ENHANCING THE ZOO VISITOR'S EXPERIENCE BY PUBLIC ANIMAL TRAINING AND ORAL INTERPRETATION AT AN OTTER EXHIBIT

URSULA S. ANDERSON *is a research associate at TECHlab (Georgia Tech Laboratory for Animal Behavior) at Zoo Atlanta and a graduate student in the School of Psychology at Georgia Institute of Technology. Her areas of research are animal cognition, learning and aging, behavioral lateralization, and human-animal interaction.*

ANGELA S. KELLING *is a research associate at TECHlab (Georgia Tech Laboratory for Animal Behavior) at Zoo Atlanta and a graduate student in the School of Psychology at Georgia Institute of Technology. Her areas of research are animal cognition, giant panda visual discrimination, felid behavior, and visitor behavior.*

ROBIN PRESSLEY-KEOUGH *works in the Education Department of Zoo Atlanta. She received the Young Alumni Award from the University of Wisconsin-Oshkosh in 2000. She is the founder and president of Animal Training Adventures, Ltd. and the vice president on the founding board of the Atlanta Wild Animal Rescue Effort.*

MOLLIE A. BLOOMSMITH, *Ph.D., is a senior behavioral research scientist at Zoo Atlanta. Her research focuses on evaluating captive-animal care and housing techniques and their influence on animal welfare.*

TERRY L. MAPLE, *Ph.D., is the Elizabeth Smithgall Watts Professor of Conservation & Behavior, a professor of psychology, and Director of the Center for Conservation & Behavior at Georgia Institute of Technology. He has taught environmental psychology at Georgia Tech for 25 years. Dr. Maple recently retired as President/CEO of Zoo Atlanta after 17 years of service. He is the author, co-author and editor of 150 scientific publications, the founding editor of* Zoo Biology*, and an elected fellow of the American Psychological Association. In 1999, Dr. Maple was elected President of the American Association of Zoos and Aquariums.*

ABSTRACT: This study investigated the effects of performing animal-training sessions with Asian small-clawed otters (*Aonyx cinerea*) while zoo visitors watched. The

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effects of having an interpreter present to describe the otters and their training on zoo visitors were also assessed. The data from 389 visitors to Zoo Atlanta's otter exhibit were analyzed, and exhibit stay times and animal activity levels were recorded during four conditions (passive exhibit viewing, interpretation-only sessions, public animal-training sessions, and public animal training with interpretation sessions). The findings suggest that public animal training and public animal training with interpretation produce more positive zoo experiences, training perceptions, exhibit size and staff assessments, and longer visitor exhibit stay times when compared to passive exhibit viewing and interpretation-only sessions. This study quantifies an outcome of positive reinforcement training beyond its effects on animals and extends the benefits to zoo visitors by providing information on how to increase positive perceptions and experiences for zoological park visitors.

Keywords: *zoo; visitor; interpretation; animal training*

Of the four goals of the modern zoological park—conservation, research, education, and recreation—the last two relate most directly to the zoo visitor. Studying visitor behavior, perceptions, and attitudes are useful tools to evaluate the zoo regarding its educational and recreational goals. Existing information suggests that zoo visitors want to see active animals, and they want to interact with keepers, guides, and interpreters (Broad, 1996; Wolf & Tymitz, 1980); and they are motivated to visit because of entertainment or recreational reasons over educational and other reasons (Morgan & Hodgkinson, 1999; Reade & Waran, 1996). Current research efforts seek to identify the many factors that influence visitor behavior so that educational and recreational benefits to the visitor may be enhanced.

Previous research identified several variables that influence visitor behavior using length of exhibit viewing time, observations of visitor behavior, and/or questionnaire data as indexes of exhibit success, visitor perceptions, and attitudes. These variables can be divided into four categories: zoo and

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exhibit physical characteristics (see Bitgood, Patterson, & Benefield, 1986, 1988; Finlay, James, & Maple, 1988; Johnston, 1998; Shettel-Neuber, 1988), visitor characteristics (see Bitgood et al., 1986, 1988; Hoff & Maple, 1982; Johnston, 1998; Phillpot, 1996), external conditions (see Bitgood et al., 1986, 1988; Johnston, 1998; Phillpot, 1996), and animal characteristics. Characteristics of the animal influence the behavior and perceptions of the visitor; specifically, visitors attend more to the behavior of animals when they are more active (Altman, 1998; Bitgood et al., 1986, 1988), and, also, visitors stay longer at the exhibits of more active animals (Jackson, 1994; Johnston, 1998).

