while adults visiting alone or with other adults reported more reading, discovering, and examining, as shown in Figure 5.10.[25]

Figure 5.9
Reported Activities, 1991 and 1992 Exit Survey, Children under 12
(In Percent of Total Responses)
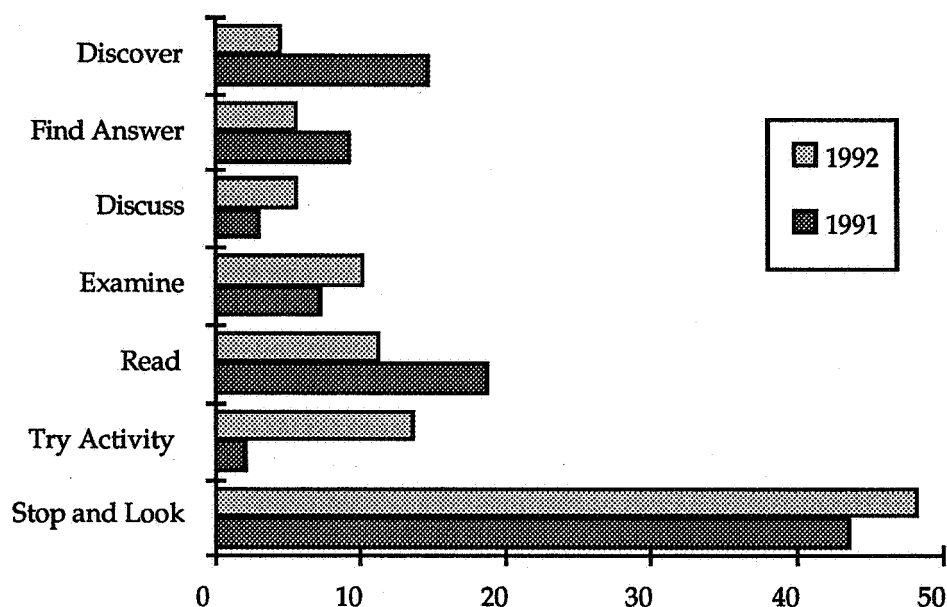
From a behavioral viewpoint, the interactive modules slowed down visitors, causing them to spend significantly more time in the exhibits and to use more of that time engaged in exhibit activities. The interactives also appear to have altered the distribution of visitors' activities, depending on their age and the presence of accompanying children.

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[25] See Chi-Square values in Appendix C, Table C.5.2.

Figure 5.10
Reported Activities, With and Without Children, 1992 Exit Survey, Age 25 and above,
(In Percent of Total Responses,)
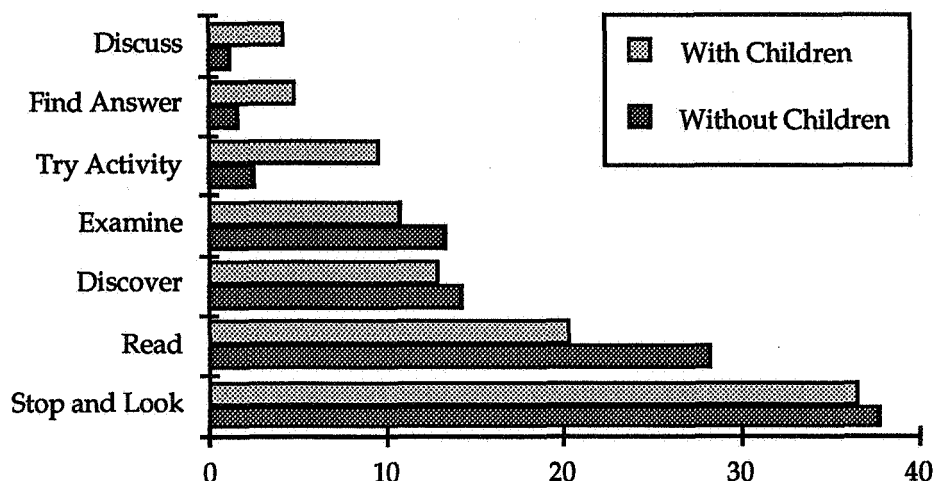
Learning

Visitors leaving the reptile exhibits in 1991 and 1992 were asked "When I say the word reptiles, what is the first thing you think of?" The responses, when compared across the two years, followed the same general pattern with two exceptions: after 1992 visits there was a significant increase in the percentage of accurate descriptions, and after 1992 visits there was a significant decrease in the simplistic "snake" response.[26] These effects are particularly noticeable when compared to 1991, when there was virtually no change between entrance and exit responses, as shown in Figure 5.11.[27]

We interpret this result as an indication that some learning may have been taking place in the Reptile Discovery Centers in 1992 that was not happening in the Reptile Houses in 1991. Why were 1992 responses less likely to include "snakes," the simple answer? Presumably more visitors were becoming aware of other types of reptiles during their visit than had been the case in 1991. Were they also developing a better understanding of what a reptile is? In 1991, in response to the question "How would you describe a reptile to someone who did not know what it was?" both accurate and inaccurate descriptions decreased after the visit, while in 1992 accurate descriptions increased and inaccurate ones decreased.[28] It seems that a few visitors may have left the Reptile Discovery Centers better able to accurately describe reptiles, but the improvement was very slight.

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[26] $X^2 = 12.534$, Df = 4, p = .01.

[27] $X^2 = 5.276$, Df = 4, p = .26.

[28] See Appendix C, Table C.3.1.

Figure 5.11
When I say the word *reptiles*, what is the first thing you think of?
(Categories of Responses by Total and Year, Entrance and Exit Surveys, in Percent)
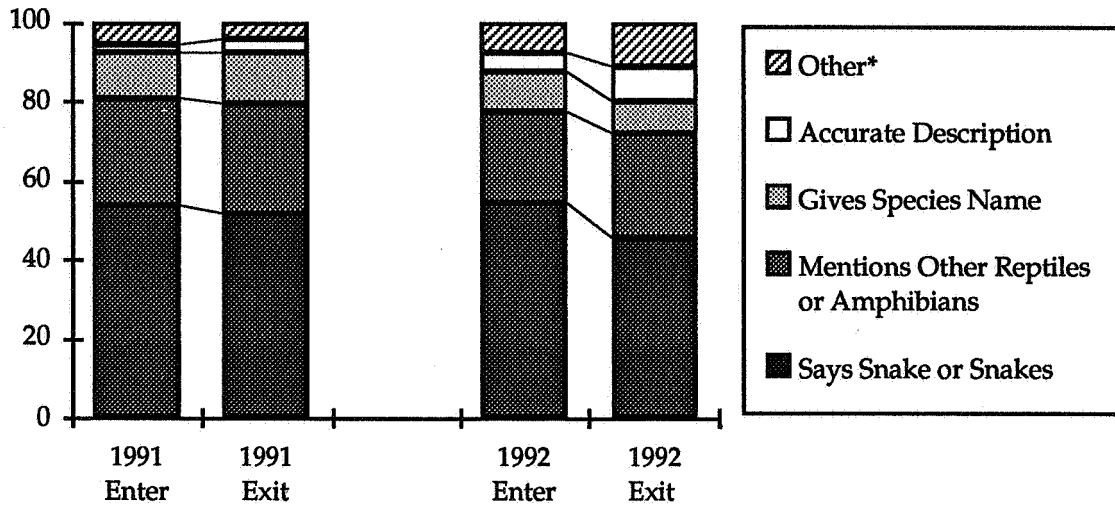
*Includes positive and negative affect comments.

There is another way to investigate cognitive changes. When those leaving the exhibits were asked to indicate their five main activities, as discussed above, they were also asked to give examples for all activities except "Stopped and Looked at a Reptile" and "Read Information." Meaningless examples were eliminated and the remaining answers were coded according to their specificity and subject. Although these examples only represent 54.9 percent of visitors (ages 12 and over) in 1991 and 51.7 percent of visitors in 1992, they offer the clearest indications of how the exhibits were affecting visitors intellectually. The most striking change between 1991 and 1992 is in the degree of specificity of the examples. The percentage of specific answers in 1992 (42.4%) is five times greater than in 1991 (8.4%), as shown in figure 5.12.

Figure 5.12
Specificity of Activity Examples, Age 12 and above
(All Zoos Combined, in Percent)
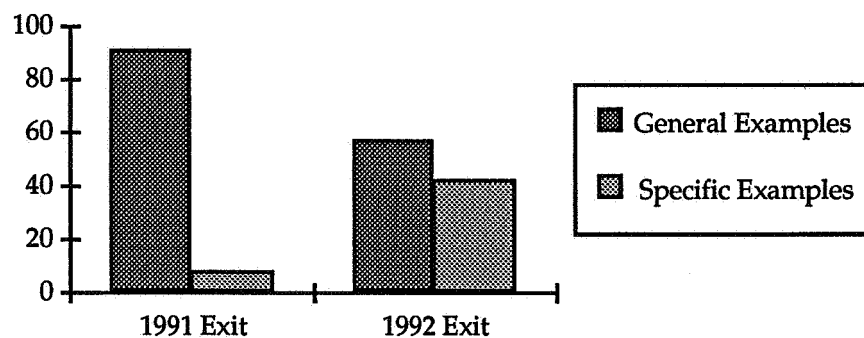
-43-

The much higher level of specificity in 1992 examples suggests that the respondents were considerably more involved in what they recalled doing. This implies a higher quality of experience, as well as an increased acuity of observation and thought.

This increased awareness of visitors can be directly linked to the interactive stations by observing the subject matter of the activity examples that visitors reported. Figure 5.13 shows the difference between the subjects of reported activities in 1991 and 1992 for visitors age 12 and above.[29]

Figure 5.13
Subjects of Reported Activities, Age 12 and above
(In Percent)
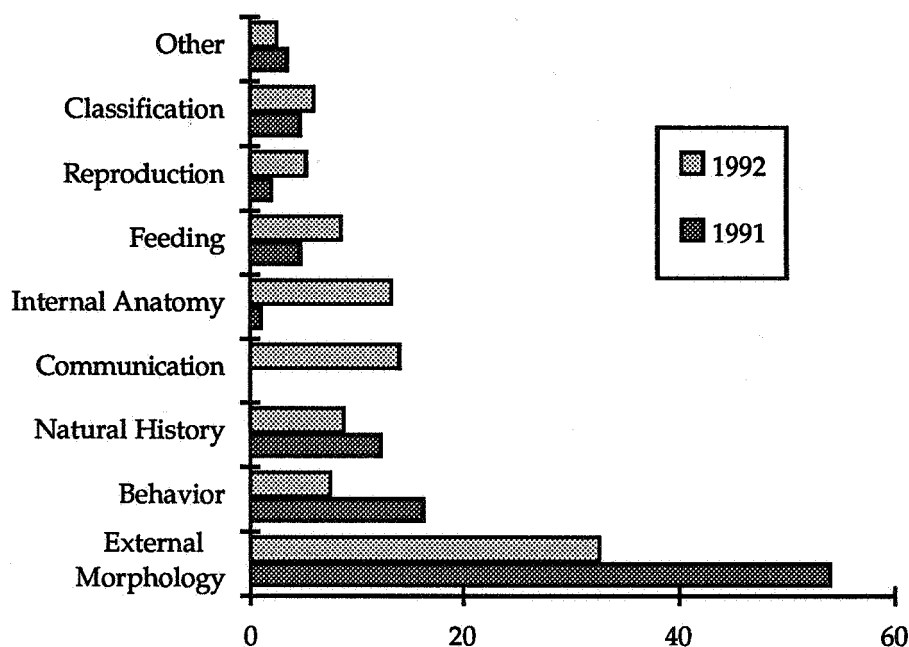
Examples of external morphology and behavior, the types of responses that are most obvious and general, were substantially reduced in 1992, while reproduction and feeding nearly double. References to communication and internal anatomy rise from nearly nothing in 1991 to about 14 percent in 1992. Visitors' attention in the Reptile Discovery Centers was clearly being shaped by the content of the interactive stations. Three modules dealt with communication (Lizard Talk, Snake Talk, Frog Talk), one with internal anatomy (What's Inside), and four with feeding (Lizard Feeding, Snake Feeding, Turtle Feeding, Frog Feeding).

We can estimate the relative impact of the modules by examining the answers that departing 1992 visitors gave to the question, "After visiting this building, which exhibits or other things that you saw or did would you like to tell a friend about?" Up to three responses per visitor were recorded. Nearly one in four people (23.1%) whose initial

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29 See Appendix C, Table C.5.1.

answer to this question was not an affective response cited one or all of the modules as the first thing they would tell a friend about. When all three replies are accounted for, 17.7 percent of the total responses referred directly to the interactive modules. The distribution of mentions across modules shows that the three modules that received the most mentions were What's Inside, Snake Talk, and Snake Feeding (Figure 5.14). Two were not mentioned at all (Turtle Feeding, Frog Feeding).

Figure 5.14
Mentions of Interactive Modules as Things to Tell a Friend About
(All Zoos Combined, 1992 Exit Survey Only)
(In Percent of Total Responses)
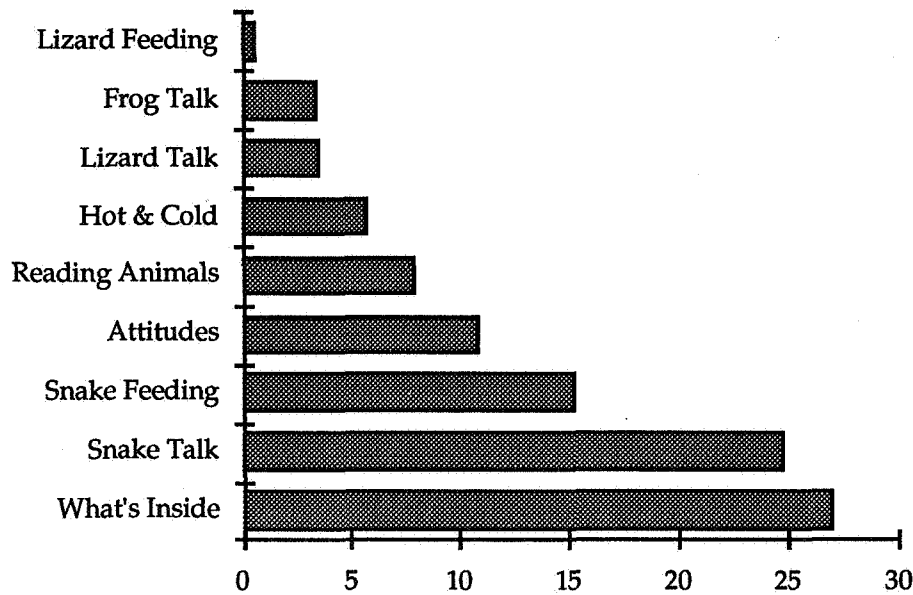
The three most attractive and effective modules seem to have been What's Inside, Snake Talk and Snake Feeding. One frequently mentioned module excluded from this figure, "Eggs and Babies," was available only at the National Zoo. It accounted for 26.9 percent of the mentions of interactive modules made by exiting visitors at NZP.

By comparing the 1991 and 1992 responses to the question of what visitors would tell a friend, we can further verify the strong, positive response that these modules generated.[30] Figure 5.15 shows the pattern of replies.

In 1992 the proportion of positive remarks almost doubled (11.5% in 1991; 22.3% in 1992), while the proportion of negative remarks was nearly cut in half (8.8% in 1991; 3.9% in 1992). Visitors were obviously much happier about the reptile exhibit as a whole when it contained the interactive modules.

The interactive modules generated new, positive feelings towards the reptile exhibits in 1992, and greatly increased the degree of attention that visitors brought to the exhibits.

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[30] $X^2 = 39.097$ Df $= 5$, p $< .001$.

Although there is no direct evidence of a significant increase in factual learning, the modules clearly furthered the zoos' educational goals by helping to set the stage for future investigations.

Figure 5.15
Things to Tell a Friend About
(All Zoos Combined, Exit Survey Only)
(In Percent of Total Responses)
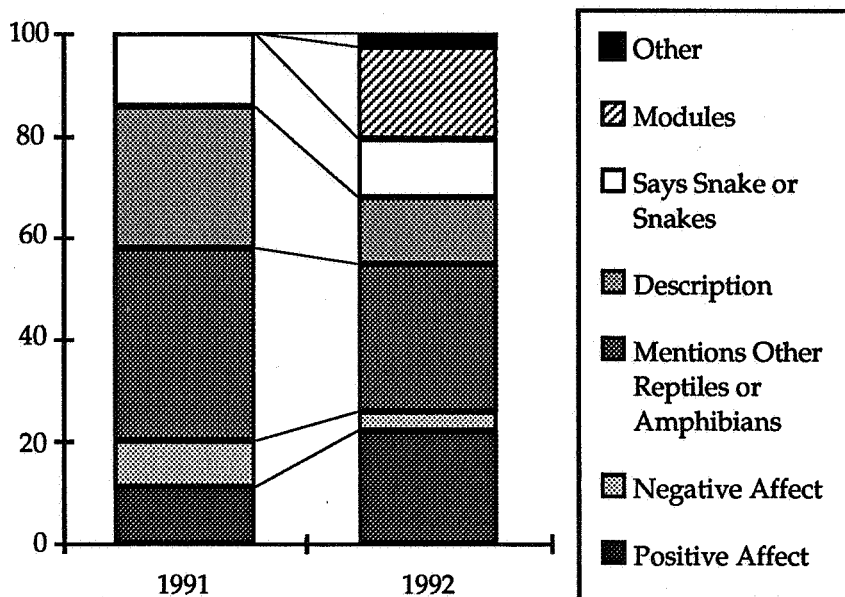
Attitude

The interactive elements not only modified people's behavior in the exhibit and focused their attention on key ideas about reptiles, they also helped visitors to view reptiles more favorably. In 1991, the average score on the Reptile Affect Scale was virtually unchanged by a visit to the Reptile House (5.91 on entry and 5.96 at exit), except at the Dallas Zoo.[31] The distribution of scores in 1991, as illustrated in Figure 5.16, shows little difference between entrance and exit.[32]

In 1992, there was a 8.2 percent increase on the scale (5.73 at entry and 6.20 at exit), except in Dallas where it was 3.6 percent. For visitors who left the Reptile Discovery Centers in 1992, as shown in Figure 5.17, there is a slight drop in the percentage of lower scores and an appreciable increase in the percentage of respondents who said they liked reptiles a lot (score 10).[33]

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[31] See Appendix C, Table C.5.1.

[32] 1991. Comparing means: $t = .602$, $Df = 1634$, $p = .547$; $X^2 = 5.066$, $p = .08$.

[33] 1992. Comparing means: $t = 2.681$, $Df = 992$, $p = .0075$; $X^2 = 17.066$, $p < .001$ This pattern does not hold true at Zoo Atlanta, however, where the gain in average score was affected by increases in scores 6, 7 and 9.

Figure 5.16
1991 Reptile Affect Scale Scores
(All Zoos Combined, by Entrance and Exit, in Percent)
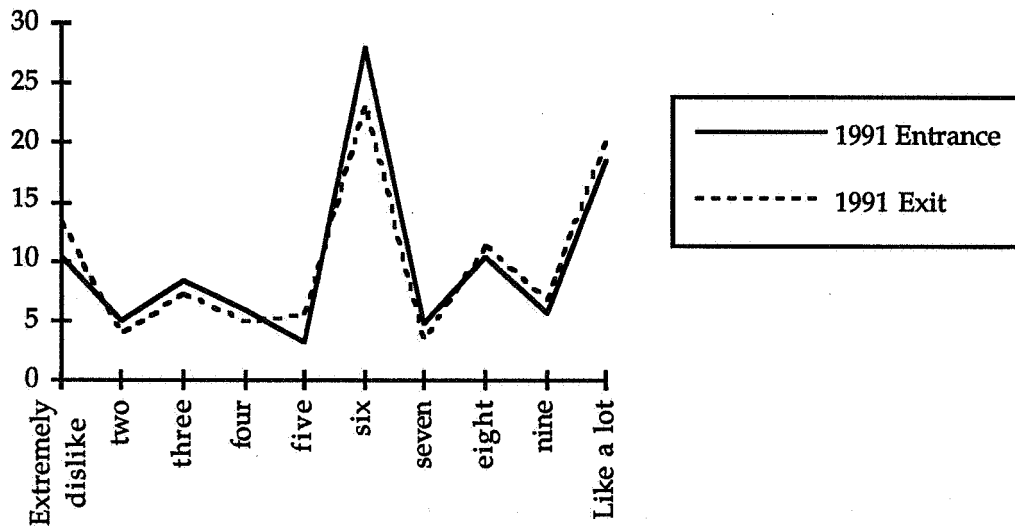
Figure 5.17
1992 Reptile Affect Scale Scores
(All Zoos Combined, by Entrance and Exit, in Percent)
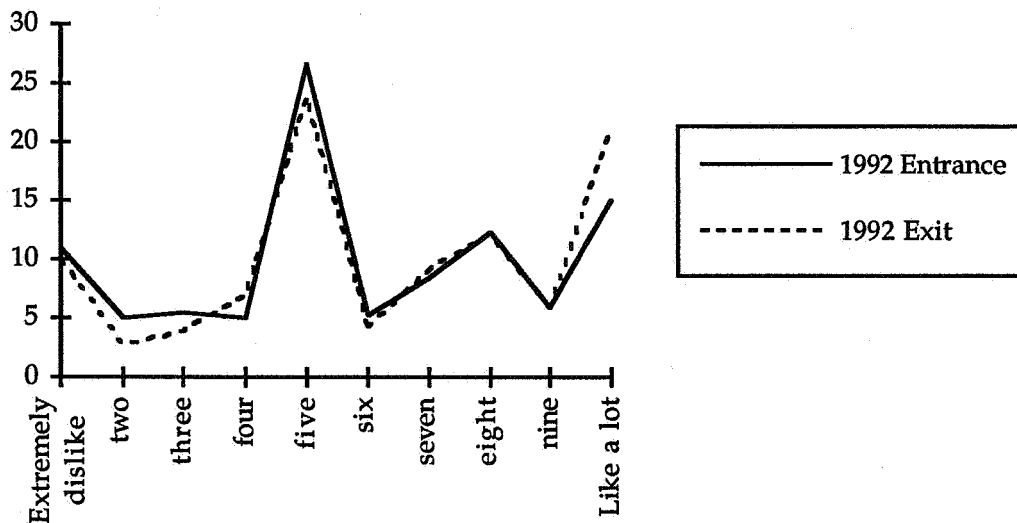
In Section III we highlighted the four demographic and behavioral factors that were associated with a greater liking of reptiles: gender, age, pet reptile, and read natural history and science magazines. The interactive modules gave rise in 1992 to a fifth

factor, visiting. Regression models of the scale scores for 1991 and 1992 quantified the relative strength of these factors:[34]

Gender. In both years being female decreased the Reptile Affect Score by 1.3

Age. In 1991, as the respondent age increased, the score fell. The rate of this reduction ranged from slightly less than one point (-0.9 points) for those aged 12 to 19 to over two-and-a-half points (-2.6 points) for those age 55 and over.

In 1992, the significant difference was for young children; for those between 6 and 11 years old the reptile score increased 1.8 points.

Pet. Having had a pet reptile increased the score by 1.2 in 1991 and 1.6 in 1992.

Reading. Reading natural history magazines (which can be considered a general indicator of interest in and knowledge of animals) had a significant effect only in 1991, when it increased the reptile-liking score by 0.4. In 1992 this effect was essentially replaced by the effect of visiting the exhibit.

Visiting. Visiting the exhibit in 1992 increased the reptile-liking score by one-half point overall.

Summary

The Tracking Study indicated that visitors spent an average of 17.2 minutes in the Reptile Houses in 1991 and 20.8 minutes in the Reptile Discovery Centers in 1992. Overall this represented a 20.5 percent increase in total visit time from 1991 to 1992.

Most of the visit was spent at timed stops. On average, the total time stopped increased by 3.5 minutes between 1991 and 1992. In addition, the percentage of visit time that was spent at timed stops also increased. In 1991, the time spent at stops was 68.1 percent of the total visit time, while in 1992 it was 72.8 percent of total visit time. So visitors were not only staying somewhat longer in 1992, they were also spending a higher proportion of their time engaged in the exhibit.

The number of stops that visitors made in the exhibit increased by one, from 23.9 in 1991 to 24.9 in 1992. In both years, the presence of children in a group of visitors decreased the average number of stops, but in 1992 the difference was larger. In 1991, groups with children made 2.5 fewer stops; in 1992 groups with children made 3 fewer stops.

An average stop in 1992 was over one-quarter longer than one in 1991. In both 1991 and 1992, visitors with children made longer stops than those without children, but most of

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[34] The final models for each year accounted for slightly over 17 percent of the overall variance in the Reptile Affect Scale. See Appendix E.

the increase in average stop time between 1991 and 1992 was due to the visitors who came without children. Between 1991 and 1992, average stop time increased 7.8 seconds for visitors with children, compared to an increase of 9.1 seconds for visitors without children.

In 1991 visitors just looked at reptiles. In 1992, they spent nearly one-third of their stops at the interactive stations.

The interactive stations attracted a fairly broad cross-section of visitors. The interactive stations had the greatest attraction for children, but visitors from all age groups were attracted to the RDC interactives. This is an important finding of the study. Although it is generally assumed that interactives are for children, this study demonstrates that they are used by all ages. The difference due to age in the probability of making a stop at an interactive between the youngest visitors (under age 12) and the oldest (age 55 and over) is less than seven percent (6.7%).

