

**Visitor Perceptions and Reliance on Active and Passive Communication Techniques in Zoos**

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## ABSTRACT

The goal of educating the public about environmental and conservation issues is found in the mission statements of almost every zoo in the world. In order to effectively teach their visitors, zoos must understand how they are communicating with their public. In this study, we attempt to quantify how Sylvan Heights Bird Park (SHBP) communicates with its visitors. SHBP is a small not-for-profit facility that specializes in birds, with a primary focus on waterfowl (Anseriformes). Located in an economically depressed eastern North Carolina county (Halifax), SHBP receives over 46,000 visitors a year. Using a survey, we collected information of visitor perceptions of the role of zoos, their reliance on different sources of information, and their retention of information provided via different modes of communication. SHBP visitors listed exhibit signage (passive communication) as the preferred method of gaining information. Interestingly, however, we found that reliance on signage varied with age and gender and we found no difference in information retention between visitors that experienced only passive communication (signage) versus those that experienced active communication. Just over half (51%) of visitors viewed the primary purpose of a zoo to be entertainment but this view changed with age and gender. Although almost all respondents identified the role of zoos in maintaining biodiversity, we found a disconnect between this view and an understanding of how zoos might contribute to species conservation.

## INTRODUCTION

The role of zoos in society has changed dramatically over time. As recently as the 1950s, the public viewed zoos as purely a form of entertainment due to few facilities participating in active conservation or sending positive educational messages to their visitors. Today many facilities take an active role in conservation and education. “Edutainment” gained popularity as zoos began to focus on how they could positively impact conservation while entertaining their audience (Hyson 2004). There are over 2000 facilities in the United States that satisfy the traditional definition of a zoo. However, there are only two primary professional organizations, Association of Zoos and Aquariums (AZA) and the Zoological Association of America (ZAA) that place a large emphasis on both *ex situ* and *in situ* conservation. To be successfully accredited by the Association of Zoos and Aquariums (AZA), an institution must donate a percentage of their overall budget to conservation projects (AZA 2016).

Funding sources have put zoos under pressure to evaluate their educational footprint and to substantiate claims that guests learn during visits to the zoo. In two generalized categories, zoos can passively or actively communicate with their visitors. All zoos passively communicate with their visitors through exhibit signage, while ~95% of zoos offer some type of active communication (Roe et al. 2014). Active communication or “live interpretation” has been shown to be more effective in eliciting strong responses from visitors (Falk 2006), such as: animal shows, “behind the scene” tours, keeper talks, and interactive exhibits. While effective, the quality of these strategies vary immensely across the industry. Skilled presenters, with high animal activity in programs that contain educational humor have been shown to increase visitor

receptivity to learning, whereas unskilled presenters can have a negative effect on visitor learning (Falk 2006; Perdue et al. 2012). Studies have shown how docent and volunteers that zoos use to interact with visitors often present inaccurate information (Mony & Heimlich 2008). Active communication can be a powerful tool to facilitate visitor learning, however zoos are often financially constrained in how much they are able to provide.

Passive communication has changed considerably in the past several decades, but traditional signage is still an industry-wide tool used by zoos to communicate with their visitors. A study across 176 zoos from 50 countries showed that ~95% of visitors read at least “some” exhibit signage (Roe et al. 2014). Well-designed signs with pointed information are still an easy and relatively inexpensive way to communicate with visitors. Signage has moved away from individualized taxonomic information, and instead focuses on ecological and conservation based messages and how the species on view fits into that picture (Andersen 2003). However, it is difficult to construct signs where the majority of visitors will take away the desired message (Woods 2002). In a previous study, the primary reason visitors gave for not reading all of the signs were they were watching the animals (Roe et al. 2014), suggesting that strategic sign placement is also important. Furthermore, 53% of visitors cited familiarity with the information, poor or uninteresting information, and too much information caused them to discontinue reading signs. Well-designed signs with pointed messages and placed in engaging locations are critical for successfully enticing visitors to fully read them.