Modern zoos may attempt to enhance the zoo visitor's experience in other ways. Public or on-exhibit animal-training sessions, naturalist talks/oral interpretation, and animal demonstrations may effectively capture attention and engage the zoo visitor such that the four goals of the modern zoo are pursued. These active environmental enhancements may be the keys to combining recreation and education thus providing a context for learning in the form of entertainment.

Animal training using positive reinforcement techniques serves as an important animal management tool in zoos to reduce problematic behaviors, to increase animal activity levels, to enhance psychological well-being, and to facilitate safe veterinary and husbandry procedures through voluntary cooperation (Bloomsmith, Stone, & Laule, 1998; Desmond & Laule, 1994; Kreger & Mench, 1995). Martin (1996) wrote that public animal-training sessions may be an effective educational program that enhances interpretation or keeper talks when the audience is engaged with the animal, inspired by more than simple facts, and empowered to participate in wildlife conservation. However, none of these claims has been scientifically evaluated; the current study seeks to do so.

The general subject of interpretation has received a good bit of attention in the literature (see Field & Wagar, 1973; Knapp, Volk, & Hungerford, 1997; Prentice, 1991; Roggenbuck, Loomis, & Dagostino, 1990; Tilden, 1957), but interpretative strategies using oral narration or verbal scripts have received limited quantitative evaluations. The few studies of oral interpretation alone have been performed at places such as museums, national parks, and forests, and assessments have revealed it to be effective in achieving behavioral and attitudinal changes (Morgan, Absher, Loudon, & Sutherland, 1997; Nielson & Buchanan, 1986; Oliver, Roggenbuck & Watson, 1985; Olson, Bowman, & Roth, 1984; Roggenbuck & Berrier, 1982; Vander Stoep & Gramann, 1988). One study performed at Zoo Atlanta found that the presence of a docent increased the time visitors stayed at the exhibit (Jackson, 1994).

Live animal demonstrations (some performed in conjunction with oral interpretation) have been evaluated as effective tools in achieving both recreational and educational goals of zoos (Heinrich & Birney, 1992; Swanagan, 1993, 2000; Yerke & Burns, 1991). Swanagan (1993, 2000) found increased support of conservation efforts in those visitors that attended a live animal demonstration when compared to visitors who passively viewed the exhibit. Also, visitors attending an animal demonstration retained large amounts of the content material weeks after having attended the animal demonstration (Heinrich & Birney, 1992).

The present study sought to extend previous research on visitor behavior and perceptions by evaluating the effects of oral interpretation and public animal-training sessions as enhancements to the zoo environment. Data were collected on visitor exhibit stay times, on visitor knowledge and attitudes (using a questionnaire format), and on animal behavior under four experimental conditions. A formal evaluation of oral interpretation and public animal training may provide valuable insights into how to effectively educate and entertain zoo visitors. Our hypotheses were (a) that public training sessions and sessions of public training with interpretation would be associated with more positive visitor responses and longer exhibit viewing times when compared to passive viewing of the animal exhibit and interpretation-only sessions and (b) that longer exhibit viewing times would be associated with higher levels of animal activity.

MATERIALS AND METHOD

SETTING AND PARTICIPANTS

This study was conducted at and around the Asian small-clawed otter exhibit at Zoo Atlanta in Atlanta, Georgia. This outdoor exhibit was a naturalistic and semi-aquatic habitat that housed between one and three otters during this study. The exhibit contained natural climbing structures, a shade tree, a waterfall, a swimming pool, and a terrestrial space. Educational signs containing photographs and written material detailing general factual information about otters were present at the otter exhibit.

Visitors that appeared to be 18 years of age or older were selected for exhibit stay-time recordings once they became visible to the data collectors and as they began to attend to the exhibit. Only 1 visitor per group was selected to ensure independent sampling with group membership defined as those visitors entering the exhibit area at approximately the same time. If a

visitor refused to answer the questionnaire, their exhibit stay-time measurement was later discarded. A total of 398 participants were surveyed.