Visitors stopped 17 seconds longer on average at an interactive than they did to look at a reptile, although they also spent 2.3 seconds longer at a typical reptile stop in 1992 than they did in 1991.

As visitors left the buildings they were asked which of a set of seven activities they had done:

1. Stopped and looked at an animal
2. Carefully examined the features of a reptile or amphibian
3. Discovered something about the animals in here I never knew before
4. Found the answer to something I always wondered about
5. Had a meaningful discussion with my group about something I saw or did here
6. Tried out an activity
7. Read information

Each visitor was allowed up to five answers. If we compare the changes across the two years, we find that they are significant for all age groups except teenagers (age 12 to 17). The most common response in both years was "Stopped and looked at animals." For all age groups, between one-third and one-half of all activities cited were looking at animals. The second most common response varied by age. For example, in 1991 the second most common activity for children (i.e., those under age 12) was "Read information" and in 1992 it was "Tried out an activity."

Generally, in 1992 the percentage of "Tried out an activity" responses increased substantially from its 1991 level, suggesting that visitors were recognizing the interactive stations as "activities."

Adults with children reported higher percentages of finding answers, discussing, and trying activities, while adults visiting alone or with other adults reported more reading, discovering, and examining.

When those leaving the exhibits were asked to indicate their five main activities, as discussed above, they were also asked to give an examples for all activities except "Stopped and Looked at a Reptile" and "Read Information." Meaningless examples were eliminated and the remaining answers were coded according to their specificity and subject. The most striking change between 1991 and 1992 is in the degree of specificity of the examples. The percentage of specific answers in 1992 is five times greater than in 1991.

The much higher level of specificity in 1992 examples suggests that the respondents were considerably more involved in what they recalled doing. This result implies a higher quality of experience, as well as an increased acuity of observation and thought.

This heightened awareness of visitors can be directly linked to the interactive stations by observing the subject matter of the activity examples that visitors reported.

Examples of external morphology and behavior, the types of responses that are most obvious and general, were cut in half in 1992, while reproduction and feeding double. References to communication and internal anatomy rise from nearly nothing in 1991 to significant percentages in 1992. Visitors' attention in the Reptile Discovery Centers was clearly being shaped by the content of the interactive stations. Three modules dealt with communication (Lizard Talk, Snake Talk, Frog Talk), one with internal anatomy (What's Inside), and four with feeding (Lizard Feeding, Snake Feeding, Turtle Feeding, Frog Feeding).

We can estimate the relative impact of the modules by examining the answers that departing 1992 visitors gave to the question, "After visiting this building, which exhibits or other things that you saw or did would you like to tell a friend about?" Up to three responses per visitor were recorded. Nearly one in four people whose initial answer to this question was not an affective response, cited one or all of the modules as the first thing they would tell a friend about. When all three replies are accounted for, 17.7 percent of the total referred directly to the interactive modules. The three modules that received the most mentions were What's Inside, Snake Talk, and Snake Feeding

By comparing the remaining 1991 and 1992 responses to the question of what visitors would tell a friend, we can further verify the strong, positive response that these modules generated. In 1992, the proportion of positive remarks more than doubled, while the proportion of negative remarks was nearly cut in half.

The interactive elements not only changed people's behavior in the exhibit and focused their attention on key ideas about reptiles, they also helped visitors to view reptiles more favorably. The average score on the scale of liking reptiles was virtually unchanged by a visit to the Reptile House in 1991, while in 1992 there was a 5 percent increase between entrance and exit. For visitors who left the Reptile Discovery Centers in 1992, there is a slight drop in the percentage of lower scores and an appreciable increase in the percentage of respondents who said they liked reptiles a lot (score 10).

What Do These Results Imply?[35]

Collectively, the substantive results of the study indicate that the addition of the interactive modules had significant effects on visitors. *Behaviorally*, the interactive stations slowed visitors down, made them more attentive, and lengthened their time in the exhibit. *Emotionally*, the modules improved visitors' feelings about reptiles. *Intellectually*, they communicated new ideas, especially about internal anatomy, communication, and feeding.

Behavioral Effects. The behavioral results set the conditions for all the other results by drawing and holding visitors' attention. During the planning process the zoo teams indicated that, as one of their goals for the project, they wanted visitors to " Look at an animal(s) carefully and for some time." The results show that visitors spent less total time looking at animals in 1992 than they did in 1991, because of the time they spent with the interactive stations. But an average reptile-looking stop in 1992 was a bit longer than an average reptile-looking stop in 1991 (see Stop-time Regression Table, Appendix E). The planning team also wanted visitors to "Discuss something related to the experience with someone." We found that discussion activities are reported much more frequently in 1992 than in 1991.

Emotional Effects. We found that the addition of the interactives into the Reptile Houses significantly improved visitors' emotional responses to the reptiles. If, as we believe, the emotional response is a central factor in the visitor's zoo experience, the fact that this response was more positive indicates that the interactives provided a real service for the visitor.

Nearly as interesting as the fact and direction of emotional change, however, may be the suggested pattern of that change. In 1991 the two largest emotional effects of a visit to the Reptile House were that most of the neutral population moved slightly downward, and that the percentage of the population that expressed extreme dislike (score 1) increased. In 1992 the two largest effects were that all those who disliked reptiles (scores 1-3) decreased and that those who scored themselves at 10, the extreme positive end of the scale, increased. Through the addition of the interactive stations the reptile exhibits seem to have changed from reinforcers of fear and dislike to sites of positive experiences for a number of visitors.

Thus, there is some evidence that visitors met the planning teams' emotional goals for the exhibition. Visitors leaving in 1992 did "Think about something in a different way than before," and strong positive responses in 1992 to the question of what visitors would tell a friend imply that visitors may "Want to return to the Reptile Discovery Center." This readiness to return is logical, especially in view of the high percentage of repeat visitors among the zoo audience.

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[35] A more interpretive analysis of these results will be published separately.

Cognitive Effects. The project articulated several cognitive goals for visitors. The first of these was to "Understand what they are seeing when looking at this animal." We found a slight increase in the accuracy of reptile descriptions, and a substantial increase in the specificity of examples in 1992, suggesting that visitors had a closer awareness of what they were seeing. There was no evidence in the study that the second cognitive goal, "Visually discover something new" was affected by the addition of the interactives. New subject matters among the 1992 activity results give clear indication that visitors were receiving new ideas from the interactives, but visitors were less inclined to refer to this new knowledge as "discovery." We believe that this is because more of visitors' learning resulted from the guided presentation of the interactives than from serendipitous realization.

While our measures did not precisely tap the planners' intended message that "reptiles and humans have certain things in common," the attractiveness of the three modules that employed direct comparisons between reptiles and humans imply that these connections were being made.

Informal Science Education. Although visitors were not seeking information and few were willing to spend enough time to significantly enhance their level of knowledge, the evidence of the study suggests that the interactives played an important motivational role. Learning is deepest when it parallels the emotional and intellectual interests of the individual.

The specific lessons for informal education in zoos that we draw from this study are that:

1. Low-tech interactives interest visitors of different ages, not just children. The assumption that interactives are attractive only to children is simply not supported by this study.

2. Visitors are not equally receptive to an exhibition subject. For example, the tendency of women and older visitors to dislike reptiles worked against the experience, while the favorable predisposition of young boys with pet reptiles offered them additional incentives. Differences in attitude must be taken into account and incorporated into the educational design.

3. Within a zoo context, interactives can slow visitors down, improve the quality of the looking experience, and foster a more positive attitude towards animals.

4. When interactives incorporate parallels between humans and animals, they are most attractive.

Looking Ahead. Some of the results of this study, especially the effect of the interactives on emotional attitudes and their attractiveness to all ages, suggest that we need to know more about precisely what takes place in the use of an interactive. How does doing differ from looking? Why does it focus attention so well?

A deeper understanding of how interactives work must await further research, but as this study shows they can be used to increase learning opportunities by improving attitudes and strengthening attention. The interactives produced for the Reptile Discovery Centers offer a proven model for zoos.

*   *   *

Now we have followed our visitors through the reptile exhibits both before and after the interactive modules were put in place. The overall impression of what they did was pretty much the same -- they wandered through the space at a fairly brisk pace, stopping frequently for brief intervals. In fifteen to twenty minutes, most of them were out and on to something else.

In 1991, they were stopping in front of reptiles. In 1992, they made virtually the same number of stops, but divided them 7 to 3 between reptiles and interactives. The modules drew a good deal of attention, taking on average over one-third of visitors' stopping time, and keeping them in the exhibit four minutes longer. One in seven visitors now stayed in the exhibit for more than a half-hour (compared to one in thirteen in 1991). Families tended to stop longer than single adults or couples.

But were they gaining anything from the experience? In view of the short visit time and the relatively large number of stops, it would seem unreasonable to expect too much in this regard. As far as this study was able to determine, visitors seemed to have been virtually unaffected by their experience of the Reptile Houses in 1991. Nearly every comparison between entrance and exit in 1991 shows no significant change. In addition, there are suggestions that 1991 visitors were not paying very close attention to the exhibit.

The introduction of the interactive modules in 1992 caused visitors to feel significantly better about reptiles in general. There are indications that the modules also improved the quality of the exhibit experience, since 1992 visitors seem to have paid much more attention to what they were doing in the exhibit, and to have been somewhat aware of the ideas contained in the modules, especially communication and internal anatomy. They not only reported liking the modules, but, because of them, they also seem to have felt better about the exhibit as a whole and about reptiles. Because of the interactive stations, 1992 visitors were having a fuller and more positive experience of reptiles.

Appendix A

Questionnaires and Tracking Forms

1991 and 1992 Studies of the Reptile Discovery Centers Project
at the
National Zoological Park, Zoo Atlanta and the Dallas Zoo

+1. Is TODAY your first visit to this zoo?   6

O Yes: Go to Q.3   1
O No: Go to Q.2   2
O NA: Employee. Go to Admin Info.   3

+2. When was the last time you visited this zoo?   8-9

   O In the last year: Ask 2A.
     2A. In the last year, how many times have you visited this zoo?

     ☐☐ [ ]

   O 1-2 yrs. ago   55
   O 2-3 yrs. ago   56
   O 3+ yrs. ago   57

+3. In the last year, how many other zoos have you visited?   11

O 0.None   O 1.One   O 2.Two or more

+4. How about natural history museums?   13

O 0.None   O 1.One   O 2.Two or more

+5. And aquariums or live marine exhibits? 15

O 0.None   O 1.One   O 2.Two or more

+*6. Who are you here with?   17

O 1.Alone   O 5.Child(ren)
O 2.One other adult   O 6.School group
O 3.Adult(s)& Child(ren)   O 7.Tour group
O 4.Friends/peers/same age group

+7. What is the main reason you visited this zoo today?   19-20

   O General visit/General interest   01
   O Natural History interest   02
   O Reputation/Read or Heard about it   03
   O Tour/school tour   04
   O Outing with family/friends/guests   05
   O Bringing a person to see _____ 06
   O Special event   07
   O Other: _____ [ ]

+8. Altogether, about how much time do you plan to spend at the zoo today? [Probe for hours]

Enter no. of hours: ☐☐ [11= DK] 22-23

9. What is the main reason you came to this exhibit building?   25-26

   O Came to see _____ 01
   O With someone who was interested   02
   O Part of zoo visit/on main route in zoo 03
   O Interest in reptiles (general)   04
   O Interest in birds   05
   O Wandered by   06
   O Saw signs/Read pamphlet   07
   O Other: _____[ ]

10. Had you heard about this Reptile House before today?   31

   O No   1
   O Yes. Ask:Where did you hear about it?
     O Saw it on last zoo visit   2
     O Other: _____[ ]

11. We are planning some new exhibits in this building and would like to ask you a few questions to help us plan. When I say the word reptiles, what is the first thing you think of?

_____

_____

_____

_____

Office :☐☐ 33-34 ☐☐ 36-37 ☐☐ 39-40

12. How would you describe a reptile to someone who did not know what it was?

_____

_____

_____

Office :☐☐ 42-43 ☐☐ 45-46 ☐☐ 48-49

13. People have different feelings about reptiles. On a scale of 1 to 10, where 1 is "like a lot" and 10 is "extremely dislike" where would you place yourself?

Enter no: ☐☐ [11= DK]   51-52

14. Here are some activities. Which of these would you like to do in here?

Enter no.: [No more than 5; None=00]

☐☐ ☐☐ ☐☐ ☐☐ ☐☐ 54-63

[64-89/blank]

15. On the back of the card are some things that might be included in the new reptile exhibit. Which two do you find most interesting?

Enter Choice 1:   Enter Choice 2 [11=DK]

☐☐ 90-91   ☐☐ 93-94

25. Have you ever had a reptile as a pet?

O 1.Yes   O 2.No   O 3.DK   105

26. Have you ever seen a nature program about reptiles?

O 1.Yes   O 2.No   O 3.DK   107

27. Have you ever seen a horror film with a reptile in it?

O 1.Yes   O 2.No   O 3.DK   109

Finally, just a few questions about you...

28. Do you subscribe to or read any natural history or science magazines? (e.g. Natural History Magazine, Scientific American, National Geographic)?

O1.Subscribe O2.Read O3.No O 4.Previously 111

+29. What is the highest level of school/ education you have completed?   113

O 1.Pre-school (0-K)   O 5.Some college/2 Yr
O 2.Grade school (1-8) O 6.Bachelor's degree
O 3.Some H.S.. (9-12)   O 7.Some grad. study
O 4.High school   O 8. MA/Ph.D/Prof. deg.

+*30. How old are you?   115-16 ☐☐

O 0-5   O 18-19   O 45-54
O 6-11   O 20-24   O 55-64
O 12-14   O 25-34   O 65 and over
O 15-17   O 35-44

+*31. Where do you live?   118

O 1. Washington, D.C.
O 2. Suburbs in MD/VA
O 3. Other U.S.: _____
O 4. Foreign: _____

Office Only: ☐☐   120-21

+*32. What is your cultural/racial/ethnic identity?   123

O 1. Afr Amer/Black   O 4. Caucasian
O 2. Am Ind/AK Native   O 5. Hispanic/Latino
O 3. Asian/Pac Islander O 6. Other: _____

+*33.CIRCLE: 1. Male   2. Female   125

Thank Respondent. Give Gift

1991 Entrance Survey

+1. Is TODAY your first visit to this zoo? 6

- O Yes: Go to Q.3 1
- O No: Go to Q.2 2
- O NA: Employee. Go to Admin Info. 3

+2. When was the last time you visited this zoo? 8-9

- O In the last year: Ask 2A.

    2A. In the last year, how many times have you visited this zoo?
    ☐☐ [ ]

    - O 1-2 yrs. ago 55
    - O 2-3 yrs. ago 56
    - O 3+ yrs. ago 57

+3. In the last year, how many other zoos have you visited? 11

O 0.None   O 1.One   O 2.Two or more

+4. How about natural history museums? 13

O 0.None   O 1.One   O 2.Two or more

+5. And aquariums or live marine exhibits? 15

O 0.None   O 1.One   O 2.Two or more

+*6. Who are you here with? 17

- O 1.Alone
- O 2.One other adult
- O 3.Adult(s)& Child(ren)
- O 4.Friends/peers/same age group
- O 5.Child(ren)
- O 6.School group
- O 7.Tour group

+7. What is the main reason you visited this zoo today? 19-20

- O General visit/General interest 01
- O Natural History interest 02
- O Reputation/Read or Heard about it 03
- O Tour/school tour 04
- O Outing with family/friends/guests 05
- O Bringing a person to see _____ 06
- O Special event 07
- O Other: _____ [ ]

+8. Altogether, about how much time do you plan to spend at the zoo today?
[Probe for hours]

Enter no. of hours: ☐☐ [11= DK] 22-23

9. What is the main reason you came to this exhibit building? 25-26

- O Came to see _____ 01
- O With someone who was interested 02
- O Part of zoo visit/on main route in zoo 03
- O Interest in reptiles (general) 04
- O Interest in birds 05
- O Wandered by 06
- O Saw signs/Read pamphlet 07
- O Other: _____ [ ]

9A. About how much time did you spend here?

Enter minutes: ☐☐ [99=99+ min.] 28-29

10. Had you heard about this Reptile House before today? 31

- O No 1
- O Yes. Ask:Where did you hear about it?
    - O Saw it on last zoo visit 2
    - O Other: _____ [ ]

11. We are planning some new exhibits in this building and would like to ask you a few questions to help us plan. When I say the word reptiles, what is the first thing you think of?

_____

_____

_____

_____

Office : ☐☐ 33-34 ☐☐ 36-37 ☐☐ 39-40

12. How would you describe a reptile to someone who did not know what it was?

_____

_____

_____

_____

Office : ☐☐ 42-43 ☐☐ 45-46 ☐☐ 48-49

13. People have different feelings about reptiles. On a scale of 1 to 10, where 1 is "like a lot" and 10 is "extremely dislike" where would you place yourself?

Enter no: ☐☐ [11= DK] 51-52

14. On this card are some activities. Which of these did you do in here?

Enter no.: [No more than 5; None=00]

☐☐ ☐☐ ☐☐ ☐☐ ☐☐ 54-63

If Q.14= #02-#06. Ask: **Can you give me an example of [x] ?** [Example for each activity]

#____ _____ 65-68

#____ _____ 70-73

#____ _____ 75-78

#____ _____ 80-83

#____ _____ 85-88

15. On the back of the card are some things that might be included in the new reptile exhibit. Which two do you find most interesting?

Enter Choice 1:   Enter Choice 2 [11=DK]

☐☐ 90-91   ☐☐ 93-94

16. After visiting this building, which exhibits or other things that you saw or did would you like to tell a friend about? [Probe].

_____

_____

_____

_____

_____

Office : ☐☐ 96-97 ☐☐ 99-100 ☐☐ 102-03

25. Have you ever had a reptile as a pet?

O 1.Yes   O 2.No   O 3.DK   105

26. Have you ever seen a nature program about reptiles?

O 1.Yes   O 2.No   O 3.DK   107

27. Have you ever seen a horror film with a reptile in it?

O 1.Yes   O 2.No   O 3.DK   109

Finally, just a few questions about you...

28. Do you subscribe to or read any natural history or science magazines? (e.g., Natural History Magazine, Scientific American, National Geographic)?

O1.Subscribe O2.Read O3.No O 4.Previously 111

+29. What is the highest level of school/ education you have completed? 113

O1.Pre-school (0-K)   O 5.Some college/2 Yr
O 2.Grade school (1-8)   O 6.Bachelor's degree
O 3.Some H.S.. (9-12)   O 7.Some grad. study
O 4.High school   O 8. MA/Ph.D/Prof. deg.

+*30. How old are you? 115-16 ☐☐

O 0-5   O 18-19   O 45-54
O 6-11   O 20-24   O 55-64
O 12-14   O 25-34   O 65 and over
O 15-17   O 35-44

+*31. Where do you live? 118

O 1. Washington, D.C.
O 2. Suburbs in MD/VA
O 3. Other U.S.: _____
O 4. Foreign: _____

Office Only: ☐☐   120-21

+*32. What is your cultural/racial/ethnic identity? 123

O 1. Afr Amer/Black   O 4. Caucasian
O 2. Am Ind/AK Native   O 5. Hispanic/Latino
O 3. Asian/Pac Islander   O 6. Other: _____
_____

+*33.CIRCLE: 1. Male   2. Female 125

Thank Respondent. Give Gift

Administrative Information
Location: O 1.NZP   O 2.ZA   O 3.DZ 127

Status:

Interview:
O 1. Adult   O 2. 6-12   O 3.Under 6 129

No interview:
O 1.NA.Employee   O 3.Refusal: Hurry 131
O 2.NIA   O 4.Refusal: Language
   O 5.Refusal: No Reason

Month: ☐☐ 133-34 *Date*: ☐☐ 136-37

Day: ☐☐ [01=Su ... 07=Sa] 139-40

Circle Shift: 1   2   3   142

Interval: ☐☐ 144-45

1991 Exit Survey

1991 Questionnaire Cards

Note: Interviewers used large print versions of these cards in conjunction with the appropriate question.

Q.14. Entrance Survey

ACTIVITIES

1.	Stop and look at an animal
2.	Carefully examine the features of a reptile or amphibian
3.	Discover something about the animals in here I never knew before
4.	Find the answer to something I always wondered about
5.	Have a meaningful discussion with my group about something I saw or did here
6.	Try out an activity
7.	Read information

Q.14. Exit Survey

ACTIVITIES

1.	Stopped and looked at an animal
2.	Carefully examined the features of a reptile or amphibian
3.	Discovered something about the animals in here I never knew before
4.	Found the answer to something I always wondered about
5.	Had a meaningful discussion with my group about something I saw or did here
6.	Tried out an activity
7.	Read information

Q.15 Entrance and Exit Surveys

TOPICS

1. **Lizard Warm-up** - Discover how a lizard heats and cools its body.
2. **Eats** - Find out how and what reptiles eat.
3. **Reading an animal** - Examine a frog, snake, or lizard's unique features through a special viewing box.
4. **Dinosaur Debates** - Draw your own conclusions about questions on these ancient reptiles.
5. **Animal Talk** - Learn the language of lizards and frogs.
6. **Masterpieces** - Compare live reptiles to works of art.
7. **What's Inside** - Find out what goes on inside a reptile's body.
8. **Zoom-In** - Use zoo binoculars to see animals close up.
9. **Animal Encounters** - Meet a reptile and its keeper.
10. **How Do You Feel?** - Find out how people feel about reptiles.

+1. Is TODAY your first visit to this zoo?　6

O Yes: Go to Q.3　　　　　　　1
O No:　Go to Q.2　　　　　　　2
O NA: Employee. Go to Admin Info.　3

+2. When was the last time you visited this zoo?　8-9
　O In the last year: Ask 2A.
　　2A. In the last year, how many times have you visited this zoo?
　　　　　　☐☐ [ ]
　O 1-2 yrs. ago　　55
　O 2-3 yrs. ago　　56
　O 3+ yrs. ago　　57

+3. In the last year, how many other zoos have you visited?　11

O 0.None　　O 1.One　　O 2.Two or more

+4. How about natural history museums?　13

O 0.None　　O 1.One　　O 2.Two or more

+5. And aquariums or live marine exhibits?　15

O 0.None　　O 1.One　　O 2.Two or more

+*6. Who are you here with?　17

O 1.Alone　　　　　　　O 5.Child(ren)
O 2.One other adult　　O 6.School group
O 3.Adult(s)& Child(ren)　O 7.Tour group
O 4.Friends/peers/same age group

+7. What is the main reason you visited this zoo today?　19-20

O General visit/General interest　01
O Natural History interest　02
O Reputation/Read or Heard about it　03
O Tour/school tour　04
O Outing with family/friends/guests　05
O Bringing a person to see _____06
O Special event　07
O Visit new Reptile Discovery Center　11
O Other: _____[ ]

+8. Altogether, about how much time do you plan to spend at the zoo today?
[Probe for hours]

Enter no. of hours: ☐☐ [11= DK]　22-23

A-8

+9. What is the main reason you came to this exhibit building?　25-26

O Came to see _____　01
O With someone who was interested　02
O Part of zoo visit/on main route in zoo　03
O Interest in reptiles (general)　04
O Interest in birds　05
O Saw signs/Read pamphlet　07
O Other: _____[ ]

10. Had you heard about this Reptile Discovery Center before today?　31

O No　　　　　　　　　　　1
O Yes. Ask:Where did you hear about it?
　O Saw it on last zoo visit　2
　O Read about it on last zoo visit　3
　O Other:_____[ ]

11. Next, I'd like to ask you a few questions about reptiles, before you go in. When I say the word reptiles, what is the first thing you think of?

_____
_____
_____
_____

Office : ☐☐ 33-34 ☐☐ 36-37 ☐☐ 39-40

12. How would you describe a reptile to someone who did not know what it was?

_____
_____
_____
_____

Office : ☐☐ 42-43 ☐☐ 45-46 ☐☐ 48-49

13. People have different feelings about reptiles. On a scale of 1 to 10, where 10 is "like a lot" and 1 is "extremely dislike" where would you place yourself?

Enter no: ☐☐ [11= DK]　　51-52

14. Here are some activities. Which of these would you like to do in here?

Enter no.: [No more than 5; None=00]

☐☐ ☐☐ ☐☐ ☐☐ ☐☐ 54-63

[64-89/blank]

15. On the back of the card are some things that are in the new Reptile Discovery Center. Which two do you find most interesting?

Enter Choice 1:   Enter Choice 2 [11=DK]

☐☐ 90-91   ☐☐ 93-94

25. Have you ever had a reptile as a pet?

O 1.Yes   O 2.No   O 3.DK   105

26. Have you ever seen a nature program about reptiles?

O 1.Yes   O 2.No   O 3.DK   107

27. Have you ever seen a horror film with a reptile in it?

O 1.Yes   O 2.No   O 3.DK   109

Finally, just a few questions about you...

28. Do you subscribe to or read any natural history or science magazines? (e.g. Natural History Magazine, Scientific American, National Geographic)?