In this study, we attempt to quantify the use and effectiveness of various sources of information by conducting a survey on visitors to Sylvan Heights Bird Park (SHBP). SHBP is a unique facility compared to many other zoological institutions with the primary difference being

that it focuses exclusively on birds. Located in a rural tier 1 (most economically distressed) county of eastern North Carolina, it is important for SHBP to gain a better understanding of the perceptions and expectations of its visitors (in order to survive as a business while fulfilling its underlying education mission). Are visitors expecting a formal education experience, a balanced day of “edutainment”, or just an entertaining day outside? To quantify the effects of active versus passive communication we focused analyses on a specific exhibit, “Avian Pirates”, that was constructed in 2014 through collaboration between SHBP and East Carolina University (ECU). The exhibit highlights a group of African songbirds (Viduidae, including the indigobirds and whydahs) with a unique reproductive system, brood parasitism, in which parasitic birds lay their eggs in the nest of different bird species (Davies 2000). Brood parasitic birds represent classic examples of evolutionary arms races including remarkable examples of the evolution of mimicry (Davies 2000). In addition to African species, the exhibit signage incorporated local examples of this reproductive system (brown-headed cowbird *Moluthrus ater*) and included information on evolution and behavior in these birds as well.

## METHODS

Park visitors were presented surveys prior to exiting the facility after their visit over 19 different days, (9 weekend days, and 10 week days), between the dates of 9/29/2015 and 1/15/2016. Participation was completely voluntary, with small incentive items such as candy and stickers offered for a completed survey. The double-sided survey contained a total of 26 questions, 12 on the front, 14 on the back; see supplemental figures 1 and 2 for complete survey. The survey was constructed to be approximately 50% discrete and 50% open-ended question

format. Discrete questions were designed to not force a visitor into picking an answer (no response or multiple responses were allowed). For example, the question “Practically speaking, how do you feel you can best support conservation of wildlife?” was followed by: support/visit zoos, donations, volunteering, daily activities (reduce, reuse, recycle), support private breeding centers, or other/fill in the blank. Visitors could then circle yes to the activities they believed were a practical approach to conservation. The first side of the survey contained 12 check-box style questions, while the backside contained open-ended questions along with an area to provide your name, age, sex, profession, and education level. The Institutional Review Board Committee of East Carolina University approved this survey and project (UMCIRB 15-000342).

To evaluate how well staff interactions increased visitor learning at SHBP, we compared responses from visitors who engaged in active communication related to the exhibit (ParkTalks, Keeper Talks, or staff interactions) to those who did not. This portion of the survey focused on a specific exhibit, “Avian Pirates”, that deals with brood parasitic behavior in songbirds. The first question gauged if visitors remembered the exhibit by asking them to describe their favorite feature while the second asked them which obligate brood parasite was being studied. When the survey was turned in, participants were asked if they had joined in a ParkTalk or a Keeper Talk and the two questions were circled if they had.

### *Statistical Analysis*

To test for variation in visitor responses, we used logistic regression in SAS (Statistical Analysis Software version 9.4 for Windows). In each model, we included the additive effects of gender and age, as well as an interaction of these explanatory variables. Since visitors were

Gender	Age Group (Years)	Response #
Female (F)	10-19	11
Male (M)		3
F	20-29	37
M		17
F	30-39	28
M		5
F	40-49	14
M		12
F	50-59	8
M		9
F	60-69	29
M		17
F	70-79	16
M		6
F	80+	1
M		1
Unreported	Unreported	19

**Table 1.** Visitors were asked to identify their age group and gender. 233 visitors participated in the survey with 19 not providing demographic information. Surveys were collected on 19 different days, (9 weekend days, and 10 week days), between 9/29/2015 and 1/15/2016.