QUESTIONNAIRE

The questionnaire consisted of the following 11 statements: (a) My experience at Zoo Atlanta has been enjoyable; (b) my experience at Zoo Atlanta has been educational; (c) I received great value for the cost of my visit to Zoo Atlanta; (d) the otter exhibit is interesting; (e) the otter exhibit is appropriate in size for the animals; (f) the qualifications of the animal care staff at Zoo Atlanta are advanced; (g) animal training is an important component of a zoo animal's life; (h) I am interested in viewing animal training; (i) the otters are happy in this exhibit; (j) otters are intelligent animals; and (k) an otter would make a good pet. The statements required evaluation according to a 5-point Likert-type scale where 1 = *strongly disagree*, 2 = *disagree*, 3 = *no opinion*, 4 = *agree*, and 5 = *strongly agree* (Likert, 1932).

INTERPRETATION SCRIPTS

An interpreter read one of two different interpretation scripts: One script was written for use while animal training sessions were ongoing with interpretation, and one script was written for interpretation-only sessions. Both scripts had general, factual information on Asian small-clawed otters such as size, behavior, information about conservation efforts, and the purpose of animal training. Also, both scripts stated that otters were not well-suited as pets. The script read during the training-with-interpretation condition described training methodology and the specific behaviors trained in more depth than the script read during the interpretation-only condition. The script read during the interpretation-only condition gave example behaviors that could be viewed during training. Each script was read for approximately 10 to 15 minutes per data collection session.

TRAINING AND INTERPRETATION PROCEDURE

Training sessions lasted approximately 10 to 15 minutes during which an equal number of animal trainers and otters entered the exhibit (the number of each varied from 1 to 3). The otters were then trained to perform behaviors facilitating aerobic activity, safe husbandry, and veterinary procedures using positive reinforcement techniques. Training sessions began with a lineup of the otters to enable each otter to be paired with 1 trainer for the duration of the session. A clicker was used as a conditioned reinforcer, and fish, crickets, and

meatballs were used as primary reinforcers. The primary reinforcers were given on a fixed-ratio schedule for behaviors in early development and on a variable-ratio schedule to maintain behaviors once they were learned. Signals with the right hand, often accompanied by verbal commands, were also used as discriminative stimuli when training.

During interpretation, an interpreter was stationed on the public side of the otter exhibit or on the animal side of the otter exhibit. The interpreter read the script, which was broadcast over the area using a microphone, receiver, and speaker system.

DATA COLLECTION PROCEDURE

The data were collected between September and October of 2000 (phase I) and March and June of 2001 (phase II). Data collection was conducted between 1 p.m. and 3 p.m. to increase consistency in temperature, time of day, and otter activity levels. For each environmental condition, the data were collected opportunistically throughout the time period whenever animal keeper staff, animal trainer staff, and volunteer availability allowed. Sessions took place an average of 3 times a week and occurred on both weekends and weekdays. Three types of data were collected for this study: exhibit stay time, questionnaire data, and animal behavioral data.

Exhibit stay time was tracked and recorded for every zoo visitor selected as a subject by direct observation. Per data collection session, 4 or 5 observers tracked visitor exhibit stay time. Timing began when the participant approached and attended to the exhibit, and timing ended when the participant's shoulders turned away from the exhibit and stopped attending to the exhibit. Participants were then approached and asked to fill out a questionnaire. The exhibit stay times were recorded only for those visitors who later agreed to fill out a questionnaire.

Animal behavioral data were also collected using a one-zero sampling method in 1-minute intervals (Altmann, 1974). One observer recorded otter behavior per data collection session. Interobserver reliability of each observer with the principal investigator was measured once before the observer collected data. Each observer was at or above 90% agreement with the principal investigator according to the index of concordance (Crockett, 1996). The animal behavior data were collected concurrently with visitor surveying and exhibit stay-time observations so that otter behavior could be correlated with exhibit stay times and questionnaire data. The data were later grouped into categories to represent the range of otter activity in terms of interest to the viewing public.