O1.Subscribe O2.Read O3.No O 4.Previously 111

+29. What is the highest level of school/ education you have completed?   113

O1.Pre-school (0-K)   O 5.Some college/2 Yr
O 2.Grade school (1-8) O 6.Bachelor's degree
O 3.Some H.S.. (9-12) O 7.Some grad. study
O 4.High school   O 8. MA/Ph.D/Prof. deg.

+*30. How old are you?   115-16 ☐☐

O 0-5   O 18-19   O 45-54
O 6-11   O 20-24   O 55-64
O 12-14   O 25-34   O 65 and over
O 15-17   O 35-44

+*31. Where do you live?   118

O 1. Metro Atlanta
O 2. Georgia, excluding Metro Atlanta
O 3. Other U.S.: _____
O 4. Foreign: _____

Office Only: ☐☐   120-21

+*32. What is your cultural/racial/ethnic identity?   123

O 1. Afr Amer/Black   O 4. Caucasian
O 2. Am Ind/AK Native   O 5. Hispanic/Latino
O 3. Asian/Pac Islander   O 6. Other: _____

+*33.CIRCLE: 1. Male   2. Female   125

Thank Respondent. Give Gift

+1. Is TODAY your first visit to this zoo?   6

O Yes: Go to Q.3   1
O No: Go to Q.2   2
O NA: Employee. Go to Admin Info.   3

+2. When was the last time you visited this zoo?   8-9

O In the last year: Ask 2A.
   2A. In the last year, how many times have you visited this zoo?

   [ ][ ][ ]

   O 1-2 yrs. ago   55
   O 2-3 yrs. ago   56
   O 3+ yrs. ago   57

+3. In the last year, how many other zoos have you visited?   11

O 0.None   O 1.One   O 2.Two or more

+4. How about natural history museums?   13

O 0.None   O 1.One   O 2.Two or more

+5. And aquariums or live marine exhibits? 15

O 0.None   O 1.One   O 2.Two or more

+*6. Who are you here with?   17

O 1.Alone   O 5.Child(ren)
O 2.One other adult   O 6.School group
O 3.Adult(s)& Child(ren) O 7.Tour group
O 4.Friends/peers/same age group

+7. What is the main reason you visited this zoo today?   19-20

O General visit/General interest   01
O Natural History interest   02
O Reputation/Read or Heard about it   03
O Tour/school tour   04
O Outing with family/friends/guests   05
O Bringing a person to see _____ 06
O Special event   07
O Visit new Reptile Discovery Center   11
O Other: _____ [ ]

+8. Altogether, about how much time do you plan to spend at the zoo today?
[Probe for hours]

Enter no. of hours: [ ][ ] [11= DK]   22-23

+9. What is the main reason you came to this exhibit building?   25-26

O Came to see _____   01
O With someone who was interested   02
O Part of zoo visit/on main route in zoo 03
O Interest in reptiles (general)   04
O Interest in birds   05
O Saw signs/Read pamphlet   07
O Other: _____ [ ]

+9A. About how much time did you spend here?

Enter minutes: [ ][ ] [99=99+ min.]   28-29

10. Had you heard about this Reptile Discovery Center before today?   31

O No   1
O Yes. Ask:Where did you hear about it?
   O Saw it on last zoo visit   2
   O Read about it on last zoo visit   3
   O Other: _____ [ ]

11. Next, I'd like to ask you a few questions about reptiles. When I say the word reptiles, what is the first thing you think of?

_____
_____
_____
_____

Office : [ ][ ] 33-34 [ ][ ] 36-37 [ ][ ] 39-40

12. How would you describe a reptile to someone who did not know what it was?

_____
_____
_____
_____

Office : [ ][ ] 42-43 [ ][ ] 45-46 [ ][ ] 48-49

13. People have different feelings about reptiles. On a scale of 1 to 10, where 10 is "like a lot" and 1 is "extremely dislike" where would you place yourself?

Enter no: [ ][ ] [11= DK]   51-52

A-

14. On this card are some activities. Which of these did you do in here?
(RECORD NUMBER IN PAIRS OF BOXES.)
If Q.14= #02-#06. Ask: Can you give me an example of [x] ?

No more than 5; None=00 in first pair of boxes.]

☐☐	_____ 65-8 _____
☐☐	_____ 70-3 _____
☐☐	_____ 75-8 _____
☐☐	_____ 80-3 _____
☐☐	_____ 85-8 _____

15. On the back of the card are some things that are in the new Reptile Discovery Center. Which two did you find most interesting?

Enter Choice 1: ☐☐ 90-91   Enter Choice 2 [11=DK] ☐☐ 93-94

16. After visiting this building, which exhibits or other things that you saw or did would you like to tell a friend about? [Probe].

_____

_____

_____

_____

Office : ☐☐ 96-97 ☐☐ 99-100 ☐☐ 102-03

25. Have you ever had a reptile as a pet?

O 1.Yes   O 2.No   O 3.DK   105

26. Have you ever seen a nature program about reptiles?

O 1.Yes   O 2.No   O 3.DK   107

27. Have you ever seen a horror film with a reptile in it?

O 1.Yes   O 2.No   O 3.DK   109

Finally, just a few questions about you...

28. Do you subscribe to or read any natural history or science magazines? (e.g., Natural History Magazine, Scientific American, National Geographic)?
O 1.Subscribe O 2.Read O 3.No O 4.Previously 111

+29. What is the highest level of school/ education you have completed?   113

O 1.Pre-school (0-K)   O 5.Some college/2 Yr
O 2.Grade school (1-8)   O 6.Bachelor's degree
O 3.Some H.S.. (9-12)   O 7.Some grad. study
O 4.High school   O 8. MA/Ph.D/Prof. deg

+*30. How old are you?   115-16 ☐☐

O 0-5   O 18-19   O 45-54
O 6-11   O 20-24   O 55-64
O 12-14   O 25-34   O 65 and over
O 15-17   O 35-44

+*31. Where do you live?   118

O 1. Dallas/Fort Worth Metroplex Area
O 2. Texas, excluding Dallas/Fort Worth
O 3. Other U.S.: _____
O 4. Foreign: _____

Office Only: ☐☐   120-21

+*32. What is your cultural/racial/ethnic identity?   123

O 1. Afr Amer/Black   O 4. Caucasian
O 2. Am Ind/AK Native   O 5. Hispanic/Latino
O 3. Asian/Pac Islander   O 6. Other: _____

+*33.CIRCLE: 1.   Male   2.   Female   125

Thank Respondent. Give Gift

Administrative Information
Location: O 1.NZP O 2.ZA O 3.DZ 127
Status:
Line: O 1. Yes O 2. No   129
Interview:
O 1. Adult   O 2. 6-12   O 3.Under 6 131
No interview:
O 1.NA.Employee O 3.Refusal: Hurry 133
O 2.NIA   O 4.Refusal: Language
O 5.Refusal: No Reason
Month: ☐☐ 135-36 Date: ☐☐ 138-39
Day: ☐☐ [01=Su ... 07=Sa] 141-42
Circle Shift: 1   2   3   144
Interval: ☐☐ 146-47
Interviewer. No. ☐☐ 149-50
Interviewer Name _____

<u>Note:</u> Interviewers used large print versions of these cards in conjunction with the appropriate question.

Q.14. <u>Entrance Survey</u>. Activities. Same as 1991 card.
Q. 14. <u>Exit Survey</u>. Activities. Same as 1991 card.
Q. 15. Entrance Survey. Stations. See below.
Q. 15 Exit Survey. Stations. Same card as below, except written in past tense.

STATIONS

1. **Snake Feeding** - Look closely at snake skulls and teeth. See human jaws that open like a snake's.

2. **Reptiles Hot and Cold** - Warm up cool down a plastic lizard to discover how a real lizard heats and cools its body.

3. **Lizard Talk : Looking Tough:** - Move a green lizard model to signal to another lizard.

4. **Frog Feeding** - Read a frog food menu. Flip out a frog tongue.

5. **Read an Animal** - Look closely at a live animal in a viewing box, using observation cards.

6. **What's Inside** - See what's inside the lizard-woman. Listen to the sound of blood; examine x-rays; lift the snake puzzle pieces.

7. **Turtle Feeding** - Closely examine a turtle skull. Read the Turtle Menu.

8. **Frog Talk: Listening** -Find a mate for a female frog by pushing buttons and listening to frog calls.

9. **How do Reptiles Make You Feel?** - Change how reptiles look and consider how you view reptiles.

10. **Snake Talk: Smelling** - Sniff smells in a maze of bottles to track a scent the way a snake does.

11. **Lizard Feeding** -Look closely at lizard skulls and teeth. Read the Lizard Lunch Menu.

12. **Demonstration** -Talk with or watch a zoo staff member.

1991 Visitor Profile : Tracking Observation Form

☐☐☐☐ 1-4

A. Record with use of watch:

1. **Time entered:** ☐☐ : ☐☐ 1 = A.M 2 = P.M. 6-10

B.Stop Time (Sec.)   B=Bird 1 =Feed 2 =Person

#1 ☐☐☐ 12-14 ☐
#2 ☐☐☐ 16-18 ☐
#3 ☐☐☐ 20-22 ☐
#4 ☐☐☐ 24-26 ☐
#5 ☐☐☐ 28-30 ☐
#6 ☐☐☐ 32-34 ☐
#7 ☐☐☐ 36-38 ☐
#8 ☐☐☐ 40-42 ☐
#9 ☐☐☐ 44-46 ☐
#10 ☐☐☐ 48-50 ☐

B.Stop Time (Sec.)   B=Bird 1 =Feed 2=Person

#11 ☐☐☐ 52-54 ☐
#12 ☐☐☐ 56-58 ☐
#13 ☐☐☐ 60-62 ☐
#14 ☐☐☐ 64-66 ☐
#15 ☐☐☐ 68-70 ☐
#16 ☐☐☐ 72-74 ☐
#17 ☐☐☐ 76-78 ☐
#18 ☐☐☐ 80-82 ☐
#19 ☐☐☐ 84-86 ☐
#20 ☐☐☐ 88-90 ☐

B.Stop Time (Sec.)   B=Bird 1=Feed 2=Person

#21 ☐☐☐ 92-94 ☐
#22 ☐☐☐ 96-98 ☐
#23 ☐☐☐ 100-02 ☐
#24 ☐☐☐ 104-06 ☐
#25 ☐☐☐ 108-10 ☐
#26 ☐☐☐ 112-14 ☐
#27 ☐☐☐ 116-18 ☐
#28 ☐☐☐ 120-22 ☐

No. of _additional_ STOPS:

☐☐ 124-25

[None = 00]

C. Time exited: ☐☐ : ☐☐ 1 = A.M 2 = P.M. [127-30 131-35=blank]

D. Record from observation:

(a) Who is the visitor with?   136

O 1.Alone
O 2.One other adult
O 3.Adult(s)& Child(ren)
O 4.Friends/peers/same age group
O 5.Child(ren)
O 6.School group
O 7.Tour group

(b) How old is the visitor?   ☐☐ 138-9

O 0-5   O 18-19   O 45-54
O 6-11   O 20-24   O 55-64
O 12-14   O 25-34   O 65 and over
O 15-17   O 35-44

(c) What is the visitor's cultural/racial/ ethnic identity?   141

O 1. Afr Amer/Black   O 4. Caucasian
O 2. Am Ind/AK Native   O 5. Hispanic/Latino
O 3. Asian/Pac Islander O 6. Other: _____

(d) Gender [Circle] 1 Male 2 Female   143

Administrative Information

Problem?0=No 1=Yes: Explain on reverse 145

Administrative Information

Location: O 1.NZP   O 2.ZA   O 3.DZ   147

Month: ☐☐ 149-50   _Date_: ☐☐ 152-3

Day: ☐☐ [01=Su ... 07=Sa]   155-6

Circle Shift   1   2   3   158

Interval: ☐☐ 160-61

Interviewer. No. ☐☐ 163-4

A-13

A. Record with use of watch:

1. Time entered: ⟦|_|_|⟧ : ⟦|_|_|⟧   1 = A.M 2 = P.M. 6-10

B.Stop Time (Sec.)   B=Bird
1 =Eating
2 =Worker
3 =Station
4 = Demo

B.Stop Time (Sec.)   B=Bird
1 =Eating
2 =Worker
3 =Station
4 =Demo

B.Stop Time (Sec.)   B=Bird
1 =Eating
2 =Worker
3 = Station
4 =Demo

#1 ⟦|_|_|_|⟧ 12-14 ⟦|_|⟧
#2 ⟦|_|_|_|⟧ 16-18 ⟦|_|⟧
#3 ⟦|_|_|_|⟧ 20-22 ⟦|_|⟧
#4 ⟦|_|_|_|⟧ 24-26 ⟦|_|⟧
#5 ⟦|_|_|_|⟧ 28-30 ⟦|_|⟧
#6 ⟦|_|_|_|⟧ 32-34 ⟦|_|⟧
#7 ⟦|_|_|_|⟧ 36-38 ⟦|_|⟧
#8 ⟦|_|_|_|⟧ 40-42 ⟦|_|⟧
#9 ⟦|_|_|_|⟧ 44-46 ⟦|_|⟧
#10 ⟦|_|_|_|⟧ 48-50 ⟦|_|⟧

#11 ⟦|_|_|_|⟧ 52-54 ⟦|_|⟧
#12 ⟦|_|_|_|⟧ 56-58 ⟦|_|⟧
#13 ⟦|_|_|_|⟧ 60-62 ⟦|_|⟧
#14 ⟦|_|_|_|⟧ 64-66 ⟦|_|⟧
#15 ⟦|_|_|_|⟧ 68-70 ⟦|_|⟧
#16 ⟦|_|_|_|⟧ 72-74 ⟦|_|⟧
#17 ⟦|_|_|_|⟧ 76-78 ⟦|_|⟧
#18 ⟦|_|_|_|⟧ 80-82 ⟦|_|⟧
#19 ⟦|_|_|_|⟧ 84-86 ⟦|_|⟧
#20 ⟦|_|_|_|⟧ 88-90 ⟦|_|⟧

#21 ⟦|_|_|_|⟧ 92-94 ⟦|_|⟧
#22 ⟦|_|_|_|⟧ 96-98 ⟦|_|⟧
#23 ⟦|_|_|_|⟧ 100-02 ⟦|_|⟧
#24 ⟦|_|_|_|⟧ 104-06 ⟦|_|⟧
#25 ⟦|_|_|_|⟧ 108-10 ⟦|_|⟧
#26 ⟦|_|_|_|⟧ 112-14 ⟦|_|⟧
#27 ⟦|_|_|_|⟧ 116-18 ⟦|_|⟧
#28 ⟦|_|_|_|⟧ 120-22 ⟦|_|⟧

No. of __additional__ STOPS:

⟦|_|_|⟧ 124-25

[None = 00]

C. Time exited: ⟦|_|_|⟧ : ⟦|_|_|⟧ 1 = A.M 2 = P.M. [127-30 131-35=blank]

D. Record from observation:
(a) Who is the visitor with?   136

O 1.Alone   O 5.Child(ren)
O 2.One other adult   O 6.School group
O 3.Adult(s)& Child(ren) O 7.Tour group
O 4.Friends/peers/same age group

(b) How old is the visitor?   ⟦|_|_|⟧ 138-9

O 0-5   O 18-19   O 45-54
O 6-11   O 20-24   O 55-64
O 12-14   O 25-34   O 65 and over
O 15-17   O 35-44

(c) What is the visitor's cultural/racial/ethnic identity?   141

O 1. Afr Amer/Black   O 4. Caucasian
O 2. Am Ind/AK Native   O 5. Hispanic/Latino
O 3. Asian/Pac Islander O 6. Other:_____

(d) Gender [Circle] 1 Male 2 Female   143

Problem?0=No 1=Yes: Explain on reverse 145

Administrative Information

Location: O 1.NZP O 2.ZA O 3.DZ   147
Status: O 1.Tracked O 2. NIA   149

Month: ⟦|_|_|⟧ 151-2 *Date:* ⟦|_|_|⟧ 154-5

Day: ⟦|_|_|⟧ [01=Su ... 07=Sa]   157-8

Circle Shift   1   2   3   160

Interval: ⟦|_|_|⟧ 162-63

Interviewer. No. ⟦|_|_|⟧ 165-6

A-14

Appendix B.

Design and Implementation of the 1991 and 1992 Studies of the Reptile Discovery
Centers Project at the National Zoological Park, Zoo Atlanta and the Dallas Zoo

Introduction

This appendix contains a detailed discussion of the design for studies of the Reptile Discovery Centers Project conducted in 1991 and 1992. These studies are part of a series conducted by the Institutional Studies Office to profile visitors to Smithsonian museums and the zoo, increase our knowledge of the visit experience and provide information for future exhibition planning. Each of these studies has been tailored to the particular needs of a client and the resources available for the study. In what follows, the rationale for the sample design, the contents of the questionnaire, and the results of survey implementation are discussed.

From the inception of the Reptile Discovery Centers (RDC) Project, it was clear to the participating zoo staffs that an experiment of this magnitude could not be conducted without a formal assessment plan, in addition to the informal assessment techniques used in developing the interactive activities and materials. It was also apparent that the main emphasis of the formal studies should be on a comparison of the visitor experience both <u>before</u> and <u>after</u> the opening of the RDCs. During the development phases of the RDC components, staff at the NZP used selected groups of visitors to try out activities and prototypes before final fabrication. Here, the discussion is restricted to the formal assessment of the Reptile RDCs undertaken by the three zoos and the Institutional Studies Office (ISO).

Study Design and Implementation

A study to assess if and how the visitor experience in the reptile houses changed as a result of introducing the RDC components needed to consider the demographic and social characteristics of visitors, their prior experience with the specific zoo, their reasons for coming to the zoo and the reptile house, their sources of information and orientation to the general topic. A possible design for the study would have been to interview visitors after they visited the building (Exit Survey). Most objective information (e.g., personal background) does not change as a result of a visit. However, subjective information -- precisely what we want to measure if there is a cognitive, behavioral or affective change -- cannot accurately be collected "after the fact." Individuals' ability to accurately report retrospectively about what they knew, did, thought or felt both *before* and *after* viewing an exhibition leads us into the complexities of human behavior well beyond a short interview. A more credible design was to interview visitors both before *and* after an experience. To avoid experimental effects, and since we were interested in aggregate rather than individual results, interviews could be conducted with different individuals at the two time points.

Conducting an Entrance Survey and an Exit Survey after the opening of the RDCs, however, would have left major questions unanswered. Specifically, assuming we detected changes as a result of the visit experience, could they be attributed to the RDC configuration? Or, alternatively, could changes be the result of simply visiting reptile houses without the RDC components? Thus, our final design called for a set of six studies, conducted over two years. In 1991, we conducted a baseline Entrance Survey and a baseline Exit Survey using personal interviews. In addition, we conducted a Tracking Study to observe, unobtrusively, the behavior of individuals in the buildings. Similarly, in 1992 we replicated the same two surveys (Entrance and Exit) and the Tracking Study.

The design allowed for several comparisons. First, by comparing 1991 Entrance and Exit Survey results, we could measure the impact, if any, of the Reptile Houses on visitors. Any change could be attributed to the experience itself. The data from the 1991 Tracking Study provided a baseline of how visitors behaved in the buildings. Then, by comparing 1992 Entrance and Exit Survey results, we could measure the impact of the Reptile Discovery Centers, if any. A comparison of change from the two years could genuinely be attributed to the RDCs. The data from the 1992 Tracking Study, showing how visitors behaved in the RDCs, could be compared to the 1991 baseline study.

Overall Survey Design.

The Zoo Studies were conducted simultaneously at all three sites (NZP, ZA and DZ). The personal interviews, from five to ten minutes in duration, were conducted with systematically selected samples of individuals over three consecutive weeks. Depending on the time of day and day of the week, interviewers intercepted visitors at predetermined intervals. These intervals ranged from every 3rd to every 25th, based on previously collected information about visitor flows. Visitors were interviewed prior to entering the reptile houses (Entrance Survey) and as they exited (Exit Survey). Personal interviews took place at the main entrance and exit points from the buildings. In addition, visitors were observed as they made their way through the reptile houses; the time they spent in the building and in front of various exhibits was recorded (Zoo Tracking Study).

1991 Data Collection. The actual data collection extended from Sunday, September 19, through Sunday, October 12, 1991, using a systematic survey schedule encompassing all hours from 10:00 am through 6:00 pm and all seven days of the week. (The schedules for 1991 and 1992 are at the end of this Appendix.) Zoo staff and contractors, and members of school groups making formal tours were excluded from the study. During the 21 survey days, we estimate that approximately 50,917 individuals passed our three interviewing locations during the hours in which interviewing was conducted. From these, 1,206 individuals were selected for the Entrance Survey, 1,287 for the Exit Survey and 536 were selected for the Tracking Survey.

1992 Data Collection. Similarly, the actual data collection in 1992 extended from Sunday, September 27, through Sunday, October, 19, and also used a systematic survey schedule encompassing all hours from 10:00 am through 6:00 pm and all seven days of

the week. Again, zoo staff and contractors, and members of school groups making formal tours were excluded from the study. During the 21 survey days, we estimate that approximately 27,373 individuals passed our three interviewing locations during the hours in which interviewing was conducted. From these, 1,067 individuals were selected for the Entrance Survey, 773 for the Exit Survey and 480 were selected for the Tracking Survey.

Cooperation rates among intercepted visitors were quite high; for the Entrance Survey, 84.9% and 90.5% for 1991 and 1992, respectively; for the Exit Survey, 84.0% and 85.6% for the two years, respectively. Table B.1 shows the results of the data collection for both years.

To conduct interviews and track, teams of two or three individuals -- one or two interviewers and a team leader -- worked during two time blocks per day. The team leader had two major responsibilities: (a) to count and record the number of persons, of all ages, entering during fifteen-minute intervals, and (b) to identify every n^{th} person entering a designated "space," and tell interviewers whom they should intercept or track. An imaginary line was selected near each of the interviewing locations to clearly define when they entered the "space." The team leader recorded the ongoing tally and time on a Sample Selection Form with the help of a mechanical counter and a stop watch. The details of Sample Selection are described below.

Sample Selection

Background. Selecting appropriate samples of museum/zoo visitors for study presents a multitude of problems. A way to summarize the problem is to point out that museum/zoo visitors are "mobile populations" and cannot be sampled in the same way that members of households, students in classrooms, or other groups with known characteristics are selected for study. These members of the general public are in transit and, from the point of view of sample designs, similar to shoppers in a mall, travelers in airports or railroad stations or users of public libraries. In all cases, they can only be defined as a population because they are in a particular space at a particular time.[1]

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[1] This discussion is indebted to Graham Kalton, Sampling Flows of Mobile Human Populations," in *Proceedings of Statistics Canada Symposium 90: Measurement and Improvement of Data Quality,* October 1990.

Table B.1
Results of Data Collection: 1991 and 1992

	NZP		ZA		DZ		1991	1992
	1991	1992	1991	1992	1991	1992	All	All
Entrance Surveys								
Intercepts	445	333	519	448	242	286	1206	1067
Complete	376	286	358	332	191	208	925	826
Refusal	58	28	74	36	33	23	165	87
R-Hurry	44	14	48	29	22	16	114	59
R-Language	11	9	5	4	6	2	22	15
R-No Reason	3	5	21	3	5	5	29	13
Employee	0	3	12	15	9	26	21	44
No Interview Available	11	16	75	65	9	29	95	110
Rates (Percent)								
Refusal Rate*	13.4	8.9	17.1	9.8	14.7	10.0	15.1	9.5
Response Rate**	86.6	91.1	82.9	90.2	85.3	90.0	84.9	90.5
Completion Rate***	84.5	86.7	70.6	76.7	82.0	80.0	78.1	80.7

	NZP		ZA		DZ		1991	1992
	1991	1992	1991	1992	1991	1992	All	All
Exit Surveys								
Intercepts	467	358	583	228	237	187	1287	773
Complete	374	279	381	157	175	130	930	566
Refusal	72	53	68	21	37	21	177	95
R-Hurry	56	43	56	16	25	13	137	72
R-Language	12	7	3	1	4	2	19	10
R-No Reason	4	3	9	4	7	6	20	13
Employee	0	3	5	11	13	17	18	31
No Interview Available	21	23	129	39	12	19	162	81
Rates (Percent)								
Refusal Rate*	16.1	16.0	15.1	11.8	17.5	13.9	16.0	14.4
Response Rate**	83.9	84.0	84.9	88.2	82.5	86.1	84.0	85.6
Completion Rate***	80.1	78.6	65.9	72.4	78.1	76.5	73.3	76.3

*Refusals/(Refusals+Completes) **100-Refusal Rate ***Completes/(Refusal+Completes+NIA)

	NZP		ZA		DZ		1991	1992
	1991	1992	1991	1992	1991	1992	All	All
Tracking Surveys								
Attempted	324	274	451	322	184	156	959	750
Completed	195	186	208	188	133	106	536	480
	519	460	659	510	317	262	1495	1230
Completion Rate****	60.2	67.9	46.1	58.4	72.3	67.9	55.9	64.0

****Subject to interviewer availability, no refusals

Before 1992, with the exception of a long-term survey, the *1988 National Air and Space Museum (NASM)Survey*, Institutional Studies Office surveys employed a relatively simple systematic random sample design. First, each visitation day was divided into several equal time intervals. A schedule was then constructed which ensured, within resource constraints, that interviewing took place at least once within each time interval on each day of the week.[2]

Within the time intervals, selection of respondents is complicated by variation in visitor flow. Conventional wisdom and observation clearly indicate that visitor flow varies across time intervals (e.g., more visitors on Saturday afternoon than on Monday morning) and within an interval (e.g., different sizes of groups, single individuals, etc.). Further, our selection method is clearly influenced by a need to make full use of available resources (interviewers) while maintaining a probability sample within each time interval.