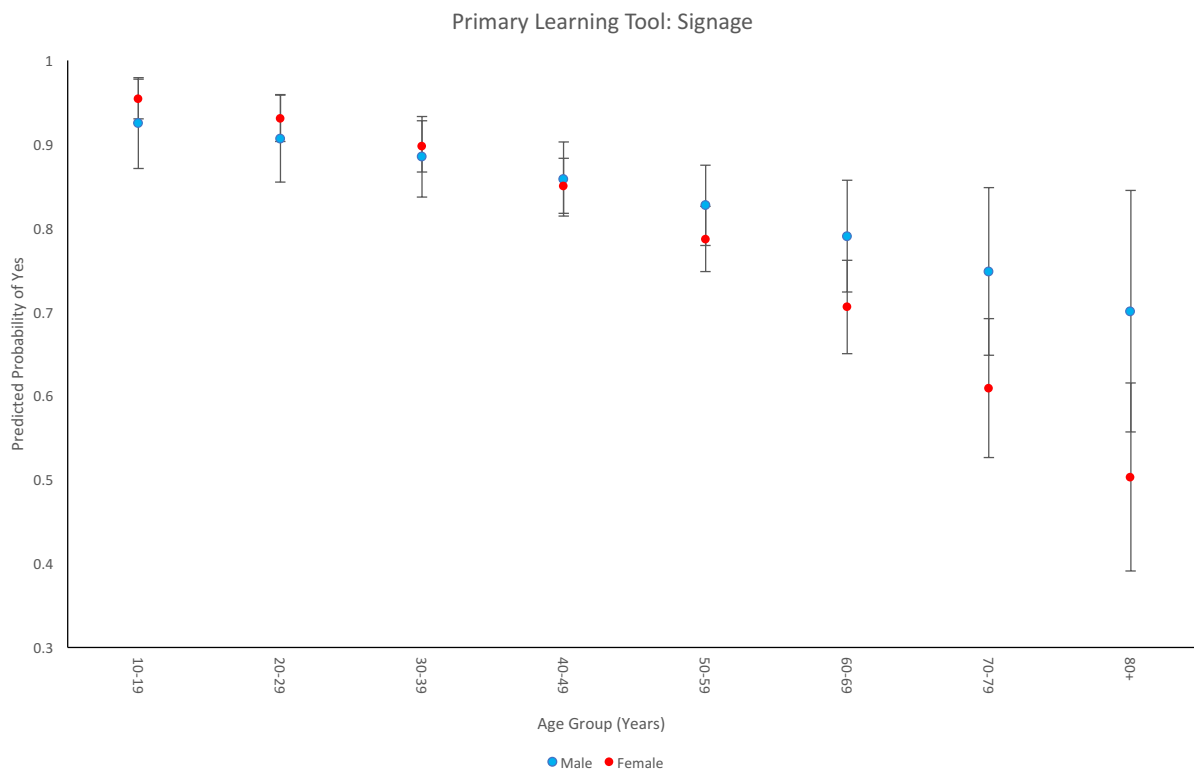
asked to place themselves in age classes (10-19, 20-29, 30-39, etc.), these data were treated as a continuous variable. The dependent variable was the visitor response (binomial) to each question. Results were considered significant at an alpha value of 0.05. The predicted probabilities and  $\pm$  standard error around the modeled relationship of four questions are presented in figures 1-4.

## RESULTS

Page 1 of the survey had a completion rate of 98% while page 2 had a 35% completion rate. Out of the 233 responses, 214 provided at least enough information to identify gender and age. The 214 responses with cohort information were used for statistical analysis of the interaction between age and gender with response rate. The response rate within each cohort are presented in table 1.