Modified from Shettel-Neuber (1988), Altman (1998), and Johnston (1998), the following animal activity levels were defined by a 5-point scale: 5 = *high activity*, 4 = *medium-high activity*, 3 = *medium activity*, 2 = *medium-low activity*, 1 = *low activity*, and 0 = *the animals were completely not visible for the duration of the visitor's exhibit stay time*. High activity was defined as extremely captivating and highly energetic behavior and included vigorous play behavior, actual or mock battles, and conflicts between animals. Medium-high activity was defined as energetic and captivating behavior and included moderate play behavior, swimming, feeding, examining or manipulating objects, and all training behavior. Medium activity was defined as moderately interesting or captivating behavior and included running, climbing, scent marking, and foraging. Medium-low activity was defined as repetitive and mostly uninteresting behavior and included walking and exhibiting other behavior while walking. Low activity was defined as mostly inactive and slow-moving behavior and included resting, sleeping, grooming, and other behavior exhibited while lying down.

ZOO ENVIRONMENTAL CONDITIONS

Of the total 389 participants, 94 were massed in the baseline/passive viewing (BL) condition, 97 were massed in the interpretation (INT) condition, 94 were massed in the training (TR) condition, and 104 were massed in the training with interpretation (T/I) condition. The BL condition consisted of participants passively viewing the otter exhibit without training or interpretation occurring. The TR condition consisted of participants viewing 1 to 3 otters engaged in a training session. The INT condition consisted of participants viewing the otters while only interpretation occurred. Data for this condition were collected only during phase II. Unfortunately, the INT condition was added in retrospect to allow for the separation of training effects from oral interpretation effects, so the conditions are not balanced throughout the duration of study. The T/I condition consisted of participants viewing the otters when both training and interpretation were occurring. During phase I of the T/I condition, the interpreter was stationed inside the animal area of the exhibit, and during phase II, the interpreter was stationed on the public side. The differences in interpreter location were the result of increased zoo-wide restrictions of personnel in animal areas and could not be controlled.

STATISTICAL ANALYSIS

To analyze the data, we used descriptive statistics, factor analysis, and multivariate analysis of variance. Because of the large sample size, the *F* tests

performed were robust to violations of homogeneity of variance, homogeneity of covariance matrices, and normality (Rencher, 1995). All results were analyzed for statistical significance at the .05 alpha level.

RESULTS

FACTOR ANALYSIS

A factor analysis using the principal component method, a direct oblimin rotation, and with $m = 5$ (Rencher, 1995) was performed on the 11 statements in the questionnaire. The factor analysis indicated that the 11 statements could be grouped into five factors and that these five factors explained 74% of the variance.

The Zoo Experience factor was formed from the composite of mean scores on the experience enjoyment, educational experience, and value-received statements. Cronbach's alpha for the Zoo Experience factor was computed as .73 indicating a high degree of reliability. The Otter Perceptions factor was formed from the composite of mean scores on the exhibit interest, perceived happiness, and perceived intelligence statements. Cronbach's alpha for the Otter Perceptions factor was computed as .71 indicating a high degree of reliability. The Training Perceptions factor was formed from the composite of mean scores from the training importance and viewing training-interest statements. Cronbach's alpha for the Training Perceptions factor was computed as .67 indicating a high degree of reliability. The Size and Staff Perceptions factor was formed from the composite of mean scores from the appropriate exhibit size and staff quality statements. Cronbach's alpha for the Size and Staff Perceptions factor was computed as .67 indicating a high degree of reliability. Finally, the Good Pet Perception factor consisted of the scores from the otters as good pets statement. Because the Good Pet Perception factor consisted of a single statement, Cronbach's alpha could not be computed.

MULTIVARIATE ANALYSIS OF VARIANCE

The multivariate tests in Table 1 indicated that the fixed factors of environmental condition, animal activity level, and phase had significant main effects on the dependent variables of exhibit stay time (measured in seconds), Zoo Experience, Otter Perceptions, Training Perceptions, Size and Staff Perceptions, and Good Pet Perception factors. Also, the multivariate tests

TABLE 1
Multivariate Tests of Overall Effects

	Hotelling's Trace	F	df	p
Animal activity level	0.19	3.89	18	.001
Environmental condition	0.21	4.23	18	.001
Phase	0.08	4.93	6	.001
Environmental Condition × Phase	0.10	3.03	12	.001
Environmental Condition × Animal Activity Level	0.05	0.95	18	.52
Phase × Animal Activity Level	0.04	0.86	18	.64

indicated a significant interaction between the environmental condition and phase on the dependent variables. The test statistics were statistically significant at the .001 level for the main effects and for the interaction effect. The probability of making a Type II error was low as indexed by observed power greater than 0.99 for each main effect and for the interaction.