Our general approach was to count visitors as they entered (or exited) the interviewing site, select visitors according to a predetermined sample selection interval (every n^{th} person) for a systematic sample, and ask that person to complete an interview. Choosing the selection interval has to be done so that there is always an interviewer available to interview the next person selected. Clearly, if the interval is very large, this will always be the case. However, large intervals mean that interviewers will not be occupied for long periods of time, leading to inefficient use of resources and few completed interviews. If the interval is too small, interviewers cannot interview selected respondents. Depending on the anticipated number of visitors, based on available data and observations, we tried to set selections intervals that optimized interviewer activity within any given time period.

To account for the fact that interviewers would sometimes not be available to interview selected respondents, the counter would also be required to record some basic facts about the "missed respondents." Clearly, this approach led to some inefficiencies and possible sample bias. Further, since the selection interval was frequently changed at the beginning of different time intervals within a given study, weights were needed in the survey analysis. Nevertheless, in spite of its drawbacks, this approach was used for all aspects of the Zoo Studies.[3]

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[2] In more technical language, the sampling frame is a list of time interval/site primary sampling units (PSUs). Rather than select a sample of PSU's and then respondents within them, we attempt systematic coverage of all PSU's and then select respondents within PSU's.

[3] In 1992, a review of studies led ISO to use a sampling strategy which calls for "continuous interviewing." This strategy was first devised for the NASM Survey. As in the case of selecting respondents based on a fix sampling interval, this approach entails using one person to count and one or two interviewers. However, the "sampling interval" varies according to on-site visitor flow and detailed contextual data are collected which provide the basis for weighting the final samples. In the 1992 Zoo Studies, we decided to continue to use the sample selection technique that was used in 1991 to avoid confusion and the need to re-train interviewers that had worked on the studies previously.

Specific Field Instructions for Selecting Respondents

Below we provide the instructions that were actually used for selecting respondents for the 1991 and 1992 zoo studies. As indicated above, the quality of the survey data depends on correctly identifying respondents to be interviewed. An interviewing team was composed of one person who selected visitors to be interviewed by counting systematically and up to three interviewers. The counter was designated as the Team Leader. A team could not rotate its members within a scheduled interviewing time block (Session).

Overall Approach. The Team Leader (counter) for each 120 minute interviewing Session had two major responsibilities: (1) To count on a mechanical counter and record the number of all persons entering the [specific location] or leaving the [specific location][4]; and (2) To select respondents and tell the two Interviewers whom they should intercept (or track).

This task was undertaken with the aid of a Sample Selection Form, a mechanical counter, and a watch. Counts of visitors were recorded on the Form by 15 minute intervals. (An example of the Sample Selection Forms used in the studies is on the next page.) In addition, when intercepts were made, the number on the counter ("Count Number") was recorded by both the Team Leader on the Sample Selection Form and by the interviewer on the questionnaire to be used.

Specific Steps (excerpted directly from the Training Manuals).

(1) The Team Leader fills out the administrative information at the top of the Sample Selection Form before the interviewing hour begins. This is done before the data collection begins. The names of the interviewers are also recorded, as is the shift (1 = morning hours, 2 = mid-day and 3 = afternoon) and the sampling interval. The weather can be described in two or three words; e.g., rainy/cool, 90° and humid, etc. The team members set their watches to the same time.

(2) The interviewers each have about ten to fifteen questionnaires on a clipboard. The administrative information at the end of each questionnaire is filled out partially before the hour starts on approximately eight of the questionnaires.

(3) The Team Leader stands at a designated location near the entrance or exit at which interviewing is to take place. We assume a hypothetical line which separates the "entrance interviewing area" from the "building area" or the "exit interviewing area" from the exhibition exit. These hypothetical lines are shown to interviewers.

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[4] Since this study called for Entry Surveys, Exit Surveys and Tracking, the time schedule was established so that the probability of interviewing the same visitors was minimized.

Sample Selection Form: *1992 Zoo Studies*: [Entrance Survey]

Date: *Sept 24*   Team Leader: *Ann*
Day: *Tuesday*   Interviewer #1 *Lassa*
Weather *Rainy*   Interviewer #1 *Elizabeth*
Shift: 1 **2** 3   Interviewer #3 .
                         Interval: *15*

Line[5]	Time	Int. #1	Int #2	Int #3	Groups	Total Count
Y N	12:00	15/45	30			47
Y N	12:30	75	60/90		80 est. 115	
Y N	1:00	120/150	135			151
Y N	1:30	180	165			183

#105   NIA[6] #1___ *F*_____ *30ish*____ *Alone*____ *White*____ *Iowa*____
                         M/F   Age   Who With Ethnic   From
          NIA #2_____
                         M/F   Age   Who With Ethnic   From
          NIA #3_____
                         M/F . Age   Who With Ethnic   From

Team Leader: *Ann*   Interviewer #2 *Lassa*
Interviewer #1 *Elizabeth*   Interviewer #3
                         Interval: *10*

Line	Time	Int. #1	Int #2	Int #3	Groups	Total Count
Y N	2:00	10	20/30			33
Y N	2:30	40	50			53
Y N	3:00	60/70	80			82
Y N	3:30	100	90			105

          NIA #1_____
                         M/F   Age   Who With Ethnic
          NIA #2_____
                         M/F   Age   Who With Ethnic
          NIA #3_____
                         M/F   Age   Who With Ethnic

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[5] Column used only in 1992 to indicate whether or not a line was present at the Reptile Discovery Center entrance.

[6] Line used for recording information about "missed respondents, when an interviewer was not available (NIA)" e.g., in this example, respondent #105.

(4)   The counter is set at zero (0) at the start of the Session and two interviewers stand by ready to begin. When the [n^{th}] person to cross the line is identified by the Team Leader, Interviewer #1 moves out to intercept. When the count reaches 2n, Interviewer #2 moves out to intercept and so forth. In other words, when there is just one interviewer, he/she tries to interview every n^{th} (the interval for that hour) visitor. When two or three interviewers are available, they alternate. The interval is set by the Team Leader in such a way as to adjust to varying visitor traffic at the zoo. Thus, during very slow morning hours, the interval may be 5 (i.e., every 5th person will be interviewed). However, during very busy weekend hours the interval may be as high as 50 (i.e., every 50th person will be interviewed or observed).

(Team Leaders start counting from the person furthest away from them and continue counting inward along the hypothetical line. If two people are crossing the line at the same time when the Team Leader is ready to identify the person, the closest person to the interviewer is selected for interview.)

(5)   The Team Leader continues to count the flow of visitors.

(6)   When either interviewer returns after completing an interview, and is ready to begin the next interview, the Team Leader identifies the next person to approach the line as the next respondent. The Team Leader notes the "Count Number" and records it on the Sample Selection Form under the interviewer's name. The interviewer also records the number on the next blank questionnaire and moves out to intercept the identified respondent.

(7)   After 15 minutes, the Team Leader writes the number of visitors recorded on the counter ("Count Number") on the Form in the column titled "Count" for that 15 minute segment. The mechanical counter is not re-set.

(8)   The Team Leader continues to provide "Count Numbers" every time interviewers indicate that they are ready to "intercept." The interviewer always writes down a "Count Number" on the next blank questionnaire. There is only one exception when the interviewer does not intercept the next person approaching the line. The exception is described below.

(9)   If the next person approaching the line is a child that is part of an escorted school group or an adult in a clearly led tour group, he/she is not to be interviewed.[7]

    (a)   The Team Leader at this point stops counting, writes a "G" in the column marked Groups on the Sample Selection Form and estimates the size of the Group.

    (b)   After the Group passes, the Team Leader continues counting and then assigns the next person to the interviewer.

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[7]   This exclusion means that our counts reflect "voluntary" visitors and exclude those who are clearly part of a group. In practice, school groups and docent led tours are thus excluded.

(10) If both interviewers return to the Team Leader at the same time, he/she handles them sequentially. In other words, a "Count Number" is given to the first interviewer and he/she is sent out. Then a "Count Number" is given to the second interviewer and the next person is intercepted. These two "Count Numbers" should be at least 3 people apart.[8]

(11) The above procedure continues until the end of the Session.

(12) At the end of the Session, the interviewers put their used questionnaires in numeric order (i.e., those with assigned Count Numbers) and give them to the Team Leader. He/she reconciles the number of questionnaires with the assignments on the Sample Selection Form. For example, if the assigned Count Numbers on the Sample Selection Form are as shown on the attached example for an Entrance Survey, 21 questionnaires should exist with those corresponding numbers (e.g., 15, 30, 45, etc.).

(13) <u>Other Exceptions</u>.

    (a) <u>Young Children</u>. If the nth person approaching the line is a child and is clearly under 12, he/she is to be interviewed with adult permission or, if it is a very young child (under 6) and unable to answer, the adult is asked for limited information about the child.

    (b) No Interviewer Available (NIA). If the zoo is unusually busy, an interviewer may not be available when the nth person is identified (i.e., the interviewer will be conducting an interview or observing). Should this happen, the Team Leader tries to record a few salient facts about the missed individual on the Sample Selection Form. The following line appears on the form:

NIA#1_____
     M/F   Age   Who With   Ethnic   From
Where..
M/F =   Gender of the missed respondent
Age =   Interviewer estimate of age
Who With = Interviewer observation of who is accompanying the respondent
From =   If possible, respondents are asked where they live
Ethnic =   Interviewer observation

<u>Summary of Field Instructions</u>. The systematic, unbiased and orderly selection of respondents was the primary responsibility of the Team Leader. In order to provide the information necessary for other aspects of the study, the Team Leader was also responsible for recording the number of persons who enter (Entrance Survey or Tracking) or exit (Exit Survey) during the 15 minute intervals of each Session. Everyone, except those in escorted groups, was counted. The interviewers were responsible for intercepting and interviewing respondents as well as recording

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[8] This qualification prevents two individuals from a given social group from being interviewed. In practice, when visitation is extremely low the Team Leader may change the interval to two people apart.

administrative information on each questionnaire. In appreciation for participating in the interview, interviewers also gave respondents a zoo sticker. In data processing, weights were assigned to each questionnaire based on the Count (selection interval) used during each session. After the weights were assigned, the computer-generated sum of weights from the questionnaires was compared to the sum shown on each Sample Selection Form.

Questionnaire Development

The assumption underlying the questionnaire development was that we needed to have comparable data for both 1991 and 1992. We also felt that each question should be designed in conjunction with some of the hypotheses we wanted to test. The questionnaire is summarized below; the actual documents are in Appendix A.

The initial portion of the interview questionnaire, in both years and in both the Entrance and Exit Surveys was designed to collect general information about the visit. Aside from asking for the frequency of (Q. 1-2) and the reason for the visit to the zoo (Q.7) and how much time the visitor planned to spend at the zoo (Q.8), we also wanted to understand the visitor's main reason for coming to the Reptile Building area (Q.9) and familiarity with it (Q.10) as well as experience with similar institutions (i.e., natural history museums, other zoos and aquaria) (Q. 3-5). After establishing some rapport with the visitor, we asked questions about their first impressions of reptiles (Q.11), descriptions of reptiles (Q.12), and feelings about reptiles (Q.13).

The interview included a set of questions requesting standard demographic characteristics, as collected in ISO studies over the past years: social composition of the visit group (Q.6), educational attainment, age, residence, cultural/racial/ethnic identity, and gender (Q. 29-33). As part of the background series, we asked several questions about experience with reptiles (Q.25-27). In the background questions, the response categories for "city" and "surrounding area" (Q. 31) were different at each of the three zoos. At NZP, we used "Washington, D.C." and "Suburbs in MD/VA." At ZA, we "Metro Atlanta and "Georgia, excluding Metro Atlanta." At DZ, we used "Dallas/Fort Worth Metroplex Area" and "Texas, excluding Dallas/Fort Worth."

Every effort was made to collect comparable information, although some questions had to differ slightly in structure between the Entrance and Exit questionnaires and between the 1991 and 1992 surveys. In both years, Question 14 asked about activities in the buildings. In the Entrance Survey, visitors were asked which activities they would like to do; in the Exit, which they had actually done and to provide examples. In 1991, on both Entrance and Exit Surveys, Question 15 asked respondents to express interest in "some things that might be included in the new reptile exhibit." In 1992, the Entrance Survey version of Q.15 asked for expressions of interest in interactive modules actually in the RDC, while the Exit Survey asked which two of the interactive modules interested them the most.

Both the 1991 and 1992 questionnaires included two questions which were specific to the Exit Survey. Q.9A asked for the visitor's perception of how much time they spend in

the building and Q.16 which asked "which exhibits or other things that you saw or did would you like to tell a friend about?"

The Tracking Study form was straightforward (see Appendix A). Interviewers recorded the time at each stop made by a visitor, as well as specific characteristics about the stop. By definition, a stop began with a physical stop and continued until the person was no longer looking at a specific exhibit, that is, engaging in behavior clearly related to looking at a reptile/amphibian or exhibition-related material. (For example, stopping to tie a shoe, pick up a toy for a child, etc. are not stops.) Further, a stop was defined as being no less than 5 seconds in length. No notation was made if the stop was to view a reptile; however, if the visitor was clearly observing an animal being fed or a person doing something with an animal a notation was made. In 1992, stops at RDC components and demonstrations were also recorded. In addition, the interviewer recorded some visitor characteristics by observation (social composition of the visit group, age, residence, cultural/racial/ethnic identity, and gender.

As part of questionnaire development, a Training Manual was written specifically for the studies. At each zoo, training sessions were conducted, and interviewers were provided with a chance to conduct several "practice" interviews before the study began. To ensure continuity and consistency in training, two ISO staff member conducted the sessions at NZP and one traveled to Dallas and Atlanta both years.

Respondent Refusal: Patterns of Response Bias in the 1991 and 1992 Zoo Studies

Introduction. As shown above in Table B.1, not everyone who was intercepted for the Entrance Survey and the Exit Survey participated in the study. We explored the differences between respondents who participated and those who refused to participate in the 1991 or 1992 Entrance or Exit Surveys, at each zoo, for several reasons. First, we wanted to assure our readers that the results were not biased in any significant way; if they were, the limitations on the analyses needed to be spelled out. Second, any discernible differences between interview sites (NZP, DA, or DZ) would have an impact on comparisons and needed to be identified.

Third, the amount of data we collected was unwieldy both for analysis and for presentation. A review of the questionnaire shows that many of the characteristics collected in both the Entrance Survey and Exit Survey were extraneous to the visit experience; i.e., could not change as a result of visitors being in the reptile buildings. Since our interviewing samples were selected so as to eliminate the possibility of an individual being included in both the Entrance and Exit Survey, it is technically correct to combine (or "pool) the data from these samples. Pooling is appropriate, however, only if there are no statistically significant differences between the two sets of data being pooled, i.e., if there is no response bias between Entrance and Exit Survey for a specific site in a given year.

Table B.2. Interviewing Schedule for 1991 Zoo Studies

Date	Day	Shift : NZP and DZ		
		1	2	3
		9:30 a.m.-11:30 a.m.	12:00 p.m.-2:00 p.m.	2:30 p.m.-4:30 p.m.
		Shift : ZA		
		1	2	3
		10:30 a.m.-12:30 a.m.	12:45 p.m.-2:45 p.m.	3:00 p.m.-5:00 p.m.
22-Sept	Sunday	TRacking	ENTrance	EXit
23-Sept	Monday	ENTrance	EXit	TRacking
24-Sept	Tuesday	EXit	TRacking	ENTrance
25-Sept	Wednesday	TRacking	ENTrance	EXit
26-Sept	Thursday	ENTrance	EXit	TRacking
27-Sept	Friday	EXit	TRacking	ENTrance
28-Sept	Saturday	TRacking	ENTrance	EXit
29-Sept	Sunday	ENTrance	EXit	TRacking
30-Sept	Monday	EXit	TRacking	ENTrance
1-Oct	Tuesday	TRacking	ENTrance	EXit
2-Oct	Wednesday	ENTrance	EXit	TRacking
3-Oct	Thursday	EXit	TRacking	ENTrance
4-Oct	Friday	TRacking	ENTrance	EXit
5-Oct	Saturday	ENTrance	EXit	TRacking
6-Oct	Sunday	EXit	TRacking	ENTrance
7-Oct	Monday	TRacking	ENTrance	EXit
8-Oct	Tuesday	ENTrance	EXit	TRacking
9-Oct	Wednesday	EXit	TRacking	ENTrance
10-Oct	Thursday	TRacking	ENTrance	EXit
11-Oct	Friday	ENTrance	EXit	TRacking
12-Oct	Saturday	EXit	TRacking	ENTrance

Table B.3 Interviewing Schedule for 1992 Zoo Studies

Date	Day	Shift : NZP and DZ 1 9:30 a.m.- 11:30 a.m.	2 12:00 p.m.- 2:00 p.m.	3 2:30 p.m.- 4:30 p.m.
		Shift : ZA 1 10:30 a.m.- 12:30 a.m.	2 12:45 p.m.- 2:45 p.m.	3 3:00 p.m.- 5:00 p.m.
27-Sept	Sunday	TRacking	ENTrance	EXit
28-Sept	Monday	ENTrance	EXit	TRacking
29-Sept	Tuesday	EXit	TRacking	ENTrance
30-Sept	Wednesday	TRacking	ENTrance	EXit
1-Oct	Thursday	ENTrance	EXit	TRacking
2-Oct	Friday	EXit	TRacking	ENTrance
3-Oct	Saturday	TRacking	ENTrance	EXit
4-Oct	Sunday	ENTrance	EXit	TRacking
5-Oct	Monday	EXit	TRacking	ENTrance
6-Oct	Tuesday	TRacking	ENTrance	EXit
7-Oct	Wednesday	ENTrance	EXit	TRacking
8-Oct	Thursday	EXit	TRacking	ENTrance
9-Oct	Friday	TRacking	ENTrance	EXit
10-Oct	Saturday	ENTrance	EXit	TRacking
11-Oct	Sunday	EXit	TRacking	ENTrance
12-Oct	Monday	TRacking	ENTrance	EXit
13-Oct	Tuesday	ENTrance	EXit	TRacking
14-Oct	Wednesday	EXit	TRacking	ENTrance
15-Oct	Thursday	TRacking	ENTrance	EXit
16-Oct	Friday	ENTrance	EXit	TRacking
17-Oct	Saturday	EXit	TRacking	ENTrance

As background, we compared all of the available characteristics, of both respondents and those who refused to participate, at each zoo and for each survey. For the "refusal" group, the data were obtained directly from visitors whenever possible and indirectly through interviewer observations. The data include gender, age, cultural/racial/ethnic background, residence and the social composition of the visit group. Our preliminary analysis indicated that only minor differences were present between the characteristics of those who were interviewed upon entering and those who were interviewed upon exiting a particular reptile building in a given year. To complement the analysis of discrete characteristics, we conducted a multivariate analysis of respondent refusal to participate in the 1991 or 1992 Exit or Entrance Surveys in order to identify statistically significant predictors of respondent refusal by each survey subgroup (Entrance, Exit) and the total or "pooled" sample (combined Entrance and Exit subgroups) of each zoo site for the years 1991 and 1992.

These multivariate procedures, known as *logistic regression models*,[9] essentially reveal the simultaneous effects of the available demographic characteristics on non-participation in the survey. The results of the multivariate analysis, which controls for all specified indicators, represent the unique or "net" contribution of each variable on the likelihood of refusing to participate. The multivariate model examines all of the variables available for respondents and non-respondents. Here, the multivariate results are summarized as the net effect of the respective variable on the probability of non-participation. The effect is expressed in two ways, as a raw logistic regression coefficient, and as a more easily interpretable "percent change" statistic (ΔP). The percent change statistic represents the amount of change in the probability of a sampled individual deciding not to participate in the survey due to a particular variable.

This can best be illustrated with an example. First, assume a set of hypothetical groups of respondents. For portions of each group, we assume similarity in the age distribution, gender, racial/ethnic makeup, social composition; however, residence varies. In the bias models reported for the 1991 NZP samples (Table B-4), Foreign Residence is statistically significant. The percent change statistic for Foreign Residence is 4.65 percent. As our dependent variable is "Non-Participation," a positive percent change means that, for individuals in the 1991 NZP samples, being a Foreign Resident increases the probability of non-participation by 4.65 percent compared to residents of the United States.

As one can see in Tables B-4 and B-5 there is little evidence of substantial participation bias. Of the three zoos, only NZP has statistically significant models for both 1991 and 1992. The Dallas Zoo has a significant model for 1991, and Zoo Atlanta has a significant model for 1992. The presence of only modest participation bias obviates the need to

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[9]Logistic regression analysis is the statistical technique used to estimate the multivariate models. It is a causal technique, based on a maximum likelihood (non-linear) procedure, that calculates the independent effects of each specified exogenous variable on the log-odds of the probability of participation in the survey. Unlike ordinary least squares (OLS) regression, logistic regression permits the specification of a dichotomous dependent variable, e.g., non-participant or participant. Moreover, logistic coefficients can be transformed into easy-to-interpret proportional change statistics.

statistically adjust ("re-weight") the sample to compensate for the observed non-random fluctuations in the distribution of reported characteristics.

In each model, five sets of characteristics were tested: gender, racial/ethnic identification, residence location, age (measured as five categories: 0 to 11 years, 12 to 19 years, 20 to 34 years, 35 to 54 years, and 55 years and older), and social composition of the visiting group. All of the characteristics were coded into dichotomous variables, so that the resulting statistics represent the percentage change in the probability of non-participation for persons in a specified category versus everyone not in that category (e.g., all persons aged 0 to 11 years versus all persons age 12 and older).

Determinants of Respondent Refusal: 1991

Table B-4 reports the significant models for the 1991 samples. As noted above, there were statistically significant models for the 1991 NZP samples and the 1991 Dallas Zoo samples. The model for the 1991 Zoo Atlanta samples was not significant (X^2 = 20.830, Df = 13, p= 0.0764).

National Zoological Park. Although NZP had the lowest refusal rate of the three sites; a total of 13.4 percent at the Entrance and 16.1 percent at the Exit, two characteristics are statistically significant: residence location and age. First, being a resident of a foreign country increases the probability of an individual not-participating by 4.65 percent (compared to residents of the United States). This is a relatively small increase that is common in ISO studies conducted in Washington. Typically, this effect reflects language differences between interviewer and respondent.

The effect of age (being under 12 years old) is slightly more complicated to interpret. As can be seen in Table B-4, being under 12 years old reduces the probability of non-participation by 8.79 percent. Because this is the only effect due to age, it can be interpreted as a 8.79 percent increase in the probability of non-participation for persons 12 years old and older.

Dallas Zoo. In Dallas, a total of 16.1 percent of those "intercepted" at the Entrance and at the Exit were not interviewed; this includes those who declined to participate due to language problems, time constraints, or lack of interest. For the Dallas Zoo, three characteristics are significant: racial/ethnic identification, residence location, and the social composition of the visiting group. Being a member of a racial/ethnic minority group increased the probability of non-participation by 3.02 percent, and visiting the Reptile House alone increased the probability of non-participation by 6.84 percent.

The effect of residence location is similar to the effect of age in the NZP model. Living in the United States but outside of Dallas and its suburbs reduces the probability of non-participation by 8.44 percent. This means that the probability of non-participation for visitors living in the Dallas Metro area and visitors living outside of the United States increases by 8.44 percent.

Determinants of Respondent Refusal: 1992

The follow-up survey of 1992 replicated the data collection design of the previous year. Overall, the response rates improve; the response rate rose at all interview sites. In terms of "pooling" the interviews, with very few exceptions, the pattern of respondent refusal was consistent by interview location; the small sample size of the location subgroups is most likely responsible for the few inconsistencies.

Table B-5 contains models for the 1992 samples. Here, there are statistically significant models for the NZP and the Zoo Atlanta samples. The model for the 1992 Dallas Zoo sample was not significant ($X^2 = 8.513$, Df = 9, p = 0.4834).

The National Zoological Park. Although NZP increased its overall participation rate, its improvement lagged behind the other two zoos; the most noticeable improvement occurred in the NZP Entrance Survey. Less than one-tenth (8.9%) of those intercepted at the Entrance and nearly twice as many at the Exit (16.0%) or a total of 12.5 percent did not participate in the survey.

At NZP one characteristic, age, was significant. As in 1991, being under age 12 reduces the probability of non-participation by 6.46 percent. This means that persons age 12 and older were 6.46 percent more likely to decline when asked to participate in the survey than were the younger children.

Zoo Atlanta. The participation rate of visits at Zoo Atlanta was somewhat higher. A total of 10.4 percent of the visit sample was either ineligible or declined to answer the survey questionnaire.