### *Zoo Communication: Signage*

There was a significant association between age and the responses to the question of whether signs were their primary source of information at SHBP, where older age classes were less likely to report signage as their primary source of information (figure 1) ( $\beta = -0.06$ , 0.02 SE,  $\chi^2 = 15.03$ ,  $p < 0.0001$ ). There was not a significant relationship between responses based on

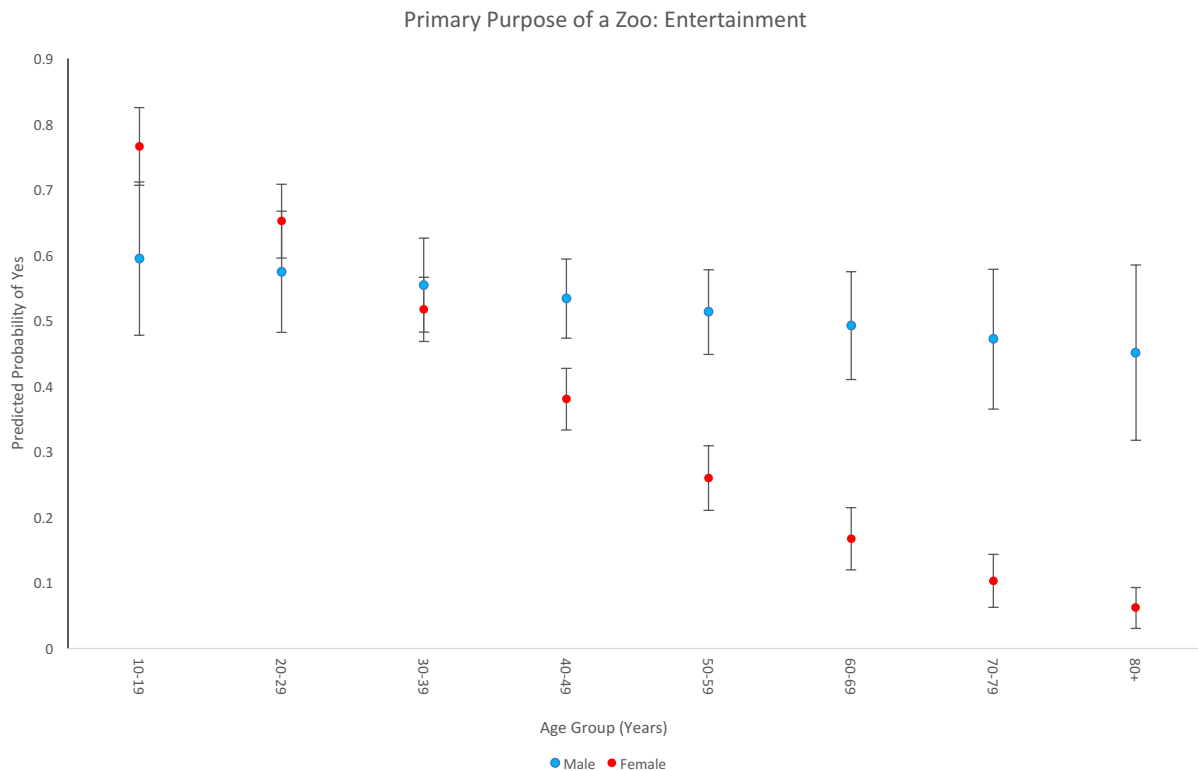


**Figure 1.** When asked about their preferred tools for learning at a zoo, 74% of visitors listed traditional signs but the use of signs declined in older groups. Fifty-eight percent of all visitors estimated that they read 60% or less of each sign. There was a significant interaction between age and gender with older females relying less on signs than similar aged males.

gender ( $\beta = -0.09$ , 0.13 SE,  $\chi^2 = 0.46$ ,  $p = 0.5$ ), nor was there a significant interaction of age and gender ( $\beta = 0.03$ , 0.03 SE,  $\chi^2 = 1.10$ ,  $p = 0.30$ ). When asked what allowed them to learn the most during their visit, 74% of visitors ranked signage as one of their primary sources. However, when visitors were asked to estimate the amount of signage they read at SHBP, 58% read 60% or less of a sign.