The univariate tests (main effects) for the fixed factor of animal activity level indicated that animal activity significantly affected Otter Perceptions and Good Pet Perception factors (Table 2). Planned polynomial contrasts indicated a significant linear effect of animal activity level on the Otter Perceptions factor. The relationship was such that visitor responses to the Otter Perceptions factor became more positive from low to medium-low to medium to medium-high activity levels (Table 3). The planned polynomial contrasts indicated a significant quadratic effect of animal activity level on the Good Pet Perception factor. The relationship was such that the responses to the Good Pet Perception factor were less positive at low and medium-high animal activity levels, and visitor responses to the Good Pet Perception factor were more positive at medium-low and medium activity levels (Table 3). High animal activity was never exhibited by the otters; thus, this activity level is not included in Table 3.

The tests of univariate effects for the fixed factor of environmental condition in Table 2 indicated that environmental condition significantly affected Zoo Experience, Training Perceptions, and Size and Staff Perceptions factors as well as exhibit stay time (main effects). The planned polynomial contrasts indicated a statistically significant linear trend of environmental condition on Zoo Experience, Training Perceptions, Size and Staff Perceptions, and exhibit stay time (Table 4). The trend was such that visitor perceptions became more positive from BL to INT to TR to T/I conditions.

The tests of univariate effects for the fixed factor of phase in Table 2 indicated that phase significantly affected the visitors' exhibit stay time (main

TABLE 2
Univariate ANOVA Effects for Fixed Factors and Interaction

Source	*Dependent Variable*	*Sum of Squares (Type III)*	df	F	p
Animal activity level	Zoo Experience	2.37	3	2.29	.08
	Training Perceptions	2.22	3	1.18	.32
	Otter Perceptions	10.60	3	9.62	.001
	Size & Staff Perceptions	3.13	3	2.21	.09
	Good Pet Perception	22.39	3	4.13	.01
	Exhibit stay time (in seconds)	251625.96	3	1.46	.22
Environmental condition	Zoo Experience	3.43	3	3.32	.02
	Training Perceptions	6.03	3	3.20	.02
	Otter Perceptions	1.86	3	1.69	.17
	Size & Staff Perceptions	7.14	3	5.03	.001
	Good Pet Perception	11.03	3	2.03	.11
	Exhibit stay time (in seconds)	2196788.18	3	12.76	.001
Phase	Zoo Experience	0.66	1	1.93	.17
	Training Perceptions	0.27	1	0.43	.51
	Otter Perceptions	0.01	1	0.04	.84
	Size & Staff Perceptions	0.02	1	0.05	.82
	Good Pet Perception	1.06	1	0.58	.44
	Exhibit stay time (in seconds)	1387688.37	1	24.19	.001
Environmental Condition × Phase	Zoo Experience	1.39	2	2.02	.13
	Training Perceptions	3.83	2	3.06	.05
	Otter Perceptions	0.43	2	0.59	.56
	Size & Staff Perceptions	0.53	2	0.56	.57
	Good Pet Perception	20.35	2	5.63	.004
	Exhibit stay time (in seconds)	706185.98	2	6.15	.002

TABLE 3
Means (With Standard Errors) of Dependent Variables by Animal Activity Level

Dependent Variable	*Low (n = 61)*	*Medium-Low (n = 21)*	*Medium (n = 28)*	*Medium-High (n = 279)*
Zoo Experience	4.08 (0.10)	4.38 (0.11)	4.26 (0.13)	4.29 (0.03)
Training Perceptions	4.07 (0.12)	4.21 (0.19)	4.00 (0.18)	4.19 (0.05)
Otter Perceptions	3.74 (0.10)	4.11 (0.20)	4.36 (0.09)	4.37 (0.03)
Size & Staff Perceptions	3.87 (0.11)	4.10 (0.16)	4.09 (0.12)	4.10 (0.04)
Good Pet Perception	2.52 (0.18)	3.38 (0.33)	3.07 (0.28)	2.42 (0.08)
Exhibit stay time (in seconds)	82.90 (11.13)	130.19 (21.85)	78.75 (9.36)	360.33 (21.60)