At Zoo Atlanta two characteristics were significant: gender and residence location. Being female increased the probability of non-participation by 4.06 percent. The effect of residence is similar to that of the Dallas Zoo in 1991. Living in the United States, but outside of Georgia (in the Zoo Atlanta surveys Atlanta was defined as the "Central City" and the rest of the state of Georgia was defined as the "Suburbs"), reduced the probability of non-participation by 3.70 percent. This means that being either a Georgia resident or a resident of a foreign country increased the probability of non-participation by 3.70 percent.

Table B.4 Results of Regression Models : Probability of Refusal, by Location - 1991

	National Zoological Park						Dallas Zoo					
	Initial Model			Final Model			Initial Model			Final Model		
Variable	Coefficient	P-Value	% Change	Coefficient	P-Value	% Change	Coefficient	P-Value	% Change	Coefficient	P-Value	% Change
INTERCEPT	2.2726	0.0004	11.34	1.5557	0.0001	15.88	1.9144	0.0185	14.39	1.9604	0.0001	14.39
Gender												
FEMALE	0.0105	0.9636	-0.05				0.2395	0.4229	-1.53			
(MALE)												
Racial/Ethnic ID												
MINORITY	-0.1928	0.5250	0.71				-0.7036	0.0365	4.01	-0.5430	0.0853	3.02
(NON-MINORITY)												
Residence Location												
(CENTRAL CITY)												
SUBURBS	-0.0425	0.9281	0.21				-0.1540	0.6926	0.74			
OTHERUS	0.1464	0.7529	-0.76				1.8748	0.0239	-9.06	1.7656	0.0257	-8.44
FOREIGN	-1.3938	0.0097	3.56	-1.3011	0.0001	4.65	1.8110	0.1821	-3.31			
Age												
0 TO 11	1.3961	0.0064	-7.87	1.2465	0.0001	-8.79	-0.0363	0.9636	0.16			
12 TO 19	-0.1330	0.8014	0.34				0.4297	0.6720	-1.22			
20 TO 34	0.1763	0.6670	-0.87				-0.2082	0.7664	1.33			
35 TO 54	0.0258	0.9513	-0.11				-0.3261	0.6543	1.85			
(55 AND OVER)												
Social Composition												
ALONE	-0.9747	0.0870	2.04				-2.6672	0.0006	7.19	-2.5532	0.0001	6.84
COUPLE	-0.3413	0.4135	1.47				0.3390	0.5688	-1.66			
ADKIDS	-0.4882	0.2027	2.63				0.1322	0.7891	-0.79			
TOURS	-0.7022	0.2969	1.25				-0.2299	0.8478	0.34			
(GROUP OF FRIENDS)												
Gamma	0.3530	0.0002		0.5700	0.0001		0.3650	0.0017		0.5050	0.0001	
N Cases	820			888			424			424		

*1991 Zoo Atlanta model was not significant (Chi Square = 20.830, Df = 13, p= 0.0764). On file, ISO.

Table B.5 Results of Regression Models : Probability of Refusal, by Location - 1992

Variable	National Zoological Park						Zoo Atlanta					
	Initial Model			Final Model			Initial Model			Final Model		
	Coefficient	P-Value	% Change	Coefficient	P-Value	% Change	Coefficient	P-Value	% Change	Coefficient	P-Value	% Change
INTERCEPT	1.6740	0.0178	12.95	1.3887	0.0001	17.28	1.5213	0.0040	17.30	1.5225	0.0001	20.59
Gender												
FEMALE	-0.0288	0.9069	0.16				-0.4784	0.0455	3.66	-0.4688	0.0257	4.06
(MALE)												
Racial/Ethnic ID												
MINORITY	-0.5291	0.0845	2.51				0.4638	0.2317	-2.26			
(NON-MINORITY)												
Residence Location												
(CENTRAL CITY)												
SUBURBS	-0.4940	0.3504	3.02				0.3430	0.2784	-2.05			
OTHERUS	-0.2597	0.6264	1.53				0.6293	0.0399	-4.27	0.4916	0.0528	-3.70
FOREIGN	-0.9862	0.1160	2.76				-0.9721	0.0664	2.48			
Age												
0 TO 11	1.5982	0.0030	-9.94	0.9271	0.0015	-6.46	0.3939	0.4992	-2.33			
12 TO 19	0.9225	0.1484	-3.20				0.5515	0.4674	-2.05			
20 TO 34	0.2910	0.5262	-1.62				-0.4622	0.3390	3.50			
35 TO 54	0.6613	0.1621	-3.75				-0.5082	0.3098	3.43			
(55 AND OVER)												
Social Composition												
ALONE	0.3235	0.6896	-0.62				-0.4049	0.5960	0.77			
COUPLE	0.5567	0.1826	-2.56				0.5022	0.1677	-3.20			
ADKIDS	-0.0835	0.7901	0.47				0.4762	0.1314	-3.63			
TOURS	1.4180	0.1906	-3.59				0.4459	0.4732	-1.31			
(GROUP OF FRIENDS)												
Gamma	0.3550	0.0132		0.4330	0.0006		0.3320	0.0029		0.2150	0.0121	
N Cases	633			683			578			607		

*1992 Dallas Zoo model not significant (Chi Square = 8.513, Df = 9, p = 0.4834). On file, ISO.

Appendix C

Supplementary Tabulations and Technical Notes

Introduction

This appendix contains supplementary tabulations for Sections II, III and V, as well as technical notes and detailed analyses. Sequential numbers have been assigned to the tables, corresponding to main text sections. For example, Table C.2.1 is the first supplementary table for Section II, Table C.5.2 is the second supplementary table for Section V, etc.

Note on the Statistical Methods

The statistical results presented in this report are supported by a range of analytic procedures designed to uncover differences in the demographic composition of visitor populations, differences in the experiences of visitors to the Reptile Discovery Centers (RDCs), and differences in the opinions of visitors due to their interaction with RDC interactives.

In the main text, some of the statistical tests not illustrated by graphic displays have been noted. In all cases, the analytic strategies and statistical tests employed in the text were driven by the measurement characteristics of the underlying variables. For analyses of categorical variables, e.g., gender, race, past visitation patterns, reason for visit, etc., the primary method of analysis used was the examination of cross-tabulations and the primary test of statistical significance used was the Chi-Square test.

For analysis of the means of continuous variables, e.g., the Reptile Affect Score, stop time, visit time, number of stops, etc., three methods were used. When differences were examined by a dichotomous variable, e.g., year of the study (1991 or 1992), ownership of a pet reptile, readership of natural history publications, etc., T-tests were used. When differences were examined by a categorical variable with more than two categories, the general linear model --a variant of the analysis of variance that does not require equal cell sizes across the categories of the independent variable-- was employed. The overall test of significance for this model is the F-distribution. Tests for significant differences of individual categories of the independent variable, e.g., to determine whether the average number of stops is different at one zoo compared with the other two, the Tukey's Studentized Range test was used.

Finally, to assess the simultaneous effects of a set of independent variables on a particular dependent variable, Ordinary Least-Squares (OLS) linear regression was used. The procedure estimates a model regression line based on the joint distribution of values of the dependent variable and each independent variable in the model. Two statistical tests are used to assess the fit of the regression line, an F-test for the overall fit of the model to the data, and T-tests for the effects of individual independent variables. Because these models are descriptive rather than predictive, extensive analysis of the overall measure of fit, the R-square term, has been omitted.

C-1

In the assessment of the relation between demographic categories and the type of stop visitors made (in Section V and Appendix D), and in the assessment of response bias (in Appendix B) logistic regression models were estimated. These models are linear regression models that transform dichotomous dependent variables (e.g., whether a visitor stopped at an exhibit station) into continuous probability values. The resulting coefficients measure changes in the probability of an event occurring due to a unit change an the independent variable. For these models, the test of overall fit is a maximum-likelihood Chi-Square test. For the effects of individual independent variables, a T-test is used.

In all cases, the level of significance was established at the .01 level, although occasionally the .05 level was used. The combination of statistical tests and analysis support the presentation and interpretation of results in the text of the report. As always, readers with further questions about the analyses and their implications are encouraged to contact the Institutional Studies Office directly.

Weighted and Unweighted Number of Respondents

As noted in Appendix B, since the respondent selection interval was frequently changed at the beginning of different time intervals within a given study, weights were needed in the survey analysis.[1]

The use of weighted data allows for the extrapolation of the sample results to the population of Zoo and RDC visitors (who entered or exited during the hours of data collection). The percentages reported in the tables in the appendices, and used in constructing the figures in the text, are based on weighted data.

The application of the weights violates most of the data assumptions behind the standard statistical tests. Consequently, all statistical tests and modeling reported here were performed on unweighted data. (If, for example, weighted data were used in the tests of significance, the effect of each observation would be greatly exaggerated. Since the purpose of most of the tests used is to measure differences between actual and expected results, only actual observations can be used with validity.)

To avoid misinterpretation, sample sizes (N's) are not reported at the bottom of tables (unweighted or weighted). However, for the more technically oriented reader we have included a table showing the various sample and subsample size (Table C.1).

Notes

Visitation Patterns. Even though, as discussed in Section III, proximity to zoos, natural history museums and aquaria clearly influences individual visitation patterns, the cumulative experience of visiting these types of institutions is a useful measure of visitor background and interest in animals generally, and in reptiles in particular.

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[1] Interviewers varied the selection criteria based on the different flow levels at various times of the day and days of the week. The changing selection interval attempts to accommodate these differences.

When we combined data collected from visitors about the frequency of visits to the zoos under study (NZP, ZA and DZ), other zoos, natural history museums and aquaria for the twelve months before they were interviewed, 54 separate patterns of museum/zoo visits were produced. At one extreme, these patterns describe visitors making their first visit to a study zoo and no visits to any other zoos, natural history museums or aquaria in the year prior to their interview. At the other extreme, we find individuals who visited a study zoo at least twice as well as visiting all of the other institutions each twice in the past year. For simplicity, these visitation patterns were collapsed into five general categories (See Figure 3.4), *New/Seldom/* Visitation (44.7% of all respondents), *Infrequent* Visitation (22.3%), *Moderate* Visitation (16.3%), *Frequent* Visitation (8.5%) and *Regular* Visitation (8.2%).[2]

As one might expect, these patterns vary significantly by study zoo and reflect the availability of each type of institution to an area's residents (see Figure C.1). For example, more than half (58.8%) of Zoo Atlanta respondents fell into the Seldom/New Visitation category, compared with 48.2 percent of Dallas Zoo respondents and 36.8 percent of the National Zoo respondents. This is primarily due to the lack of appropriate institutions in the Atlanta Metropolitan area (i.e., no "other" zoo to visit, no natural history museum within city limits at the time the studies were conducted, etc.). The presence of such institutions does not necessarily lead to Frequent or Regular Visitation. For the National Zoo respondents, individuals with ample opportunities to visit a wide variety of institutions, only 10.8 percent of visitors fell into the Frequent Visitation category and 10.0 percent fell into the Regular Visitation category.

As seen in Table C.3.2, the overall distribution of the visitation pattern does not vary systematically across most visitor demographic characteristics. For example, if we look at the racial and ethnic identification of visitors, 83.1 percent of all respondents identify themselves as white or Caucasian. For each of the visitation categories between 80.4 percent (New/Seldom Visitation) and 89.6 percent (Frequent Visitation) of respondents identified themselves in the same way.

The statistically significant differences in the visitation pattern that exist are highly specific. For example, they exist by racial/ethnic identification for visitors who live in central cities and who were interviewed while visiting the National Zoo and the Dallas Zoo. For central city residents interviewed at the National Zoo, over half (53.3%) of the minority group members fell into the New/Seldom Visitation category, compared with about one-fifth (20.5%) of non-minority visitors. Conversely, 6.2 percent of minority visitors fell into the Regular Visitation category, compared to 20.8 percent of non-minority visitors. None of the other residence categories showed statistically significant differences.

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[2]   The visitation pattern variable is the sum of responses to the individual visit variables (i.e., visits to the zoos under study, other zoos, natural history museums and aquaria. The variables were coded "0" if the respondent reported no visits to the specific institution in the past year, "1" if they had visited an institution once, and "2" if more than once. When combined, the individual pattern variables produce 54 distinct patterns, which fully describe respondent visits over the past year. When added together, these 54 patterns collapse into 8 different sums. The sums range from "8" for the person who was coded "2" for each of the 4 variables to "1" for the person who was a first time visitor to a study zoo. These sums were then coded into the five categories of visitation.

Figure C.1

Visitation Patterns, by Zoo and Total
(In Percent)
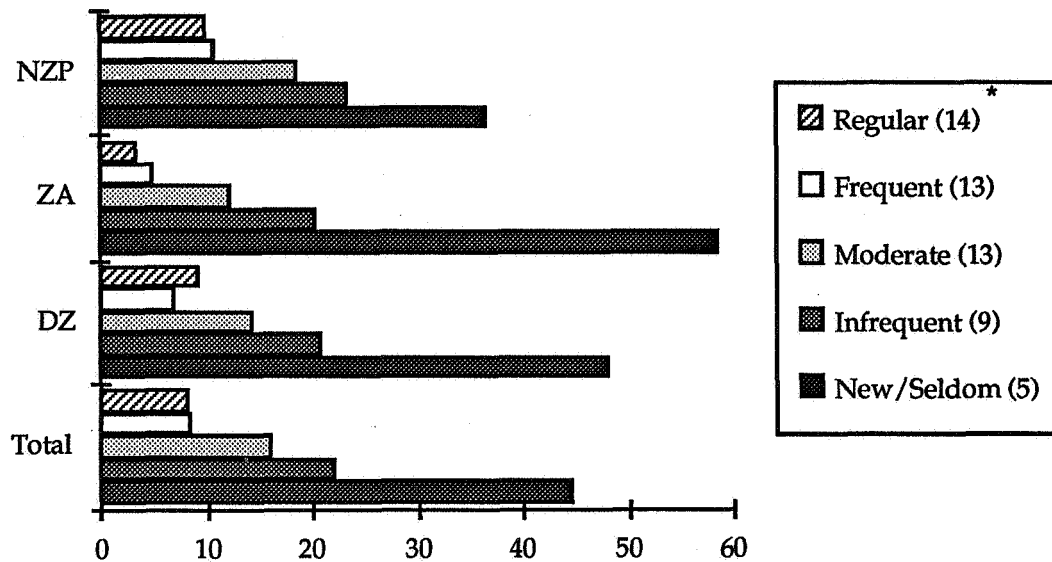
*Number of visitation patterns included in definition.

A similar situation applies to visitors to the Dallas Zoo, where 66.0 percent of minority visitors and 43.8 percent of non-minority visitors living in the Dallas/Fort Worth Metroplex fell into the New/Seldom Visitation category, compared to 3.2 percent of minority visitors and 11.4 percent of non-minority visitors falling into the Regular Visitation category. Visitors to Zoo Atlanta did not show statistically significant differences in visitation patterns by either race or residence location.

Finally, it should be noted that no significant differences in the Reptile Affect Scale score were found by visitation pattern.

Reason for Visiting Zoo. The variable that reported a respondent's reason for visiting the zoo, based on Q.7, was recoded into three general categories that identified individuals visiting the zoo because of an interest in natural history and animals (9.2% of all respondents), those visiting the zoo as part of an outing with friends or family or as part of an organized tour (43.4% of all respondents), and those on a general visit to the zoo (47.5% of all respondents). Reasons for visiting varied significantly by zoo;[3] 12.7 percent of visitors to the National Zoo were visiting because of an interest in natural history, compared to 4.8 percent of visitors to Zoo Atlanta and 5.2 percent of visitors to the Dallas Zoo (See Table C.3.3).

Although only 9.2 percent of all respondents were visiting their respective zoo because of their interest in natural history, these visitors were more likely than respondents on zoo outings or general visits to the zoo to have visited other natural history institutions in the past year: 11.2 percent of these visitors fell into the Regular visitation category,

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3     $X^2 = 106.55$, Df = 4, p <.001

compared with less than 9.0 percent of other visitors (8.7% for visitors on a zoo outing or tour, and 7.0% of visitors on a general zoo visit). On the other end of the scale, 40.7 percent of respondents visiting the zoo because of an interest in natural history fell into the New/Seldom visitation category, compared with 47.5 percent of respondents on a zoo outing and 43.3 percent on a general visit.[4] There were no significant differences in the relationship between reason for visiting a zoo and the overall visitation patterns by individual zoos.

Building Visit. Like the question that asked respondents about their reason for visiting the zoo, questions about why respondents were visiting the specific Reptile House in each zoo were collapsed into four general categories: visitors who were in the building to see a specific animal (17.1%), visitors who expressed a general interest in reptiles (34.7%), visitors on a general visit (34.9%), and those visiting the building for other reasons (13.2%).

Reason for visiting the reptile buildings also varies significantly by zoo[5]. In each zoo, over thirty percent of all visitors on average were in the reptile house because of their interest in reptiles (35.2 percent of visitors to the National Zoo, 31.9 percent of visitors to Zoo Atlanta, and 37.0 percent of visitors to the Dallas Zoo). At the National Zoo and Dallas Zoo these visitors were the largest group. At Zoo Atlanta, the largest group of visitors were those visiting the reptile building as part of a general visit to the zoo (43.8%).

Reason for visiting the reptile buildings varied significantly by the year of the survey[6]; in 1991, 28.7 percent of all respondents were visiting the buildings because of their interest in reptiles, and in 1992, 45.3 percent of respondents were visiting the reptile buildings for the same reason.

The changes across the two years in the percentage of individuals visiting the Reptile House because of an interest in reptiles are striking. At the National Zoo, the percentage nearly doubled (from 26.1% in 1991 to 49.7% in 1992), at Zoo Atlanta the percentage increased from 27.6 percent to 38.5 percent and at the Dallas Zoo the percentage increased from 30.4 percent to 47.4 percent.

While visitation patterns do vary significantly by the reasons for visiting the reptile buildings[7], these differences are not as pronounced as in the case of the reasons for visiting the zoo. Ten percent of respondents visiting the Reptile building because of an interest in reptiles fell into the Regular Visitation category, compared to 8.2 percent of respondents visiting the reptile buildings to see a specific animal, 6.5 percent of respondents on a general visit and 7.3 percent visiting for other reasons.

Reason for being in the building does not vary significantly by visitation pattern across individual zoos, or for each study year for individual zoos.

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[4]   ISO data on file.
[5] $X^2 = 57.41$, Df = 6, p<.001
[6] $X^2 = 119.20$, Df = 3, p<.001
[7] $X^2 = 38.15$, Df = 12, p<.001

Table C.1

Sample Sizes: Unweighted and Weighted, by Zoo, Year, Survey,
and Totals

Group	Total Intercepts		Total Completed		Age 0 to 11		Age 12 and Over	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
NZP 1991 Entrance	445	13445	376	11205	123	3965	253	7240
NZP 1991 Exit	467	13085	374	10635	115	3080	259	7555
NZP 1991 Total	912	26530	750	21840	238	7045	512	14795
NZP 1992 Entrance	333	6955	286	6065	83	1775	203	4290
NZP 1992 Exit	355	6568	279	5333	84	1675	195	3658
NZP 1992 Total	688	13523	565	11398	167	3450	398	7948
ZA 1991 Entrance	519	6424	358	4317	57	689	301	3628
ZA 1991 Exit	583	8293	381	5250	109	1775	272	3475
ZA 1991 Total	1102	14717	739	9567	166	2464	573	7103
ZA 1992 Entrance	448	6179	332	4775	76	1350	256	3425
ZA 1992 Exit	228	1493	157	1095	45	294	112	801
ZA 1992 Total	676	7672	489	5870	121	1644	368	4226
DZ 1991 Entrance	242	4760	191	3715	32	665	159	3050
DZ 1991 Exit	236	4910	175	3635	34	770	141	2865
DZ 1991 Total	478	9670	366	7350	66	1435	300	5915
DZ 1992 Entrance	286	3158	208	2290	57	621	151	1669
DZ 1992 Exit	187	3020	130	2494	38	455	92	2039
DZ 1992 Total	473	6178	338	4784	95	1076	243	3708
All 1991 Entrance	1206	24629	925	19237	212	5319	713	13918
All 1991 Exit	1286	26288	930	19520	258	5625	672	13895
All 1991 Total	2492	50917	1855	38757	470	10944	1385	27813
All 1992 Entrance	1067	16292	826	13334	216	3746	610	9588
All 1992 Exit	770	11081	566	8718	167	2424	399	6294
All 1992 Total	1837	27373	1392	22052	383	6170	1009	15882

Table C.2.1

Demographic Characteristics, by Zoo, Year and Totals

(In Percent)

Characteristics	National Zoo			Zoo Atlanta			Dallas Zoo			All Zoos 1991&1992
	1991	1992	Total	1991	1992	Total	1991	1992	Total	Total
Gender										
Male	52.0	49.4	51.1	48.2	41.7	45.8	43.9	50.7	46.5	48.7
Female	48.0	50.6	48.9	51.8	58.3	54.2	56.1	49.3	53.5	51.3
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Age										
0-5	17.7	13.4	16.2	7.6	8.6	8.0	5.0	9.9	6.9	12.1
6-11	9.2	12.3	10.3	11.1	13.5	11.9	10.1	8.4	9.5	10.6
12-14	2.6	3.7	3.0	3.6	3.1	3.4	1.6	4.9	2.9	3.1
15-17	2.0	2.4	2.2	1.7	1.6	1.7	0.4	1.1	0.7	1.7
18-19	2.4	1.7	2.1	2.2	3.5	2.7	2.0	2.8	2.3	2.3
20-24	7.5	8.5	7.8	10.0	9.6	9.9	14.5	12.2	13.6	9.6
25-34	28.3	23.1	26.5	31.5	29.0	30.6	35.0	34.6	34.9	29.3
35-44	16.9	19.1	17.7	18.4	17.6	18.1	19.2	15.6	17.8	17.8
45-54	6.6	9.7	7.6	7.3	7.5	7.4	6.7	5.8	6.4	7.3
55-64	4.0	4.2	4.1	3.8	4.1	3.9	3.8	2.9	3.4	3.9
65 and over	2.8	1.8	2.5	2.7	1.9	2.4	1.7	1.7	1.7	2.3
	100.0	99.9	100.0	99.9	100.0	100.0	100.0	99.9	100.1	100.0
Race/Ethnicity										
Caucasian/White	84.6	79.5	82.9	82.7	87.0	84.2	77.3	70.1	74.5	81.6
Afr. Amer./Black	6.4	9.8	7.5	12.2	9.9	11.4	5.6	7.2	6.2	8.3
Asian/Pac. Is.	4.7	5.7	5	1.9	2.0	1.9	1.1	1.3	1.2	3.4
Hispanic/Latino	3.9	4.8	4.2	2.7	1.1	2.1	15.7	21.1	17.8	6.4
Nat. Am/AK Native	0.4	0.2	0.3	0.5	0.1	0.3	0.3	0.2	0.2	0.3
	100.0	100.0	99.9	100.0	100.1	99.9	100.0	99.9	99.9	100.0

Table C.2.1 (cont.)

Characteristics	National Zoo			Zoo Atlanta			Dallas Zoo			All Zoos 1991&1992
	1991	1992	Total	1991	1992	Total	1991	1992	Total	Total
Education Level (All ages)										
Pre-school	20.0	14.2	18.0	9.0	10.5	9.7	7.2	10.9	8.5	14.0
Grade School	11.1	16.6	13.0	14.0	14.8	15.2	12.3	17.2	13.3	13.6
Some H.S.	4.0	4.0	4.0	4.1	6.3	4.0	4.8	3.8	5.4	4.3
High School	12.3	13.0	12.5	20.8	26.1	20.4	25.6	19.9	25.8	17.2
Some College	18.5	18.7	18.6	22.9	20.6	22.1	22.2	20.7	21.6	20.1
Bachelor's Degree	18.8	18.3	18.6	17.1	14.3	17.2	19.3	17.3	17.4	18.0
Some Grad Study	3.4	2.5	3.1	3.4	1.2	3.5	3.0	3.5	2.3	3.0
MA/MS/Ph.D	11.8	12.7	12.1	8.6	6.3	7.9	5.5	6.7	5.8	9.8
	99.9	100.0	99.9	99.9	100.1	100.0	99.9	100.0	100.1	100.0
Where Do You Live?*										
City/Metro	7.3	7.3	7.3	52.7	55.0	53.5	72.5	74.3	73.2	32.7
Suburb/State	41.1	44.5	42.3	23.8	21.8	23.1	17.8	16.9	17.5	32.2
Other, U.S.	46.8	42.2	45.2	21.6	20.6	21.2	8.6	7.3	8.1	31.5
Foreign	4.8	6.0	5.2	1.9	2.6	2.2	1.0	1.5	1.2	3.6
	100.0	100.0	100.0	100.0	100.0	100.0	99.9	100.0	100.0	100.0
Social Composition										
One adult	3.6	2.3	3.2	1.6	2.5	1.9	1.9	1.2	1.6	2.5
Two adults	18.1	16.6	17.6	16.3	20.2	17.7	17.3	16.9	17.2	17.5
Adult(s) & Child(ren)	63.1	60.9	62.3	61.3	61.5	61.4	68.4	62.0	66.0	62.8
Friends/peers	9.1	8.9	9.0	9.9	7.9	9.2	4.1	11.4	6.8	8.6
Adult & Child(ren)	3.7	7.7	5.1	6.9	3.9	5.8	6.5	7.0	6.7	5.6
School Group**	1.4	3.2	2.0	2.6	1.7	2.3	0.4	1.1	0.7	1.8
Tour Group**	1.0	0.4	0.8	1.3	2.3	1.7	1.4	0.5	1.0	1.1
Total	100.0	100.0	100.0	99.9	100.0	100.0	100.0	100.1	100.0	99.9

*NZP: City= Washington, D.C.; Suburbs= MD/VA Suburbs

ZA: City= Metro Atlanta; Suburbs= Georgia, excluding Metro Atlanta

DZ: City= Dallas/Ft.Worth Metro; Suburbs=Texas, excluding Dallas/Ft.Worth

**Members of school or tour groups who were visiting independently of their group; formal school and tour groups were excluded. See Appendix B.