Among those who had participated in active forms of communication ( $n = 37$ ), 21 (56%) responded to both questions pertaining to the “Avian Pirates” exhibit. Of these, 16 individuals (76%) correctly answered both questions. Among those who only engaged in passive communication ( $n = 196$ ) only 14 (0.07%) answered both questions, but remarkably, all 14



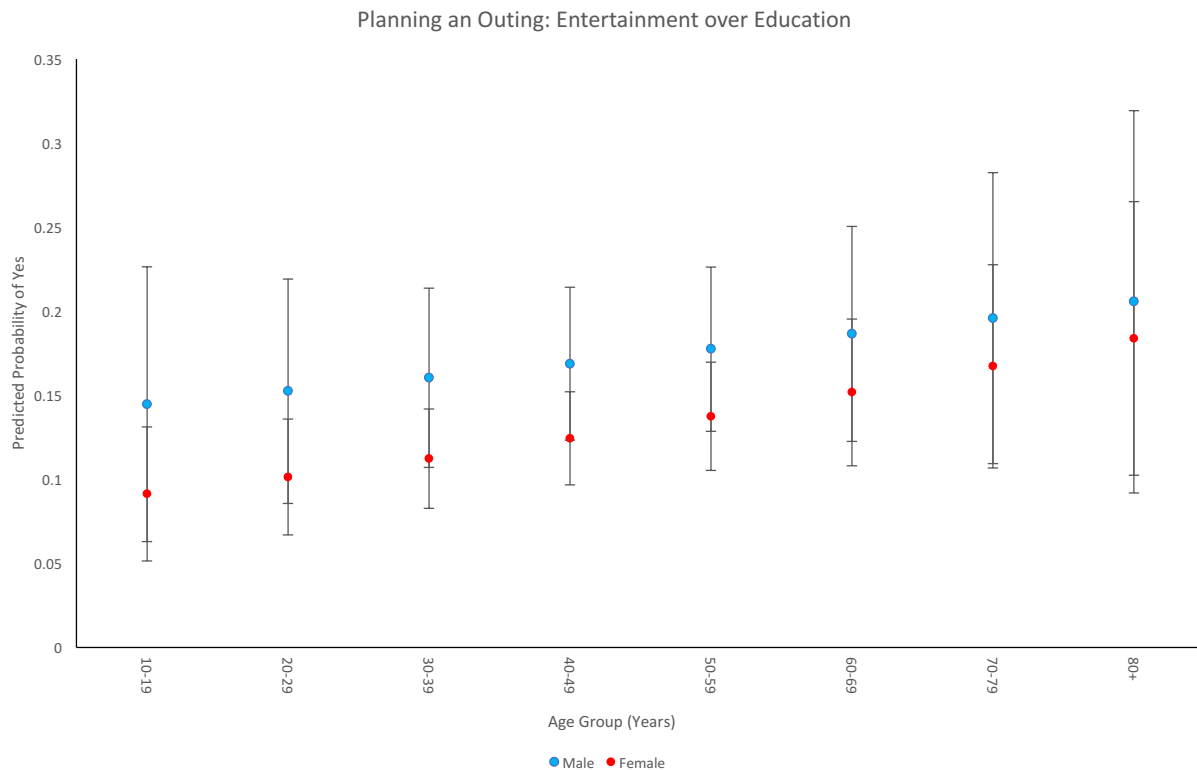


**Figure 2.** When asked about the primary purpose of a zoo, 51% of visitors listed entertainment. There was a significant interaction between gender and age. Older men were more likely to list entertainment as a primary purpose than females.

correctly answered both questions. This difference in the proportion of correct answers was not statistically significant (Fisher's Exact Test,  $p = 0.07$ ), but the survey response rate was significantly different between those who participated in active (21 of 37) versus passive (14 of 196) communication ( $p < 0.0001$ ).

#### *Entertainment verse Education*

When asked if the primary purpose of a zoo was entertainment, there was a significant relationship between the response patterns and age-class, where younger individuals were more likely to answer yes than older age classes (figure 2); ( $\beta = -0.11$ , 0.02 SE,  $\chi^2 = 34.60$ ,  $p < 0.0001$ ). When analyzed independently, response patterns between genders were not significant



**Figure 3.** Visitors were asked to rank education and entertainment when planning an outing on a scale of one through five. One being education as the most important and five being entertainment being as the most important. Approximately 19% of visitors ranked entertainment over education.