TABLE 4
Means (With Standard Errors) of Dependent Variables by Environmental Conditions

Dependent Variable	*BL (n = 94)*	*INT (n = 100)*	*TR (n = 94)*	*T/I (n = 104)*
Zoo Experience	4.10 (0.07)	4.18 (0.07)	4.28 (0.06)	4.43 (0.04)
Training Perceptions	4.01 (0.09)	4.08 (0.08)	4.17 (0.09)	4.36 (0.07)
Otter Perceptions	4.03 (0.08)	4.10 (0.08)	4.47 (0.05)	4.41 (0.05)
Size & Staff Perceptions	3.91 (0.08)	3.91 (0.08)	4.30 (0.06)	4.12 (0.06)
Good Pet Perception	2.66 (0.15)	2.69 (0.14)	2.65 (0.14)	2.19 (0.13)
Exhibit stay time (in seconds)	133.67 (15.80)	108.16 (10.36)	388.79 (42.92)	492.21 (34.31)

NOTE: BL = baseline viewing condition; INT = interpretation condition; TR = training condition; T/I = training with interpretation condition

effect). The planned polynomial contrasts revealed a statistically significant linear effect of phase on exhibit stay time such that exhibit stay time decreased from phase I (M = 452.85, SE = 31.99) to phase II (M = 152.40, SE = 9.36).

The univariate tests for interactions in Table 2 indicated that the main effect of the environmental condition on the Training Perceptions factor, the Good Pet Perception factor, and exhibit stay time was significantly moderated by phase. First, the interaction of environmental condition and phase on the Training Perceptions factor was such that responses to the Training Perceptions factor were more positive in the BL (M = 4.25, SE = 0.18) and TR (M = 4.28, SE = 0.10) conditions of phase II than the BL (M = 3.92, SE = 0.11) and TR (M = 4.05, SE = 0.14) conditions of phase I. Also, responses to the

Training Perceptions factor in the T/I condition were more positive in phase I (M = 4.51, SE = 0.08) than in phase II (M = 4.18, SE = 0.11).

Second, the interaction of environmental condition and phase on the Good Pet Perception factor was such that responses to the Good Pet Perception factor were more positive in the BL (M = 2.83, SE = 0.31) and T/I (M = 2.61, SE = 0.19) conditions of phase II than the BL (M = 2.60, SE = 0.17) and T/I (M = 1.82, SE = 0.17) conditions of phase I. Also, responses to the Good Pet Perception factor in the TR condition were more positive in phase I (M = 2.89, SE = 0.21) than the responses in the TR condition in phase II (M = 2.42, SE = 0.19). Finally, the interaction of environmental condition and phase on exhibit stay time was such that exhibit stay times were longer in the BL (M = 147.81, SE = 20.42), TR (M = 584.22, SE = 74.11), and T/I (M = 731.20, SE = 40.21) conditions of phase I than in the BL (M = 92.42, SE = 14.35), TR (M = 201.50, SE = 23.92), and T/I (M = 223.96, SE = 22.06) conditions of phase II.

DISCUSSION

The visitors we studied reported more positive zoo experiences, training perceptions, size and staff perceptions, and visitors viewed exhibits longer during the training with interpretation and training-only sessions than when compared to visitor responses during passive viewing and interpretation-only sessions. These findings of more positive perceptions during training sessions and training with interpretation confirm our first hypothesis and correspond to the results from two studies of live animal demonstrations. A live bird demonstration performed with an oral script was assessed, the demonstration was found to be entertaining, and the educational message was effectively delivered such that positive agreement with proconservation issues increased from pre-animal to postanimal demonstration (Yerke & Burns, 1991). Swanagan (1993, 2000) found that visitors who attended a live elephant demonstration were more likely to support elephant conservation efforts in comparison to those visitors who passively viewed the elephants in the exhibit and read the graphics. In contrast, interviews of visitors completing a self-guided tour at an aquarium revealed that 78% of the interviewed visitors reported no change in their knowledge and feelings about marine life (Kidd & Kidd, 1997).