Table C.2.2

Selected Demographic Tabulations, All Zoos

(In Percent)

Characteristics	One Adult	One Adult &Child(ren)	Two or more Adults &Child(ren)	Two or more Adults	School/Tour Tour Group*
Male	61.3	34.3	49.3	50.9	43.0
Female	38.7	65.7	50.7	49.1	57.0
Total	100.0	100.0	100.0	100.0	100.0

	Zoo Visitors Over 25	US Population Over 25
High School or Less	25.7	54.8
Some College/AA Degree	26.1	24.9
Bachelor's Degree/Some Grad.	31.7	13.1
MA/PhD/ Advanced Degree	16.6	7.2
	100.1	100.0

*Members of school or tour groups who were visiting
independently of their group; formal school and tour groups
were excluded. See Appendix B.

Table C.3.1

Table C.3.1
Background Characteristics, by Zoo, Year and Totals
(In Percent)

Characteristics	National Zoo			Zoo Atlanta			Dallas Zoo			All Zoos 1991&1992
	1991	1992	Total	1991	1992	Total	1991	1992	Total	Total
Visits to Zoo										
First Time	43.4	38.3	41.7	42.0	40.5	41.4	39.7	39.2	39.5	41.2
Repeat	[56.6]	[61.7]	[58.3]	[58.0]	[59.5]	[58.6]	[60.3]	[60.8]	[60.5]	[58.8]
In last year	20.7	30.1	23.8	21.7	27.9	24.0	21.4	27.9	24.0	23.9
1-2 years	18.0	13.7	16.6	18.6	13.7	16.8	16.5	14.0	15.5	16.4
2-3 years	3.2	3.6	3.3	4.2	5.2	4.6	4.2	5.9	4.9	3.9
3+ years	14.7	14.2	14.5	13.4	12.7	13.2	18.1	13.0	16.0	14.5
	100.0	99.9	99.9	99.9	100.0	100.0	99.9	100.0	100.0	100.0
Visits to Other Places										
Other Zoos										
None	61.2	55.4	59.2	69.0	68.9	68.9	53.2	55.2	54.0	60.7
One	26.7	29.0	27.5	22.9	21.9	22.5	31.7	32.5	32.0	27.1
Two +	12.1	15.7	13.3	8.1	9.2	8.5	15.0	12.3	14.0	12.2
	100.0	100.1	100.0	100.0	100.0	99.9	99.9	100.0	100.0	100.0
Nat. History Museums										
None	44.2	39.8	42.7	74.1	69.4	72.3	60.2	63.1	61.3	53.9
One	37.9	40.8	38.9	19.5	22.6	20.7	28.8	26.0	27.7	32.1
Two +	17.9	19.4	18.4	6.4	8.0	7.0	11.0	10.9	11.0	14.0
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Aquaria										
None	41.1	43.8	42.1	62.9	54.7	59.8	52.0	56.1	53.6	48.8
One	43.8	39.6	42.3	30.6	35.9	32.6	38.1	34.0	36.5	38.7
Two +	15.1	16.6	15.6	6.5	9.4	7.6	9.9	9.9	9.9	12.5
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table C.3.1 (cont.)

Characteristics	National Zoo			Zoo Atlanta			Dallas Zoo			All Zoos 1991&1992
	1991	1992	Total	1991	1992	Total	1991	1992	Total	Total
Reason for Reptile House Visit										
General Visit	32.9	25.9	30.3	42.5	45.7	43.8	35.0	34.5	34.8	34.9
Interest in Reptiles	26.1	49.7	35.2	27.6	38.5	31.9	30.4	47.4	37.0	34.7
To See a Specific Animal	22.7	9.9	17.9	20.0	5.1	14.2	26.4	7.6	19.0	17.1
With Someone Interested	18.2	14.5	16.6	9.9	10.7	10.1	8.2	10.6	9.1	13.2
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

"First Thing" said in response to word "Reptile"

	Entrance	Entrance	N/A	Entrance	Entrance	N/A	Entrance	Entrance	All Zoos 1991 Ent.	All Zoos 1992 Ent.
Accurate Description	3.2	5.5		0.9	2.9		1.4	3.5	2.2	4.2
Inaccurate Description	4.0	3.3		2.8	2.2		7.9	6.0	4.5	3.4
Positive Affect	0.0	0.0		0.3	0.4		0.2	0.0	0.1	0.2
Negative Affect	1.1	5.1		0.2	4.3		1.0	3.0	0.9	4.4
Says Snake/Snakes	58.5	50.0		62.2	59.3		34.4	54.4	53.6	54.3
Gives Species Name	7.6	10.7		15.5	12.3		16.1	7.8	11.7	10.7
Other Reptiles or Amphibians	25.6	25.4		18.1	18.5		39.0	25.3	27.0	22.8
	100.0	100.0		100.0	100.0		100.0	100.0	100.0	100.0

	Exit	Exit	N/A	Exit	Exit	N/A	Exit	Exit	All Zoos 1991 Exit	All Zoos 1992 Exit
Accurate Description	4.2	11.3		4.7	6.1		2.1	5.4	3.4	9.0
Inaccurate Description	1.2	2.3		1.0	2.8		3.3	3.8	1.6	2.8
Positive Affect	0.0	0.8		0.0	0.9		1.2	1.8	0.3	1.1
Negative Affect	0.0	5.4		2.2	12.4		3.4	7.4	2.4	7.0
Says Snake/Snakes	53.6	43.6		57.6	45.1		40.0	49.0	27.4	26.8
Gives Species Name	12.8	9.7		13.7	12.6		13.1	2.3	51.9	45.2
Other Reptiles or Amphibians	28.1	26.9		20.9	20.0		36.8	30.4	13.1	8.2
	99.9	100.0		100.0	100.0		100.0	100.0	100.0	100.0

Table C.3.1 (cont.)

Characteristics	National Zoo			Zoo Atlanta			Dallas Zoo			
	1991	1992	Total	1991	1992	Total	1991	1992		
Description of "Reptile"									All Zoos 1991 Ent.	All Zoos 1992 Ent.
	Entrance	Entrance	N/A	Entrance	Entrance	N/A	Entrance	Entrance		
Accurate Description	45.9	41.8		38.9	43.3		41.2	37.2	43.0	41.5
Inaccurate Description	38.9	35.9		37.8	32.5		35.0	31.0	37.7	33.8
Positive Affect	1.7	0.4		1.4	0.4		1.9	1.7	1.6	0.6
Negative Affect	7.5	6.9		10.3	9.4		11.3	9.8	9.1	8.3
Uses Word Snake(s)	3.0	6.0		4.1	9.1		3.2	6.3	3.8	7.2
Gives Species	0.0	0.8		0.2	0.4		0.0	0.2	0.1	0.6
Other Reptiles or Amphibians	1.1	5.4		1.8	3.5		3.0	9.2	1.2	5.4
Other	1.9	2.7		5.6	1.4		4.5	4.6	3.5	2.6
	100.0	100.0		100.0	100.0		100.0	100.0	100.0	100.0
									All Zoos 1991 Exit	All Zoos 1992 Exit
	Exit	Exit	N/A	Exit	Exit	N/A	Exit	Exit		
Accurate Description	39.8	45.0		39.1	47.1		36.3	38.3	38.8	43.6
Inaccurate Description	38.2	32.2		33.7	27.1		34.6	27.6	36.1	30.3
Positive Affect	2.3	1.9		2.9	0.0		2.0	2.3	3.8	1.7
Negative Affect	5.9	7.3		11.2	9.4		8.5	5.7	8.1	7.2
Uses Word Snake(s)	2.6	2.5		4.0	5.0		5.3	5.5	3.6	3.6
Gives Species	1.2	0.0		0.8	0.4		2.1	0.0	1.3	0.1
Other Reptiles or Amphibians	3.8	5.7		4.0	8.2		9.6	14.6	3.7	8.3
Other	6.1	5.4		4.3	2.7		1.6	6.0	4.6	5.2
	100.0	100.0		100.0	100.0		100.0	100.0	100.0	100.0
	1991	1992	Total	1991	1992	Total	1991	1992	Total	All Zoos 1991&1992
Pet Reptile?										
Yes	36.4	34.5	35.7	31.8	34.3	32.7	30.2	32.4	31.2	33.8
No	63.6	65.5	64.2	68.2	65.7	67.3	69.8	67.6	68.6	66.1
	100.0	100.0	99.9	100.0	100.0	100.0	100.0	100.0	99.8	99.9

Table C.3.1 (cont.)

Characteristics	National Zoo			Zoo Atlanta			Dallas Zoo			All Zoos 1991&1992
	1991	1992	Total	1991	1992	Total	1991	1992	Total	Total
Nature Program on Reptiles?										
Yes	84.0	82.9	83.6	84.6	85.6	84.9	81.2	73.2	78.2	82.8
No	14.7	15.8	15.0	14.9	13.3	14.3	18.8	26.0	21.5	16.3
Don't Know	1.3	1.3	1.3	0.5	1.2	0.7	0.0	0.8	0.3	0.9
	100.0	100.0	99.9	100.0	100.1	99.9	100.0	100.0	100.0	100.0
Horror Film With Reptiles?										
Yes	76.2	71.8	74.6	77.9	77.8	77.9	74.4	74.4	74.4	75.5
No	20.1	26.7	22.5	20.6	21.6	20.9	24.4	24.8	24.5	22.5
Don't Know	3.7	1.5	2.9	1.5	0.6	1.2	1.2	0.8	1.1	2.0
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Natural History or Science Magazines?										
Subscribe	30.9	29.3	30.3	24.6	26.9	25.5	17.7	24.8	20.4	26.8
Read	17.4	16.2	17.0	16.2	17.7	16.8	15.7	21.6	17.9	17.1
No	44.8	47.3	45.7	53.1	51.5	52.5	61.7	50.8	57.6	50.2
Previously	6.9	7.2	7.0	6.1	3.8	5.3	5.0	2.8	4.1	5.9
	100.0	100.0	100.0	100.0	99.9	100.1	100.1	100.0	100.0	100.0

Table C.3.2

<u>Visitation Categories by Selected Demographic Characteristics,</u>   <u>Total and Location,</u>
(1991 and 1992 combined, in Percent)

Characteristics	All Zoos Combined					
	New/Seldom	Infrequent	Moderate	Frequent	Regular	Total
<u>Gender</u>						
Male	48.6	51.1	49.7	54.4	46.0	49.6
Female	51.4	48.9	50.3	45.6	54.0	50.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
<u>Age</u>						
0-5	12.6	12.2	12.1	15.5	18.1	13.2
6-11	8.4	13.7	17.0	13.0	9.6	11.5
12-14	2.6	4.4	2.0	6.1	4.5	3.4
15-17	2.0	1.7	2.3	1.9	1.0	1.9
18-19	3.2	1.5	2.9	1.5	0.9	2.5
20-24	12.0	9.0	5.6	10.4	7.1	9.8
25-34	28.2	29.4	26.2	23.0	23.8	27.3
35-44	16.4	17.9	19.3	17.8	22.4	17.8
45-54	6.5	5.9	7.9	7.6	5.3	6.6
55-64	5.3	2.0	2.7	2.2	4.6	3.8
65+	2.5	2.3	1.9	1.0	2.7	2.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
<u>Racial/Ethnic Identity</u>						
Caucasian/White	80.4	82.9	85.9	89.6	85.4	83.1
African Amer./Black	9.6	9.2	7.4	4.7	5.6	8.4
Asian/Pacific Is.	6.9	5.0	5.1	4.1	5.8	5.9
Hispanic/Latino	2.9	2.6	1.4	1.5	1.5	2.3
Amer In./AK Nat.	0.3	0.2	0.3	0.2	1.7	0.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
<u>Education</u>						
Pre-school	13.5	13.5	12.3	16.2	15.1	13.6
Grade School	10.2	15.9	16.9	16.6	14.4	13.4
Some H.S.	6.1	3.4	1.8	4.5	1.6	4.3
High School	23.7	13.0	14.7	8.2	8.7	17.4
Some College	22.2	20.7	17.2	20.1	14.9	20.3
Bachelor's Degree	15.8	17.6	22.2	20.1	21.9	18.1
Some graduate Study	2.3	3.5	3.3	2.5	5.4	3.0
MA/Ph.D./Advanced	6.5	12.3	11.6	11.8	17.9	10.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

Table C.3.2 (cont.)

	All Zoos Combined					
	New/Seldom	Infrequent	Moderate	Frequent	Regular	Total
Residence						
City proper	36.7	30.8	27.4	23.8	28.9	32.1
Suburb/State	31.9	33.5	34.0	31.5	39.3	33.2
Other US	28.6	33.3	36.6	41.0	28.9	32.0
Foreign	2.8	2.3	2.1	3.7	2.9	2.7
Total	100.0	100.0	100.0	100.0	100.0	100.0

	National Zoological Park					
Gender						
Male	50.5	50.8	53.0	56.8	48.5	51.5
Female	49.5	49.2	47.0	43.2	51.5	48.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Age						
0-5	18.7	15.8	14.5	17.2	24.5	17.7
6-11	8.0	11.8	19.2	11.3	7.0	11.3
12-14	2.1	3.6	1.4	7.5	5.2	3.2
15-17	2.2	1.9	2.8	2.8	1.5	2.3
18-19	3.2	1.6	2.3	1.4	0.5	2.2
20-24	9.7	7.5	4.7	11.0	7.5	8.2
25-34	23.5	27.9	23.6	20.1	22.1	24.0
35-44	15.2	20.0	18.5	18.4	19.4	17.7
45-54	7.2	6.0	9.2	7.5	5.6	7.2
55-64	6.6	2.1	2.4	2.1	4.4	4.0
65+	3.5	1.8	1.5	0.7	2.3	2.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Racial/Ethnic Identity						
Caucasian/White	81.4	84.4	86.4	91.6	84.3	84.4
African Amer./Black	9.2	8.1	7.9	2.8	5.2	7.6
Asian/Pacific Is.	4.7	3.8	3.6	3.8	6.3	4.3
Hispanic/Latino	4.5	3.8	1.8	1.4	2.2	3.2
Amer In./AK Nat.	0.2	0.0	0.3	0.3	2.0	0.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

Table C.3.2 (cont.)

	National Zoological Park					
	New/Seldom	Infrequent	Moderate	Frequent	Regular	Total
Education						
Pre-school	19.9	16.4	14.4	17.5	19.9	17.8
Grade School	8.6	14.5	18.4	15.9	12.2	12.9
Some H.S.	5.6	3.2	1.9	4.7	2.5	3.9
High School	18.4	8.2	11.9	7.1	7.1	12.5
Some College	20.9	20.8	15.4	20.3	10.9	18.8
Bachelor's Degree	15.4	17.9	23.7	19.1	23.2	18.7
Some graduate Study	2.8	3.2	2.9	2.6	3.5	3.0
MA/Ph.D./Advanced	8.4	15.9	11.4	12.8	20.9	12.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Residence						
City proper	6.2	7.4	7.5	5.7	11.3	7.2
Suburb/State	42.0	44.0	43.0	41.0	50.5	43.4
Other US	47.4	45.7	47.0	49.4	34.5	45.9
Foreign	4.3	2.9	2.4	3.9	3.8	3.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

	Zoo Atlanta					
Gender						
Male	46.7	52.8	44.2	49.6	41.8	47.6
Female	53.3	47.2	55.8	50.4	58.2	52.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Age						
0-5	9.0	7.0	4.7	13.7	10.3	8.3
6-11	10.2	17.6	11.5	23.6	22.1	13.0
12-14	2.9	7.2	3.7	6.6	2.8	4.1
15-17	2.3	1.6	2.8	0.0	0.0	2.0
18-19	3.0	2.1	6.7	1.3	5.6	3.3
20-24	11.3	8.8	6.9	11.3	7.5	10.1
25-34	30.0	27.8	24.2	18.2	25.3	28.1
35-44	16.7	16.9	27.1	17.9	18.4	18.1
45-54	7.2	5.9	7.7	2.7	3.2	6.6
55-64	5.1	1.6	1.8	4.8	2.8	3.9
65+	2.3	3.6	2.9	0.0	1.9	2.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

Table C.3.2 (cont.)

	Zoo Atlanta					
	New/Seldom	Infrequent	Moderate	Frequent	Regular	Total
Racial/Ethnic Identity						
Caucasian/White	85.1	82.2	86.2	82.8	78.4	84.3
African Amer./Black	11.2	15.2	10.0	14.6	9.4	12.0
Asian/Pacific Is.	1.4	1.4	2.7	2.0	7.5	1.8
Hispanic/Latino	1.8	1.2	1.1	0.7	0.9	1.5
Amer In./AK Nat.	0.5	0.0	0.0	0.0	3.8	0.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Education						
Pre-school	9.4	9.0	7.0	16.1	12.2	9.4
Grade School	11.9	21.2	11.4	28.4	23.1	15.0
Some H.S.	5.4	1.8	2.8	2.1	0.0	4.0
High School	24.3	16.3	20.7	7.4	3.2	20.7
Some College	23.3	23.1	15.9	18.6	21.6	22.1
Bachelor's Degree	17.3	16.1	22.0	11.3	18.0	17.3
Some graduate Study	1.9	5.4	5.9	1.7	13.1	3.5
MA/Ph.D./Advanced	6.4	7.1	14.4	14.5	8.8	8.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Residence						
City proper	53.2	57.4	51.8	52.1	35.6	53.2
Suburb/State	26.5	21.7	18.2	15.6	32.8	24.2
Other US	18.3	19.5	27.9	29.8	28.7	20.6
Foreign	2.0	1.4	2.1	2.4	2.8	2.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
	Dallas Zoo					
Gender						
Male	47.7	49.8	43.9	48.7	40.9	47.0
Female	52.3	50.2	56.1	51.3	59.1	53.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Age						
0-5	5.7	7.9	11.5	10.1	3.1	7.1
6-11	6.5	14.5	15.4	10.7	11.1	10.2
12-14	3.2	3.2	2.6	0.0	3.1	2.9
15-17	1.3	1.2	0.0	0.0	0.0	0.9
18-19	3.7	0.8	1.1	1.8	0.0	2.2
20-24	18.1	13.5	7.4	7.1	5.8	13.7
25-34	35.1	36.2	37.4	39.4	28.0	35.3

(cont.)

Table C.3.2 (cont.)

	Dallas Zoo					
	New/Seldom	Infrequent	Moderate	Frequent	Regular	Total
Age (cont.)						
35-44	18.4	12.7	13.6	15.4	33.3	17.7
45-54	4.1	5.7	3.7	12.5	5.3	5.1
55-64	3.0	2.2	5.1	0.0	5.8	3.2
65+	0.9	2.2	2.0	3.0	4.4	1.8
Total	100.0	100.0	100.0	100.0	100.0	100.0
Racial/Ethnic Identity						
Caucasian/White	71.1	79.5	83.7	86.9	92.1	77.7
African Amer./Black	7.8	5.4	2.9	3.6	4.7	6.0
Asian/Pacific Is.	19.8	13.5	12.9	7.1	3.3	15.1
Hispanic/Latino	1.2	0.7	0.3	2.4	0.0	0.9
Amer In./AK Nat.	0.1	1.0	0.3	0.0	0.0	0.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Education						
Pre-school	6.3	10.2	11.1	10.9	3.2	7.9
Grade School	10.6	13.8	18.2	9.7	16.5	12.9
Some H.S.	7.9	6.0	0.0	5.7	0.0	5.5
High School	33.6	23.7	18.2	13.3	16.1	26.3
Some College	23.0	17.8	24.6	20.6	22.9	22.0
Bachelor's Degree	14.2	18.6	17.3	32.0	20.2	17.3
Some graduate Study	1.7	2.0	1.7	2.4	6.9	2.3
MA/Ph.D./Advanced	2.6	8.0	8.9	5.4	14.2	5.9
Total	100.0	100.0	100.0	100.0	100.0	100.0
Residence						
City proper	74.2	69.0	70.9	73.3	76.9	72.8
Suburb/State	19.4	16.3	19.2	6.5	9.8	16.9
Other US	5.6	12.9	9.3	16.0	12.9	9.1
Foreign	0.8	1.9	0.6	4.2	0.4	1.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

	All Zoos Combined*					
	New/Seldom	Infrequent	Moderate	Frequent	Regular	Total
Reason for Building Visit						
To See Specific Animal	11.7	11.9	15.1	14.0	14.7	12.7
Reptile Interest	33.7	34.4	41.3	39.0	42.9	36.2
General Visit	42.7	38.5	31.2	31.4	29.8	38.1
Other	11.9	15.2	12.5	15.5	12.6	13.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

*Chi-Square= 40.847 DF = 12 p = 0.000

Table C.3.3

Selected Background Characteristics

(In Percent)

	National Zoo 1991&1992	Zoo Atlanta 1991&1992	Dallas Zoo 1991&1992	All Zoos 1991&1992 Total
a. Frequency of Visits, Repeat Visitors Only				
1-2 in last yr	24.1	26.4	25.9	25
3-9 in last yr	14.1	12.1	12.2	13.3
Over 10 in last yr	2.7	2.5	1.6	2.4
1-2 yrs ago	28.4	28.7	25.7	27.9
2-3 yrs ago	5.7	7.8	8.1	6.7
3+ yrs ago	24.9	22.5	26.5	24.7
Total	99.9	100	100	100
b. Main Reason for Zoo Visit				
General visit/General interest	47.7	43.8	45.7	46.3
Natural History Interest	12.7	4.6	5.2	9.2
Read/Heard about it	1.2	0.9	1.4	1.2
Tour/school tour	3.2	3.6	1.7	3.0
Outing with family/ friends/guests	30.1	35.2	42.8	33.9
Bringing a person to see something	2.3	1.8	2.5	2.2
Special event	2.7	10.1	0.8	4.2
Total	100	100.0	100.0	100.0

c. Visits to Study Zoo and "Other Zoos"

Category	Percent of Visitors
First Visit	
No Other Zoos in Last Yr	22.5
One Other Zoo in Last Yr.	13.1
Two or more Zoos in Last Yı	5.7
Sub-total	[41.3]
Not First Visit	
No Other Zoos in Last Yr	38.2
One Other Zoo in Last Yr.	14.0
Two or more Zoos in Last Yı	6.5
Sub-total	[58.7]
Total	100.0

d. Activities of Interest, Entrance Survey

Activity	Percent of All Responses
Stop and Look	26.7
Discover	22.4
Examine	15.1
Find answer	11.2
Read	10.8
Try activity	9.1
Discussion	4.9
	100.0

Table C.3.4
Reptile Affect Scale Scores and Selected Characteristics, All Zoos
1991 and 1992 Entrance Survey Only

(In Percent)

Reptile Scale Score	Characteristics					Total Distribution
	Age	Gender	Pet Reptile?	Subscribed or Read?	Visit Reasons	
					Reptile Interest or To See a	
	6 to 19	Male	Yes	Yes	Specific Animal	1991
Extremely dislike	1.1	2.5	1.9	4.6	3.3	10.4
two	0.1	1.6	0.8	2.9	1.4	4.9
three	0.7	2.0	1.6	3.4	2.3	8.4
four	0.5	1.7	1.1	2.5	2.7	5.8
five	2.7	5.5	2.8	6.1	6.3	3.3
six	2.6	8.6	5.2	8.6	7.5	28.0
seven	1.1	3.7	2.1	2.4	2.6	4.7
eight	2.3	6.2	4.7	5.9	5.3	10.5
nine	1.5	3.3	2.7	3.4	3.6	5.7
Like a lot	8.3	10.5	8.7	10.4	11.7	18.5
Subtotal	[20.9]	[45.7]	[31.6]	[50.2]	[46.8]	100.0
					General Visit	Total
	Age				or with Someone	Disribution
	20 and over	Female	No	Neither	Interested	1992
Extremely dislike	9.7	8.2	8.9	6.2	7.4	11.0
two	4.9	3.4	4.3	2.1	3.6	5.1
three	6.6	5.1	5.7	3.9	4.8	5.4
four	5.0	3.8	4.4	3.0	2.8	5.0
five	10.4	7.4	10.4	6.9	6.8	26.7
six	15.8	9.9	13.1	9.6	10.9	5.2
seven	5.3	2.6	4.3	4.0	3.7	8.5
eight	9.0	5.0	6.0	5.1	5.9	12.2
nine	4.4	2.4	3.1	2.4	2.1	5.9
Like a lot	8.1	6.5	8.2	6.6	5.3	15.0
Subtotal	[79.1]	[54.3]	[68.4]	[49.8]	[53.2]	100.0
Total	100.0	100.0	100.0	100.0	100.0	