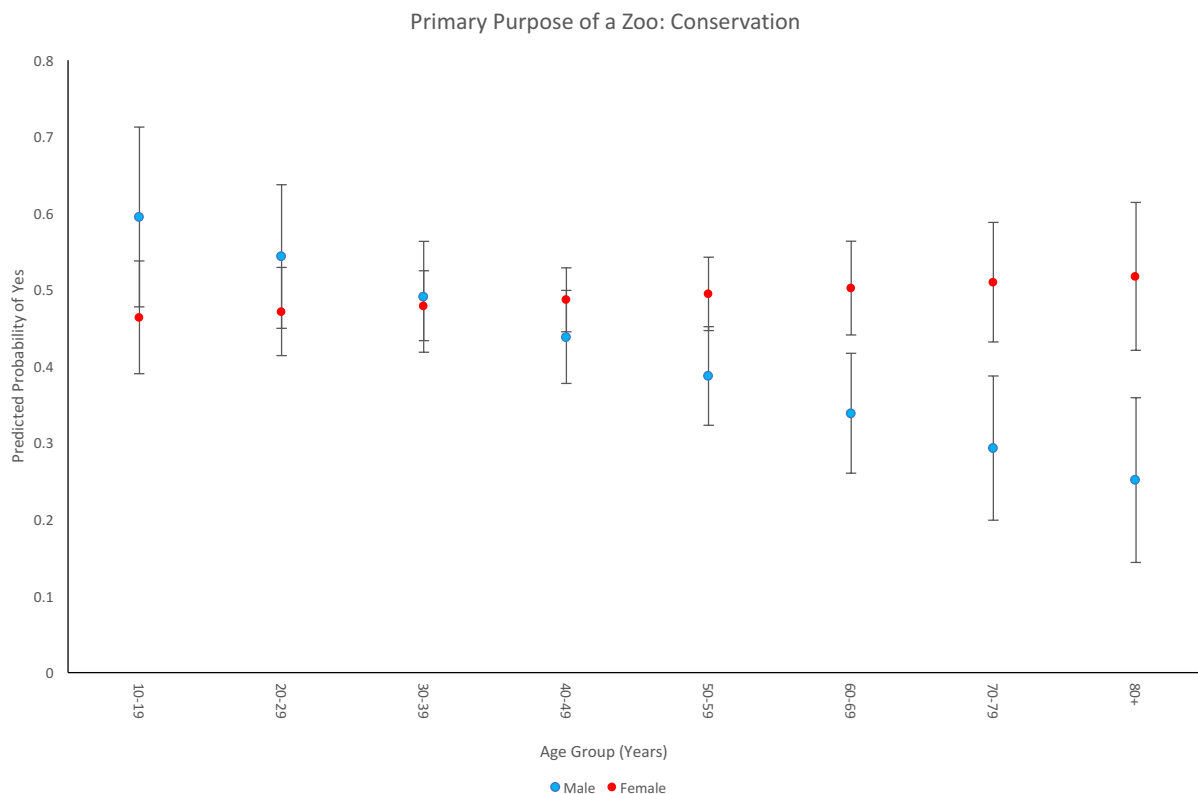
( $\beta = -0.25$ ,  $0.16$  SE =  $2.47$ ,  $p = 0.12$ ). However for this model, there was a significant interaction between age and gender response patterns ( $\beta = 0.09$ ,  $0.04$  SE,  $\chi^2 = 7.08$ ,  $p = 0.0078$ ), such that older women tending to answer “yes” less frequently than men.

Only 19% of individuals’ ranked entertainment higher than education when planning an outing. For those who did rate entertainment higher, there was no significance difference between response patterns in age, gender, or their interaction (figure 3). The results are as follows, gender ( $\beta = 0.06$ ,  $0.12$  SE,  $\chi^2 = 0.24$ ,  $p = 0.62$ ), age ( $\beta = 0.01$ ,  $0.15$  SE,  $\chi^2 = 0.76$ ,  $p = 0.38$ ), interaction of age and gender ( $\beta = -0.01$ ,  $0.03$  SE,  $\chi^2 = 0.03$ ,  $p = 0.87$ ).