The effect of the environmental conditions on exhibit stay time in the current study were rather profound with visitors staying at exhibits significantly longer when they viewed training sessions or training-with-interpretation

sessions; mean exhibit stay time more than doubled from passive viewing and interpretation sessions to training sessions and training-with-interpretation sessions. It is interesting that the environmental conditions did not directly affect the zoo visitors' likelihood of thinking that otters would make good pets as indexed by the Good Pet Perception factor, even though the notion of otters as pets was discussed in both oral scripts ($F[3, 389] = 2.03$, $p = .11$).

In addition, exhibit stay time was significantly longer in phase I than phase II of this study. It is unclear what caused such a large difference in findings across the study phases, so this result should be interpreted with caution. The variables of temperature, time of day, and session length remained relatively constant throughout data collection, and, thus, they most likely do not account for the differences in exhibit stay time across the two phases. As mentioned earlier, there was a difference in the positioning of the interpreter in the two study phases, but we have no reason to believe that this could be responsible for the effect measured.

The interpretation of the interaction of the environmental condition and phase on the Training Perceptions and Good Pet Perception factors is unclear. However, the interaction of environmental condition and phase on exhibit stay time is consistent with the main effects found. Specifically, in both phases I and II exhibit stay times were longer during training-with-interpretation sessions followed by training sessions, interpretation sessions (data only in phase II), and passive exhibit viewing.

Contrary to our second hypothesis and the previous literature associating increased animal activity with longer exhibit viewing times (Bitgood et al., 1986, 1988; Jackson, 1994; Johnston, 1998), our results did not support such a relationship between otter activity levels and zoo visitor stay time at the exhibit. However, when examining the mean exhibit stay times, we found that visitor stay time approximately tripled at medium-high activity levels ($M = 360.33$, $SE = 21.60$) when compared to the times at low ($M = 82.90$, $SE = 11.13$), medium-low ($M = 130.19$, $SE = 21.85$), and medium ($M = 78.75$, $SE = 9.36$) activity levels. These averages suggest that the lack of a relationship found may be the result of using a 5-point activity level, and the use of a larger numbered scale might have been more sensitive in detecting the relationship between activity and exhibit viewing time.

Otter activity level was critical in determining how visitors perceived the otters. The greater the otter activity level, the more positive the Otter Perceptions factor was, such that visitor responses moved from generally agreeing with positive otter perceptions toward strongly agreeing with positive otter perceptions. Also, otter activity level influenced the Good Pet Perception factor: Visitors perceived the otters as good pets when the otters were at

medium-low and medium activity levels and as not-so-good pets when the otters were at low and medium-high activity levels. This may indicate that people prefer moderately active pets to nonactive or highly active pets.

Although our questionnaire evaluated only visitor perceptions and attitudes and did not test possible informal learning benefits, public training sessions may promote informal learning as well as prevent the transmission of inaccurate information. Heinrich and Birney (1992) assessed the effect of a live animal demonstration (performed in conjunction with oral narration) on information retention rates by zoo visitors with the overall results indicating high retention rates of content material and major concepts. Thus, animal training sessions and sessions of training with interpretation should be formally evaluated with regard to the possible informal learning benefits. The knowledge level of the visitor must also be formally evaluated so that useful, interesting, and relevant information is available in interpretive programs of this type (Ben-Ari, 2000; Roggenbuck et al., 1990; Stoinski, Ogden, Gold, & Maple, 2001).

CONCLUSIONS

With the shift in the zoo paradigm extending the goals of the zoo to include not only recreation but also education, conservation, and research, zoos need to take advantage of every opportunity to educate visitors. Based on the results of the present study, zoos can use public animal-training sessions and public training sessions with interpretation to increase educational and recreational benefits and visitor perceptions of the zoo.

This study suggests several other areas for further research. The effects of where interpreters are placed, the presentation quality of interpreters, and how these two variables may affect visitor perceptions and attitudes should be analyzed. In addition, this study examined the effects of training a single species on exhibit, whereas the specific effects of publicly training a broader range of species should be examined in a similar manner. Reade and Waran (1996) and Morgan and Hodgkinson (1999) wrote that the educational impact of the zoo and other outdoor environments on visitor learning and knowledge of animal species is not yet fully understood or explored. Zoological parks, museums, and aquariums have the potential to educate visitors on a general and specific level and to facilitate more positive conservation attitudes. These results suggest a definite quantitative benefit to both the zoo and the visitor in using on-exhibit training sessions and on-exhibit training sessions with interpretation.

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