Table C.5.1
Supplementary Tabulations, 1991 and 1992, Exit Survey

	1991 Exit	1992 Exit		1991 Exit	1992 Exit
Q.14 Activities in which Respondent Participated			**Specificity of Activity Examples, Specific Replies Only, by Education**		
Stop and Look	30.9	35.2			
Try activity	1.4	9.9	Less than High School	12.3	32.17
Read	20.0	22.1	HS Grad./Some College	9.32	40.45
Examine	21.4	12.4	Bachelor's/Some Grad.	8.52	42.53
Discussion	1.5	3.9	MA/PhD/Adv. Degree	6.25	49.25
Find answer	7.2	2.9			
Discover	<u>17.5</u>	<u>13.5</u>	**Q.16 Things to Tell a Friend About..**		
	100.0	100.0	Positive Affect	11.5	22.3
			Negative Affect	8.8	3.9
Q.16 Subject of Activity Examples			Mentions Other Reptiles or Arr	37.8	28.7
			Says Snake or Snakes	14.2	11.5
Behavior	16.5	7.7	Other		2.5
Internal Anatomy	1.1	13.5	Description	<u>27.8</u>	13.4
Physiology	0.0	1.3	Modules		<u>17.7</u>
Reproduction	2.1	5.5		100.1	100.0
Conservation	0.0	0.3			
Feeding	5.0	8.6	**Q.16 Modules Mentioned**		
External Morphology	54.2	32.8	Communication: Lizard Talk		3.3
Locomotion	3.2	0.7	Communication: Frog Talk		3.2
Husbandry/Zoo	0.5	0.3	Communication: Snake Talk		22.4
Communication	0.0	14.3	Feeding: Snake		13.8
Natural History	12.5	9.0	Lizard Feeding		0.7
Classification	<u>5.0</u>	<u>6.1</u>	Attitudes: How Feel		9.9
	100.0	100.0	Reproduction: Eggs & Babies		9.9
			Looking: Reading Animals		7.2
			Thermoregulation: Hot and Cold		5.3
			Internal Anatomy: What's Inside?		<u>24.4</u>
					100.0

Reptile Affect Scale	1991 Entrance	1991 Exit	Reptile Affect Scale	1992 Entrance	1992 Exit
Extremely dislike	10.4	13.3	Extremely dislike	11.0	9.9
two	4.9	3.8	two	5.1	2.8
three	8.4	7.3	three	5.4	3.9
four	5.8	5.1	four	5.0	7.0
five	3.3	5.4	five	26.7	23.8
six	28.0	23.2	six	5.2	4.3
seven	4.7	3.5	seven	8.5	9.1
eight	10.5	11.3	eight	12.2	12.0
nine	5.7	6.8	nine	5.9	6.0
Like a lot	18.5	20.3	Like a lot	15.0	21.1

Table C.5.1 (cont.)
Supplementary Tabulations, 1991 and 1992, Exit Survey

Location	Mean/ Std.Dev.	1991 Entrance	1991 Exit	Reptile Affect Scale	1992 Entrance	1992 Exit
National Zoo						
	Mean	5.99	5.98		6.03	6.48
	Std. Dev.	2.85	2.99		2.64	2.81
Zoo Atlanta						
	Mean	5.79	5.77		5.46	5.92
	Std. Dev.	2.93	3.22		3.02	2.97
Dallas Zoo						
	Mean	6.02	6.34		5.77	5.98
	Std. Dev.	2.81	3.07		2.82	3.08
Total						
	Mean	5.91	5.96		5.73	6.20
	Std. Dev.	2.87	3.11		2.85	2.92

Table C.5.2
Activities, by Age and With and Without Children
1991 and 1992 Exit Survey Only, All Zoos (In Percent)

Activity	1991	1992	1991	1992	1991	1992	1991	1992	1991	1992
	0 to11	0 to11	12 to17	12 to17	18 to 24	18 to 24	25 to 44	25 to 44	45 and over	45 and over
Stop and Look	43.7	48.3	46.6	44.1	39.2	40.4	40.1	37.9	41.7	34.2
Examine	7.5	10.3	9.6	8.8	12.9	10.6	13.4	11.8	12.2	12.1
Discover	15.0	4.6	8.2	8.8	12.5	16.3	12.5	13.2	12.8	14.8
Find Answer	9.4	5.7	8.2	1.5	5.0	2.1	4.9	3.7	4.5	4.0
Discuss	3.1	5.7	1.4	2.9	0.8	4.3	1.9	2.9	0.3	4.7
Try Activity	2.4	13.8	1.4	7.4	0.8	4.3	0.7	7.6	1.0	6.0
Read	18.9	11.5	24.7	26.5	28.8	22.0	26.4	22.9	27.4	24.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Activity	Without Children	With Children	Without Children	With Children	Without Children	With Children	Without Children	With Children	Without Children	With Children
	0 to11	0 to11	12 to17	12 to17	18 to 24	18 to 24	25 to 44	25 to 44	45 and over	45 and over
Stop and Look	38.1	51.5	50.0	40.9	36.7	48.8	37.9	38.0	37.8	29.9
Examine	19.0	7.6	12.5	6.8	11.2	9.3	14.3	10.7	12.2	11.9
Discover	9.5	3.0	4.2	11.4	17.3	14.0	14.3	12.8	14.6	14.9
Find Answer	9.5	4.5	0.0	2.3	2.0	2.3	2.1	4.3	1.2	7.5
Discuss	4.8	6.1	4.2	2.3	5.1	2.3	2.1	3.2	0.0	10.4
Try Activity	9.5	15.2	8.3	6.8	5.1	2.3	2.1	9.9	3.7	9.0
Read	9.5	12.1	20.8	29.5	22.4	20.9	27.1	21.2	30.5	16.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Activity,	Age Group	Chi-Sq.	DF	p(Chi-Sq.)		Age Group	Chi-Sq.	DF	p(Chi-Sq.)
by Age Gp	0 to 11	26.921	6	0.0001		24 to 44	54.182	6	0.0000
and Year:	12 to17	6.730	6	0.3466		45 and Ovr	21.198	6	0.0017
	18 to 24	14.661	6	0.0231					
Activity,	Age Group	Chi-Sq.	DF	p(Chi-Sq.)		Age Group	Chi-Sq.	DF	p(Chi-Sq.)
by Age Gp	0 to 11	5.275	6	0.5090		24 to 44	12.256	6	0.0565
and With/Out	12 to17	2.999	6	0.8089		45 and Ovr	17.556	6	0.0074
Children:	18 to 24	2.523	6	0.8659					

The 1991 and 1992 Tracking Study: Methods and Results

Introduction

Many museum educators accept measures of time as important indicators of the success of an exhibition. Visitors who spend more time in an exhibition are presumed to be more likely to receive its intended educational messages. A recently proposed standard for "successful" exhibitions, for example, included two time-based criteria: 1) 51% of the visitors move through the exhibit at a rate of less than 300 square feet per minute, and 2) 51% of the visitors attend to at least 51% of the exhibit elements and spend more than one minute per exhibit element.[1]

Observational data collected in this study allows us to explore some of these issues. The data allow for a comparative analysis of both total duration and time allocations within an exhibition under two different conditions, i.e., the original Reptile Houses as they were configured in 1991 and the new Reptile Discovery Centers after supplementary educational materials were installed in 1992. The materials were supplements to the existing animal exhibitions, i.e., the number and configuration of the live exhibitions remained unchanged.

This appendix contains the detailed results of the 1991 and 1992 Tracking Study conducted at the three participating zoos (National Zoological Park (NZP), Zoo Atlanta (ZA) and the Dallas Zoo (DZ)). Earlier, in Section V these results were summarized. Here they are presented with the associated technical information.

Approach and Method

Previous studies conducted in the NZP Reptile House have used highly trained personnel to observe visitors.[2] The number of observers was small and the work conducted under the supervision of a herpetologist. As described in Appendix B, the design of this study called not only for observing visitor behavior, but also for interviewing visitors as they entered and exited the buildings. It was critical for analysis purposes that the data collection procedures be completely comparable across the three sites. Further, to ensure efficient utilization of volunteer interviewers and provide for unexpected interviewer absences, more than a handful of individuals had to be trained to observe visitors at each location. Thus, the very detailed observations conducted by Marcellini, in which durations at specific exhibits were recorded as visitors moved through the Reptile House, had to be

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[1] Beverly Serrell, "The 51% Solution: Defining a Successful Exhibit by Visitor Behavior," in Current Trends in Audience Research and Evaluation, (AAM Visitor Research and Evaluation Committee, 1992), Vol. 6, p. 28.

[2] Dale L. Marcellini and Thomas A. Jensson, "Visitor Behavior in the National Zoo's Reptile House." Zoo Biology, Vol. 7 (1988), pp. 329-338.

simplified.[3] Instead of recording both the specific location within a building and duration of specific stops, in the present study we collected information about durations, but not the specific location of a stop. Thus, we know when individuals entered and exited the Reptile Houses, how many stops they made and the duration at each stop. However, we do not know the location of a specific stop. Even if such precise information were available, since the arrangement of exhibits and the content of exhibits varies somewhat from zoo to zoo, the data would present serious analysis problems in making comparisons. We did record, as will be more fully described below, the type of stop (e.g., viewing a reptile in general, watching zoo personnel at an exhibit, stopping at an interactive in 1992, etc.).

In the Tracking Study, then, observers discreetly followed visitors through the Reptile House, recorded time-use information with the aid of a stop watch, and also estimated a few demographic characteristics of the visitors.

Protocol. The protocols used for the Tracking Study are in Appendix A. The forms allow for recording entry and exit times, as well as details for 28 stop durations at exhibits. For visitors who made more than 28 exhibit stops, the number was recorded, but not their durations. In addition, a record was made of the type of stop. By definition, a stop lasted 5 seconds or more. In addition to stops made to observe an animal, the following were recorded in 1991:

1 =   The reptile/amphibian is being fed or is eating; e.g., a mouse is being eaten.
2 =   A keeper/worker is with the animal or doing something to the exhibit --except feeding.
B =   Birds are being observed [Dallas Zoo only].

The decision to record bird observation, while seemingly counter-intuitive, arises from the configuration of the Dallas Zoo. Specifically, an aviary is adjacent to and accessible through the Reptile House. In addition, a few bird exhibits are in a portion of the building which is part of the Reptile House.

In 1992, more detail about the stops was collected:

1 =   The reptile/amphibian is being fed or is eating; e.g., a mouse is being eaten.
2 =   A keeper/worker is with the animal or doing something to the exhibit --except feeding.
3 =   Visitor is using or engaged in (e.g., watching) one of the interactive stations.
4 =   A staff member is engaged in a scheduled program or demonstration.
B =   Birds [Dallas Zoo only]

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[3] Data collection for the three studies (Tracking Study, Entrance Survey and Exit Survey) alternated within a given day. Interviewers were trained to collect data for all three.

The two additional types of stops were specific to the educational stations and demonstrations introduced in 1992.

Implementation. As discussed in Appendix B, the data collection extended from Sunday, September 22, through Saturday, October 12, 1991, and Sunday, September 27, through Saturday, October 17, 1992, using a systematic survey schedule encompassing all hours from 9:30 am through 4:30 pm and all seven days of the week.[4] In 1991, during the 21 survey days, we estimate that approximately 22,000 individuals passed the three interviewing locations during the hours in which the tracking study was conducted. Almost half (47.1%) of these were at NZP, another third at ZA and the remainder (19.5%) at DZ. Of these, 536 individuals were observed. In 1992, during the 21 survey days, we estimate that approximately 22,000 individuals passed the three interviewing locations during the hours in which the tracking study was conducted. Almost half (47.1%) of these were at NZP, another third at ZA and the remainder (19.5%) at DZ. Of these, 480 individuals were observed. The limitation on the number actually observed resulted from the availability of interviewers. The results of the fieldwork are described more fully in Appendix B.

In the case of the interview studies (Entrance and Exit Surveys), since the length of the questionnaire was fixed and we had information on visitor flow, we were able to select relatively efficient sampling intervals and minimize the situation in which a visitor was selected by the team leader but an interviewer was still in the process of conducting an interview with a previously selected respondent. However, in the case of the Tracking Study the situation was quite different. As will be discussed, the variability of the total time spent in the building was so high that the situations in which the team leader selected a visitor but the interviewer or interviewers were still tracking other visitors were quite frequent. Of the total 959 selected for observation, interviewers were available to track 536 or 55.9 percent in 1991 and 480 of 750 in 1992 (or 64.0%). The "tracking rates" for each of the zoos are shown in Table B.1, Appendix B. However, although detailed tracking protocols are not available for large portions of the sample, limited information are available about those individuals who were not tracked. The team leader recorded the time they entered and exited the building as well as demographic information. Our review of completed and "missed" trackings shows that there is no bias in the type of people who were selected for tracking or in the overall time they spent in the buildings.

Results

Earlier, in Section V of this report, the discussion of Tracking Study results was somewhat abbreviated. Here additional information is provided.

Time and Activity Measures. To describe the tracking data, four summary measures were used:

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4   At NZP and DZ, interviewing/tracking took place in three sessions, 9:30-11:30 am, 12:00-2:00 pm, and 2:30-4:30 pm. At ZA, due to later opening hours, the sessions were 10:30 am-12:30 pm, 12:45-2:45 pm, and 3:00-5:00 pm. See Appendix B for the full schedule.

(a) <u>Total Length of Visit, in Minutes</u> (VISIT)

As shown in Table D.1, at the end of this appendix, the total time visitors spent in the buildings varied by year and by location only. In 1991, the visit time varied between 15.2 minutes at NZP and 19.3 minutes at the Dallas Zoo. The average visit at NZP was significantly shorter than the visit time at either Atlanta or Dallas. In 1992 visit times varied between 18.4 minutes at Zoo Atlanta and 24.5 minutes at the Dallas Zoo. The average visit at Dallas was significantly longer than the visit time at Atlanta and NZP. Between 1991 and 1992, the average length of visit increased by 5.89 minutes at NZP, followed by an increase of 5.24 minutes at Dallas and 0.55 minutes at Atlanta. Analysis on file show that the length of the visit did not vary significantly by any demographic factors. The calculation of the length of visit was very straightforward -- the difference (in minutes) between the time the visitor entered the building and the time they exited, as recorded by the observer.

(b) <u>Total Time Stopped, in Minutes</u> (QTOT)

The observational data allows us to divide the total visit time into two components, the time spent at stops (that were at least five seconds long) and the time between stops.

Overall, there were no differences by any factor except location (analysis on file). In 1991, total time stopped at NZP was shortest -- 10.0 minutes, compared with 12.4 minutes at Atlanta and 13.2 minutes at Dallas. In 1992, total time stopped at Zoo Atlanta was significantly less than the other zoos; 12.7 minutes versus 16.3 minutes at NZP and 17.3 at the Dallas Zoo.

The calculation of QTOT was complicated by the fact that the Tracking Form allowed a detailed recording of information for only 28 stops (see Appendix A). However, we did have information about the number of additional stops made by the visitor observed and the total length of the visit (VISIT). It was possible to calculate, for each visitor, the mean stop time for stops 1-28. The mean stop time was applied to the remaining stops. This approach proved effective in all but a few cases where the resulting observation time exceeded the VISIT. In these situations, it was always the result of an outlier (an extremely long stop) that inflated the mean time. Removing the outlier and recalculating the mean time and then estimating the time spent observing corrected these few exceptions. [Several other approaches to allocating time to stops beyond 28 were tried (e.g., time series); all involved making assumptions about the data which did not apply.] After the observation times were estimated for stops beyond 28, the calculation of QTOT was a straightforward addition of the time spent at each stop.

(c) <u>Total Number of Stops</u> (TSTOP)

In 1991, the number of total stops varied significantly by location. On average, visitors to NZP made the fewest number of stops, 21.3, compared with about 25 for

each on the other zoos. No other factors (age, racial/ethnic identification, gender, presence of children, etc.) were significant.

In 1992, total stops varied by location and by the presence of children. For zoo location, the largest change in the total number of stops was at the Dallas Zoo. Here, the average number of stops made increased by 5.1, to an average of over 30 stops. At NZP, the change was less striking; the average number of stops increased by 2.5 from 1991 to 1992. At the Atlanta Zoo, the average number of stops decreased by 2.6 stops. Overall, in 1992 the presence of children in a group of visitors decreased the average number of stops by 3; groups of visitors without children made an average of 26.7 stops and those with children made an average of 23.8 stops.

The decrease in the number of stops for groups visiting with children exists in both years. However, the difference in 1992 is larger. In 1991, groups and individuals visiting the Reptile House without children made an average of 25.5 stops, while those visiting with children made an average of 23.0 stops. In 1991, the difference in the number of stops is 2.5 compared to a difference of 3.0 in 1992.

Overall, between 1991 and 1992 the average number of stops increased for NZP and Dallas. At NZP the average number of stops increased by 2.5, at the Dallas Zoo they increased by 5.1 stops, while at Zoo Atlanta the average number of stops fell by 2.6.

No significant differences by other demographic factors were found in this variable.

TSTOP is defined as the count of all stops, including stops beyond 28 for which detailed data were not collected.

(d) Length of Stop, in Seconds (QAVG)

The average length of stops increased 8.5 seconds between 1991 and 1992, from 30.5 seconds in 1991 to 39.0 seconds in 1992. The largest increase was at NZP. In 1991, the average stop was 28.9 seconds, in 1992 it was 43.0 seconds, an increase of 14.1 seconds. At Zoo Atlanta the average length of stops increased by 7.3 seconds, and at the Dallas Zoo, they increased by 1.2 seconds.

Overall, respondents visiting with children had longer average stop times than those visiting without children. Across all zoos and both years, visitors without children stopped an average of 33.0 seconds, while those visiting with children stopped an average of 35.2 seconds.

Although visitors with children had longer average stop times, most of the change in stop time was for visitors without children. Between 1991 and 1992, the average stop time increased 7.8 seconds for visitors with children, compared to an increase of 9.1 seconds for visitors without children. Across individual zoos, the largest changes in average stop time were seen for visitors without children. At NZP, average stop time for visitors without children increased by an average of 17.0 seconds, compared with 12.1 seconds for visitors with children. At Atlanta, visitors without children increased their average stop times by 1.3 seconds, compared with

an increase of 10.3 seconds for visitors with children. At the Dallas Zoo, the average stop time for visitors without children increased 8.8 seconds and decreased 2.1 seconds for visitors with children. Overall, visitors at NZP increased their average stop time by 14.1 seconds, compared to 7.3 seconds at Atlanta and 1.2 seconds at the Dallas Zoo.

No differences were found by any other demographic factors (data on file).

In analysis using QAVG, we include both actual stop times recorded for stops 1-28 and extrapolated stop times for additional stops (i.e., those beyond 28).

Model of Interactive Station Stops

To understand the relative drawing power of the RDC interactive stations, a multivariate model of the probability that visitors made a stop at any of the interactive stations was estimated. This model is reported in Table D.7. Because the interactive stations were installed as part of the Reptile Discovery Centers (RDCs), only data from the 1992 Tracking Study are used.

The model shows that the stations attract a fairly broad cross section of visitors. First, there are statistically significant effects for Gender, Race/Ethnic identification, and the Social Composition of the visiting group. However, these effects are relatively small: being Female increased the probability of stopping at an interactive station by 1.60 percent, being a member of a racial or ethnic minority reduces this probability by 1.78 percent, and visiting the RDC with another adult reduces it by 1.00 percent.

Substantively, the most important results are the effects due to age. The interactive stations have the greatest attraction for children, but visitors from all age groups are attracted to the RDC interactives. Although it is generally assumed that interactives are for children, this study demonstrates that they are used by all ages· The largest age effect is for visitors under 12 years old, being in this group increases the probability of stopping at an exhibit station by 6.70 percent, compared to adults age 55 and over. But these stations also attract visitors of most other ages. The change in probability for the remaining age groups ranges between 2.21 percent (for teenagers -- visitors between 12 and 19 years old) and 3.37 percent (for young adults --visitors between 20 and 34 years old).

In addition to background characteristics, the model shows an effect, albeit small, of the particular zoo visited. Being at the National Zoo increased the probability of stopping at a station (4.45%) and at the Dallas Zoo (2.28%), compared to Zoo Atlanta. In all likelihood, this effect results from a combination of the placement of the interactive stations and technical difficulties encountered in their operation during the study period.

Table D.1
Summary of Tracking Survey Measures, Total, Year and Location

All Zoos	Variable	Mean 1991	Std. Dev.	Mean 1992	Std. Dev.	Mean Difference
Length of Visit	(VISIT, Minutes)	17.24	8.61	20.78	11.55	3.54**
Total Time Stopped	(QTOT, Minutes)	11.74	7.66	15.13	10.2	3.39**
Total Stops	(TSTOP)	23.91	14.47	24.86	14.91	0.95
Length of Stop	(QAVG, Seconds)	30.53	13.53	39.00	21.58	8.47**

1991, by Zoo		National Zoo		Zoo Atlanta		Dallas Zoo	
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Length of Visit	(VISIT, Minutes)	15.20**	7.96	17.82	8.84	19.27	8.59
Total Time Stopped	(QTOT, Minutes)	10.01**	6.62	12.44	8.07	13.15	7.99
Total Stops	(TSTOP)	21.33**	13.8	25.06	14.49	25.86	14.95
Length of Stop	(QAVG, Seconds)	28.85	11.66	29.8	11.39	34.12**	17.91

1992, by Zoo		National Zoo		Zoo Atlanta		Dallas Zoo	
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Length of Visit	(VISIT, Minutes)	21.09	11.59	18.37	10.67	24.51**	12.01
Total Time Stopped	(QTOT, Minutes)	16.33	10.78	12.73**	9.43	17.25	9.68
Total Stops	(TSTOP)	23.83	12.83	22.46	15.8	30.96**	15.53
Length of Stop	(QAVG, Seconds)	42.98**	25.41	37.08	20.76	35.28	12.95

Difference In Means, by Zoo		National Zoo	Zoo Atlanta	Dallas Zoo
		Mean	Mean	Mean
Length of Visit	(VISIT, Minutes)	5.89**	0.55	5.24**
Total Time Stopped	(QTOT, Minutes)	1.13**	0.29	4.10**
Total Stops	(TSTOP)	2.5	-2.6	5.10**
Length of Stop	(QAVG, Seconds)	14.13**	7.28**	1.16

** $p > .01$

Table D.2
Distribution of Visit Time, in Minutes

Time (Minutes)	All Zoos			NZP			ZA			DZ		
	1991	1992	Total	1991	1992	Total	1991	1992	Total	1991	1992	Total
0 to 5	5.3	3.9	4.8	6.4	1.9	5.3	5.0	5.8	5.3	4.3	3.0	3.7
6 to 10	19.3	14.7	17.7	26.6	18.5	24.7	17.6	22.1	19.1	11.2	5.0	8.3
11 to 15	21.7	17.4	20.2	22.0	14.8	20.3	23.6	23.1	23.4	18.1	12.9	15.7
16 to 20	20.9	20.1	20.6	17.9	20.4	18.5	19.6	18.3	19.1	27.6	21.8	24.9
21 to 25	14.5	16.6	15.3	15.6	22.2	17.2	13.1	14.4	13.5	15.5	15.8	15.7
26 to 30	11.3	13.9	12.2	8.7	11.1	9.3	12.6	11.5	12.2	12.9	17.8	15.2
31 to 35	4.3	5.4	4.7	1.2	3.7	1.8	6.0	1.9	4.6	6.0	9.9	7.8
36 to 40	1.8	3.1	2.3	0.6	1.9	0.9	2.0	1.0	1.7	3.4	5.9	4.6
41 to 45	0.4	2.7	1.2	0.6	3.7	1.3	0.0	1.9	0.7	0.9	3.0	1.8
46 to 50	0.4	1.2	0.7	0.6	0.0	0.4	0.5	0.0	0.3	0.0	3.0	1.4
Over 60	0.0	1.2	0.4	0.0	1.9	0.4	0.0	0.0	0.0	0.0	2.0	0.9
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table D.3
Type of Stops, by Year, Location and Total

Type of Stop	All Zoos			NZP		
	1991	1992	Total	1991	1992	Total
Feeding/Keeper	0.5	1.7	1.0	0.7	1.2	0.9
Exhibit Station	------	29.2	12.5	------	32.8	15.7
Watching Reptile/Snake	99.5	69.1	86.5	99.3	66.0	83.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

Type of Stop	ZA			DZ		
	1991	1992	Total	1991	1992	Total
Feeding/Keeper	0.4	3.3	1.5	0.3	0.3	0.3
Exhibit Station	------	25.0	9.8	------	29.4	12.2
Watching Reptile/Snake	99.6	71.7	88.7	99.7	70.3	87.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

Table D.4 Total Number of Stops and Average Length of Stops, by Year, Location, and Presence of Children

Type	Year	Location	Kids	Stops Avg	Stops StD	N Obs	Time (Sec.) Avg	Time StD	N Obs
Total				24.38	14.67	1011	34.38	17.81	1008
By Year									
	91			23.91	14.47	535	30.53	13.53	535
	92			24.86	14.91	476	39.00	21.58	473
By Zoo									
		NZP		22.56	13.29	379	35.79	20.86	379
		ZA		23.89	15.12	394	32.86	15.48	391
		DZ		28.11	15.39	238	34.63	15.89	238
By Children									
			No Kids	26.09	16.27	380	32.96	17.97	378
			Kids	23.36	13.53	631	35.23	17.67	630
Year by Location									
	91	NZP		21.33	13.80	193	28.85	11.66	193
	91	ZA		25.06	14.49	209	29.80	11.39	209
	91	DZ		25.86	14.95	133	34.12	17.91	133
	92	NZP		23.83	12.65	186	42.98	25.41	186
	92	ZA		22.46	15.80	185	37.08	20.76	182
	92	DZ		30.96	15.53	105	35.28	12.95	105
Year by Children									
	91		No Kids	25.50	16.07	195	28.56	10.79	195
	91		Kids	23.00	13.41	340	31.66	14.78	340
	92		No Kids	26.71	16.49	185	37.66	22.40	183
	92		Kids	23.77	13.68	291	39.41	19.78	290
Location by Children									
		NZP	No Kids	23.13	15.16	156	34.34	24.05	156
		NZP	Kids	22.16	11.83	223	36.80	18.29	223
		ZA	No Kids	26.45	16.84	155	31.83	12.48	153
		ZA	Kids	22.23	13.67	239	33.53	17.13	238
		DZ	No Kids	31.97	15.91	69	32.37	10.79	69
		DZ	Kids	26.53	14.93	169	35.55	17.50	169
Year by Location by Children									
	91	NZP	No Kids	23.05	16.96	80	26.06	9.22	80
	91	NZP	Kids	20.12	10.96	113	30.83	12.79	113
	91	ZA	No Kids	25.69	15.08	75	31.15	12.46	75
	91	ZA	Kids	24.70	14.20	134	29.04	10.71	134
	91	DZ	No Kids	30.03	15.40	40	28.68	9.31	40
	91	DZ	Kids	24.06	14.46	93	36.45	20.13	93
	92	NZP	No Kids	23.21	13.12	76	43.05	30.91	76
	92	NZP	Kids	24.25	12.36	110	42.94	20.93	110
	92	ZA	No Kids	27.15	18.40	80	32.49	12.54	78
	92	ZA	Kids	19.09	12.34	105	39.31	21.60	104
	92	DZ	No Kids	34.66	16.48	29	37.47	10.75	29
D-9	92	DZ	Kids	29.55	15.03	76	34.44	13.67	76

Stop Type	Stops	Mean	Std Dev	Mini-mum	Maxi-mum	Stops	Mean	Std Dev	Mini-mum	Maxi-mum
Year:			1991					1992		
All Zoos										
Feeding/Keeper	59	72.19	83.37	13	441	165	67.15	104.13	7	790
Exhibit Station						2790	49.36	55.78	6	961
Watching Reptile/Snake	12734	29.80	27.87	6	384	6608	32.37	37.27	6	941
All Stop Types	12793	30.00	28.52	6	441	9563	37.93	46.13	6	961
National Zoo										
Feeding/Keeper	27	82.78	86.80	13	358	46	95.37	138.02	10	790
Exhibit Station						1233	56.46	66.04	8	961
Watching Reptile/Snake	4090	27.91	23.77	6	310	2480	33.84	34.14	9	514
All Stop Types	4117	28.27	25.07	6	358	3759	42.01	50.74	8	961
Zoo Atlanta										
Feeding/Keeper	21	55.67	49.45	17	211	111	55.66	87.98	7	634
Exhibit Station						843	49.82	50.02	6	386
Watching Reptile/Snake	5216	30.38	26.04	6	351	2419	30.08	27.85	6	531
All Stop Types	5237	30.48	26.22	6	351	3373	35.86	38.98	6	634
Dallas Zoo										
Feeding/Keeper	11	77.73	122.15	13	441	8	64.25	50.88	7	139
Exhibit Station						714	36.54	37.82	7	463
Watching Reptile/Snake	3428	31.18	34.27	6	384	1709	33.50	50.71	7	941
All Stop Types	3439	31.33	34.94	6	441	2431	34.49	47.32	7	941

Table D.6
Summary of Regression Models: Stop Time

All Zoos	Combined					
	Initial			Final		
VARIABLE	Coefficent	Probability	Standardized Coefficient	Coefficent	Probability	Standardized Coefficient
Intercept	27.9823	0.0001	0.0000	28.2509	0.0001	0.0000
Gender						
Female	0.6721	0.1745	0.0090			
(Male)						
Race/Ethnic ID						
Minority	2.1376	0.0020	0.0205	2.1075	0.0022	0.0202
(Non-Minority)						
Study Year						
1992	2.2860	0.0001	0.0303	2.2835	0.0001	0.0302
(1991)						
Type of Stop						
Feeding/Keeper	36.6461	0.0001	0.0981	36.7094	0.0001	0.0983
Exhibit Station	16.8696	0.0001	0.1497	16.8861	0.0001	0.1499
(Watching Reptile/Snake)						
Zoo Location						
National Zoo	1.4542	0.0122	0.0185	1.5243	0.0035	0.0194
Dallas Zoo	-0.1511	0.8095	-0.0018			
(Zoo Atlanta)						
Visit Composition						
Visiting With Children	1.2926	0.0134	0.0164	1.3104	0.0119	0.0166
(Not Visiting With Children)						
R-Square	0.0381	0.0001		0.0380	0.0001	
Adjusted R-Square	0.0377			0.0377		

(cont.)

Summary of Regression Models: Stop Time

National Zoo	Combined					
	Initial			Final		
VARIABLE	Coefficent	Probability	Standardized Coefficient	Coefficent	Probability	Standardized Coefficient
Intercept	25.5047	0.0001	0.0000	25.8542	0.0001	0.0000
Gender Female (Male)	0.6780	0.4435	0.0084			
Race/Ethnic ID Minority (Non-Minority)	7.2166	0.0001	0.0605	7.2126	0.0001	0.0605
Study Year 1992 (1991)	5.6816	0.0001	0.0703	5.6670	0.0001	0.0701
Type of Stop Feeding/Keeper	58.9021	0.0001	0.1415	58.9112	0.0001	0.1415
Exhibit Station (Watching Reptile/Snake)	22.5035	0.0001	0.2045	22.5383	0.0001	0.2048
Visit Composition Visiting With Children (Not Visiting With Children)	2.0422	0.0266	0.0243	2.0476	0.0262	0.0244
R-Square	0.0832	0.0001		0.0831	0.0001	
Adjusted R-Square	0.0825			0.0825		

(cont.)

Zoo Atlanta	Combined					
	Initial			Final		
VARIABLE	Coefficent	Probability	Standardized Coefficient	Coefficent	Probability	Standardized Coefficient
Intercept	29.5905	0.0001	0.0000	29.3232	0.0001	0.0000
Gender						
Female	-0.2299	0.7354	-0.0036			
(Male)						
Race/Ethnic ID						
Minority	-1.0441	0.2965	-0.0111			
(Non-Minority)						
Study Year						
1992	-0.0518	0.9465	-0.0008			
(1991)						
Type of Stop						
Feeding/Keeper	25.8001	0.0001	0.0996	25.5326	0.0001	0.0983
Exhibit Station	19.4009	0.0001	0.1811	19.3738	0.0001	0.1804
(Watching Reptile/Snake)						
Visit Composition						
Visiting With Children	1.4928	0.0352	0.0225	1.5149	0.0306	0.0228
(Not Visiting With Children)						
R-Square	0.0416	0.0001		0.0412	0.0001	
Adjusted R-Square	0.0410			0.0409		

(cont.)

Dallas Zoo	Combined					
	Initial			Final		
	Coefficent	Probability	Standardized	Coefficent	Probability	Standardized
VARIABLE			Coefficient			Coefficient
Intercept	30.6644	0.0001	0.0000	31.9492	0.0001	0.0000
Gender						
Female	1.9330	0.0679	0.0238			
(Male)						
Race/Ethnic ID						
Minority	1.1117	0.3972	0.0111			
(Non-Minority)						
Study Year						
1992	2.2477	0.0611	0.0273			
(1991)						
Type of Stop						
Feeding/Keeper	39.5924	0.0001	0.0555	40.1034	0.0001	0.0562
Exhibit Station	3.1332	0.0826	0.0253	4.5942	0.0045	0.0370
(Watching Reptile/Snake)						
Visit Composition						
Visiting With Children	-0.8764	0.4568	-0.0097			
(Not Visiting With Children)						
R-Square	0.0058	0.0001		0.0044	0.0001	
Adjusted R-Square	0.0048			0.0041		

Table D.7
Logistic Regression Models:
Stops at Interactive Stations, 1992

	Initial Model			Final Model		
	Coefficient	Probability	% Change	Coefficient	Probability	% Change
Intercept	1.6987	0.0001	26.05	1.7533	0.0001	26.05
Gender						
Female	-0.1682	0.0005	1.65	-0.1658	0.0005	1.63
(Male)						
Racial/Ethnic Identification						
Minority	0.2492	0.0002	-1.84	0.2432	0.0003	-1.80
(Non-Minority)						
Respondent Age						
0 To 11	-0.7554	0.0001	6.80	-0.7457	0.0001	6.70
12 To 19	-0.3612	0.0109	2.08	-0.3834	0.0064	2.21
20 To 34	-0.3381	0.0058	3.36	-0.3388	0.0057	3.37
35 To 54	-0.2976	0.0233	2.17	-0.2986	0.0227	2.18
(55 And Over)						
Social Composition						
Alone	0.1427	0.4034	-0.42			
Couple	0.1832	0.0247	-1.41	0.1300	0.0473	-1.00
Adult(s) and	0.0699	0.3055	-0.66			
Child(ren)						
(Tours And Friends)						
Zoo Location						
National Zoo	-0.4495	0.0001	4.45	-0.4494	0.0001	4.44
Dallas Zoo	-0.2650	0.0001	2.28	-0.2616	0.0001	2.25
(Zoo Atlanta)						
Gamma	0.1900	0.0001		0.1900	0.0001	
N Stops	9562			9562		

Appendix E.

Reptile Affect Scale: Regression Results

Introduction

To assess whether there were differences in visitor reports on how much they liked or disliked reptiles between entering and exiting Reptile Houses in 1991 or Reptile Discovery Centers (RDCs) in 1992, we estimated several regression models. The overall results show that visitor reports varied significantly by only four sets of factors in each study year (1991 and 1992). Of these factors, three were significant in both years, while the fourth changed with the installation of the RDC materials. Two of the significant factors, gender and age, were demographic characteristics, while the others were behavioral characteristics: having owned a pet reptile, reading natural history magazines, and being exposed to the RDC materials (by virtue of being in the 1992 Exit Survey sample). The results of these analyses are discussed below and shown in Table E.1.

Results

In these models a number of possible variables were tested, e.g., ethnic/racial minority status versus non-minority status, residence location (in relation to a specific zoo), who the respondent was visiting the reptile building with, etc., but none of these variables had a significant impact on the Reptile Affect Scale. The final models for each year accounted for slightly over seventeen percent of the overall variance in the Reptile Affect Score -- the 1991 model had an R-Square value of 0.172 and the 1992 model had an R-Square value of 0.171. Each model had an Adjusted R-Square of 0.168.

1991 Results. In the 1991 model, four variables had a significant effect on the scale: gender, age, whether the respondent ever had a reptile as a pet, and whether they read or subscribed to natural history or science magazines. This last variable is a general indicator of interest and knowledge of animals. Respondent gender was coded as being female; being female reduced the reptile score by 1.33 points. The effect of age was generally negative; as visitor age increased the score fell. The rate of this reduction ranged between slightly less than one point (-0.90 points) for respondents aged 12 to 19 to slightly more than two-and-a-half points (-2.59 points) for respondents age 55 and over.

The two behavioral variables -- having had a reptile as a pet, and reading natural history magazines -- each had positive effects. Having had a reptile as a pet increased the reptile score by 1.21 points, while reading natural history magazines increased the score by 0.34 points.

1992 Results. In the 1992 models, gender had a similar negative effect; being female again reduced the reptile score by 1.33 points. However, age had a positive effect. In the 1991 model, significant differences appeared only for respondents in their teens or older, i.e., over eleven years old. Here the significant difference is for young children,

respondents between six and eleven years old. For these young visitors, the reptile score increased 1.84 points. The effects for other age groups were not large enough to be significant.

As in 1991, the two behavioral variables had positive effects on the overall reptile score. As in 1991, having had a reptile as a pet increased the score by 1.55 points. While this effect is significant in the 1992 model it is not a significant increase over its effect in 1991.

The major difference between the 1991 and 1992 models is in the replacement of the effect of reading natural history magazines with an effect of experiencing the RDC. This effect is measured through the design-variable of being interviewed in the Exit Survey. While the effect of reading natural history magazines is not significant in 1992, being part of the 1992 Exit Survey increased the reptile score by nearly one-half point (0.495 points).

The effect of being in the RDC (i.e., interviewed in the 1992 Exit Survey) is evidence that, all other variables being equal, the new materials had their intended effect. Across the three zoos, exposure to these materials increased visitor appreciation of reptiles by one-half point.

Individual Zoo Results. In terms of the individual zoos, there are consistent effects due to gender (being female reduced the Reptile Affect Score between 1.2 and 1.5 points, depending on the zoo and year, except at Zoo Atlanta where the decrease in 1991 was 0.83) and having a pet reptile (having such a pet increased the score by between 0.93 and 2.10 points, depending on the zoo and year). The effect of the RDC modules (the "Exit effect") is statistically significant in two of the three zoos (the National Zoo and the Dallas Zoo). The Exit effect for the National Zoo was 0.41 and for Dallas it was 0.57.

The effect of age is not consistent, i.e., different age groups were statistically significant in different years, but, generally being older than 19 had a negative effect on the Reptile Affect Score, while being 19 or younger had a positive effect on the score.

Table E.1   Results of Regression Models : Reptile Affect Scale, Total and by Location

| All Zoos All Ages | 1991 | | | | | | 1992 | | | | | |
| | Initial | | | Final | | | Initial | | | Final | | |
VARIABLE	Coefficent	Probability	Standardized Coefficient	Coefficent	Probability	Standardized Coefficient	Coefficent	Probability	Standardized Coefficient	Coefficent	Probability	Standardized Coefficient
Intercept	8.2300	0.0001	0.0000	7.7443	0.0001	0.0000	6.4400	0.0001	0.0000	5.6912	0.0001	0.0000
MINORITY (Non-Minority)	0.2577	0.1738	0.0323				-0.1601	0.4568	-0.0206			
FEMALE (Male)	-1.3311	0.0001	-0.2243	-1.3308	0.0001	-0.2242	-1.3403	0.0001	-0.2321	-1.3338	0.0001	-0.2311
(Age 0 to 5)												
Age 6 to 11	-0.7366	0.0974	-0.0704				1.3374	0.0314	0.1379	1.8422	0.0001	0.1913
Age 12 to 19	-1.5044	0.0010	-0.1344	-0.9035	0.0043	-0.0805	0.5763	0.3608	0.0580			
Age 20 to 34	-2.2232	0.0001	-0.3722	-1.6653	0.0001	-0.2788	-0.5723	0.3286	-0.0983			
Age 35 to 54	-2.6986	0.0001	-0.4074	-2.1092	0.0001	-0.3188	-1.0639	0.0721	-0.1676			
Age 55 and Over	-3.1298	0.0001	-0.3002	-2.5885	0.0001	-0.2477	-0.8126	0.2048	-0.0750			
LOCAL	0.0599	0.8802	0.0096				0.1220	0.7856	0.0202			
OTHERUS (Foreign)	-0.1571	0.6985	-0.0246				0.2637	0.5647	0.0426			
ALONE	0.8019	0.1036	0.0461				0.4450	0.4423	0.0235			
COUPLE	0.0968	0.7690	0.0131				-0.1229	0.7088	-0.0177			
ADKIDS	0.0203	0.9469	0.0034				-0.4478	0.1399	-0.0774			
FRIENDS	0.0797	0.8299	0.0079				-0.4372	0.2636	-0.0430			
GROUP (Children Alone)	0.0318	0.9461	0.0020				-0.3617	0.4567	-0.0250			
PET REPTILE (No Pet Reptile)	1.2305	0.0001	0.1948	1.2083	0.0001	0.1913	1.4630	0.0001	0.2424	1.5452	0.0001	0.2555
READ NAT HIST MAGAZINES (Do not Read Nat Hist Magazines)	0.3734	0.0089	0.0627	0.3469	0.0136	0.0582	0.2216	0.1596	0.0384			
EXIT (Entrance)	-0.0833	0.5458	-0.0141				0.4313	0.0068	0.0731	0.4952	0.0017	0.0841
R-Square	0.1774	0.0001		0.1722	0.0001		0.1989	0.0001		0.1713	0.0001	
Adjusted R-Square	0.1684			0.1685			0.1867			0.1684		

| National Zoo | 1991 | | | | | | 1992 | | | | | |
| All Ages | Initial | | | Final | | | Initial | | | Final | | |
VARIABLE	Coefficent	Probability	Standardized Coefficient	Coefficent	Probability	Standardized Coefficient	Coefficent	Probability	Standardized Coefficient	Coefficent	Probability	Standardized Coefficient
Intercept	8.4610	0.0001	0.0000	8.3350	0.0001	0.0000	10.0395	0.0001	0.0000	7.6787	0.0001	0.0000
MINORITY (Non-Minority)	0.0812	0.8060	0.0099				0.0171	0.9586	0.0024			
FEMALE (Male)	-1.2752	0.0001	-0.2194	-1.3597	0.0001	-0.2349	-1.4395	0.0001	-0.2636	-1.4507	0.0001	-0.2670
(Age 0 to 5)												
Age 6 to 11	-0.9338	0.4570	-0.0907				-1.0356	0.4223	-0.1215			
Age 12 to 19	-3.0620	0.0157	-0.2918	-1.8276	0.0006	-0.1731	-2.2879	0.0806	-0.2593			
Age 20 to 34	-3.1918	0.0086	-0.5428	-2.1513	0.0001	-0.3670	-2.9224	0.0211	-0.5158	-1.3804	0.0001	-0.2452
Age 35 to 54	-3.2772	0.0072	-0.5132	-2.1830	0.0001	-0.3435	-3.4469	0.0067	-0.5980	-1.7498	0.0001	-0.3048
Age 55 and Over	-3.7989	0.0025	-0.3985	-2.7586	0.0001	-0.2877	-4.0936	0.0023	-0.3631	-2.4430	0.0001	-0.2189
LOCAL	0.6581	0.2518	0.1122				-0.7233	0.2210	-0.1324			
OTHERUS (Foreign)	0.1515	0.7895	0.0260				-0.6912	0.2404	-0.1265			
ALONE	0.8655	0.2613	0.0609				0.5252	0.4796	0.0357			
COUPLE	0.5232	0.3780	0.0769				-0.2542	0.5966	-0.0373			
ADKIDS	0.2942	0.6031	0.0505				-0.3346	0.4425	-0.0613			
FRIENDS	1.0686	0.1014	0.1112				-0.7894	0.1602	-0.0878			
GROUP (Children Alone)	1.3771	0.1006	0.0843				-0.0685	0.9195	-0.0059			
PET REPTILE (No Pet Reptile)	1.0392	0.0001	0.1707	1.0007	0.0001	0.1652	0.9559	0.0001	0.1683	0.9266	0.0001	0.1637
READ NAT HIST MAGAZINES (Do not Read Nat Hist Magazines)	0.1615	0.4944	0.0278				0.3293	0.1690	0.0602			
EXIT (Entrance)	-0.1056	0.6467	-0.0182				0.4772	0.0453	0.0873	0.4087	0.0758	0.0752
R-Square	0.1906	0.0001		0.1687	0.0001		0.2239	0.0001		0.1948	0.0001	
Adjusted R-Square	0.1647			0.1597			0.1932			0.1841		

Zoo Atlanta	1991						1992					
All Ages	Initial			Final			Initial			Final		
VARIABLE	Coefficent	Probability	Standardized Coefficient	Coefficent	Probability	Standardized Coefficient	Coefficent	Probability	Standardized Coefficient	Coefficent	Probability	Standardized Coefficient
Intercept	7.4244	0.0001	0.0000	7.5122	0.0001	0.0000	6.1762	0.0001	0.0000	6.1955	0.0001	0.0000
MINORITY (Non-Minority)	0.3230	0.4029	0.0454				0.1104	0.7850	0.0154			
FEMALE (Male)	-0.9706	0.0015	-0.1665	-0.8300	0.0057	-0.1415	-0.9580	0.0035	-0.1647	-1.2990	0.0001	-0.2235
(Age 0 to 5)												
Age 6 to 11	-1.3614	0.0852	-0.1244				-0.2044	0.8332	-0.0200			
Age 12 to 19	-1.7136	0.0463	-0.1353				-0.2010	0.8418	-0.0186			
Age 20 to 34	-2.2385	0.0004	-0.3864	-1.2848	0.0010	-0.2208	-1.3920	0.1059	-0.2401			
Age 35 to 54	-2.9673	0.0001	-0.4458	-1.9823	0.0001	-0.2976	-2.5650	0.0042	-0.3681	-1.5340	0.0001	-0.2190
Age 55 and Over	-3.6622	0.0001	-0.3098	-2.6380	0.0001	-0.2187	-1.1860	0.2402	-0.1072			
LOCAL	1.6047	0.1440	0.1987				0.7860	0.4332	0.0914			
OTHERUS (Foreign)	0.7909	0.4902	0.0922				0.9496	0.3871	0.1009			
ALONE	1.2220	0.3315	0.0553				2.3774	0.0959	0.0968			
COUPLE	-0.3900	0.5516	-0.0521				0.6917	0.3034	0.0963			
ADKIDS	-0.7458	0.2035	-0.1205				-0.4415	0.4612	-0.0740			
FRIENDS	-1.3520	0.1601	-0.0891				0.1538	0.8507	0.0136			
GROUP (Children Alone)	-2.1564	0.1061	-0.0892				0.0022	0.9988	0.0001			
PET REPTILE (No Pet Reptile)	1.3788	0.0001	0.2170	1.6017	0.0001	0.2506	2.0819	0.0001	0.3392	2.0997	0.0001	0.3417
READ NAT HIST MAGAZINES (Do not Read Nat Hist Magazines)	0.5645	0.0765	0.0928				0.1729	0.5934	0.0297			
EXIT (Entrance)	0.2372	0.4201	0.0409				0.2599	0.4232	0.0435			
R-Square	0.2021	0.0001		0.1567	0.0001		0.2615	0.0001		0.2116	0.0001	
Adjusted R-Square	0.1604			0.1446			0.2141			0.2033		

Dallas Zoo All Ages	1991						1992					
	Initial			Final			Initial			Final		
VARIABLE	Coefficent	Probability	Standardized Coefficient	Coefficent	Probability	Standardized Coefficient	Coefficent	Probability	Standardized Coefficient	Coefficent	Probability	Standardized Coefficient
Intercept	8.9376	0.0001	0.0000	7.5181	0.0001	0.0000	2.0488	0.1806	0.0000	5.1138	0.0001	0.0000
MINORITY (Non-Minority)	0.2160	0.4684	0.0259				-0.6443	0.1188	-0.0720			
FEMALE (Male)	-1.5127	0.0001	-0.2487	-1.5128	0.0001	-0.2487	-1.3005	0.0001	-0.2160	-1.1973	0.0001	-0.1983
(Age 0 to 5)												
Age 6 to 11	-0.8270	0.2004	-0.0798				4.0766	0.0003	0.3778	2.2079	0.0001	0.2050
Age 12 to 19	-0.8224	0.2208	-0.0735				3.4092	0.0028	0.3201	1.5638	0.0013	0.1452
Age 20 to 34	-2.1596	0.0002	-0.3516	-1.4477	0.0001	-0.2356	1.8652	0.0785	0.3096			
Age 35 to 54	-2.6405	0.0001	-0.3888	-1.9246	0.0001	-0.2839	1.6927	0.1129	0.2545			
Age 55 and Over	-3.0176	0.0001	-0.2830	-2.1953	0.0001	-0.2059	2.0082	0.0768	0.1957			
LOCAL	-1.1072	0.0951	-0.1602				1.5378	0.0967	0.2385			
OTHERUS (Foreign)	-0.9415	0.1683	-0.1311				1.6906	0.0738	0.2568			
ALONE	1.0897	0.1757	0.0563				-0.5558	0.6370	-0.0242			
COUPLE	0.1331	0.7953	0.0167				-0.1733	0.7807	-0.0253			
ADKIDS	0.2816	0.5484	0.0459				-0.1850	0.7557	-0.0308			
FRIENDS	0.0068	0.9902	0.0007				-0.0339	0.9632	-0.0031			
GROUP (Children Alone)	-0.0213	0.9746	-0.0015				-0.5213	0.5467	-0.0349			
PET REPTILE (No Pet Reptile)	1.3229	0.0001	0.2041	1.3649	0.0001	0.2110	1.7048	0.0001	0.2716	1.8038	0.0001	0.2852
READ NAT HIST MAGAZINES (Do not Read Nat Hist Magazines)	0.4333	0.0497	0.0713				0.1998	0.4653	0.0334			
EXIT (Entrance)	-0.1871	0.3864	-0.0308				0.5445	0.0668	0.0841	0.5682	0.0501	0.0878
R-Square	0.2064	0.0001		0.1942	0.0001		0.1942	0.0001		0.1921	0.0001	
Adjusted R-Square	0.1858			0.1882			0.1882			0.1822		