### *Conservation*

When asked if zoos were needed to maintain biodiversity (biodiversity being defined in the survey as keeping as many species alive as possible), 96% of visitors answered “yes”. However, when asked if the primary purpose of zoos was conservation, only 35% of visitors agreed. Furthermore, only 16% of visitors agreed that captive propagation was an important part of a zoo. The data show that 27% of individuals listed daily activities such as reduce, reuse, and recycle as a practical way to support conservation, whereas 79% listed visiting a zoo as a practical approach to support conservation.

We did not find statistical difference between the response patterns by age, sex, or their interaction when respondents were asked whether the primary purpose of a zoo was conservation (figure 4). The results are as follows, gender ( $\beta = 0.19, 0.17 \text{ SE}, \chi^2 = 1.16, p = 0.28$ ), age ( $\beta =$



**Figure 4.** When asked about the primary purpose of a zoo, 35% of respondents listed conservation. 96% of respondents said zoos were needed to maintain biodiversity. While not statistically significant, older females listed conservation more often than similar aged males.

0.01, 0.02 SE,  $\chi^2 = 0.13$ ,  $p = 0.71$ ), interaction of age and gender ( $\beta = -0.06$ , 0.04 SE,  $\chi^2 = 2.34$ ,  $p = 0.13$ )

## DISCUSSION

### *The Role of Exhibit Signage*

Zoos continue to develop new approaches to effectively reach their visitors. Nevertheless, our results suggest that signs remain a primary and critical source of information, particularly for younger age groups at SHBP (figure 1). In 2014, SHBP revised every species description sign throughout the park. In addition to higher quality images, the largest change was a reduction in the amount of text. Older signs typically had one “low” quality image in addition to three to four sentences. Anecdotal evidence showed that many visitors become overwhelmed and quickly stopped reading exhibit signs thereby missing important messages within the text. With the change in 2014, SHBP focused on higher quality images next to one sentence with a “take home message”. Like SHBP, many zoos are reducing species-specific text and instead focusing in on big picture messages (Fogelberg 2014). Such efforts may facilitate information uptake from visitors that rely primarily on exhibit signs.

Signs have rarely been designed to target specific genders or ages in the zoos. However, our results suggest that males and females at different ages place varying values on how they utilize signs to gain information during their visit. Younger women ranked signs as their primary sources of information more often than young men. Conversely, older male visitors to SHBP appeared to utilize signs more than their female equivalents (figure 1). Younger cohorts also used signs more than older generations regardless of gender. At SHBP, these data could provide useful insight on which conservation messages to focus. If the majority of visitors using signs are under

30 years of age, then messages related to conservation could be targeted accordingly (Allen 1982), for example, by focusing on small lifestyle changes instead of donations as a way to help conservation. With advances in technology, interactive signs are becoming popular. Many facilities recognize that interactive signs increase engagement, which in turn facilitates learning (Allen 2004). With the right pathways, information could be layered in interactive signs that allow each user to access information in a personalized manner. Google, Facebook, Amazon, and similar organizations market to the individual (Rust & Huang 2014). A future platform that allowed interactive signs to deliver personalized messages/information based on the user would allow for the delivery of material tailored towards the individual.

#### *Active Versus Passive Communication*

In addition to traditional signage, SHBP offers daily “keeper talks”, weekly “ParkTalks”, and staff interactions. In an effort to understand how well staff interactions increased visitor learning at SHBP we quantified performance on questions related to the “Avian Pirates” exhibit. We compared responses from visitors who engaged in active communication related to the exhibit (ParkTalks, Keeper Talks, staff interactions) to those who did not. We expected respondents who had participated in active communication to perform better compared to those who only passively viewed the exhibit. Our results, however, revealed the opposite trend. For those who completed both questions, 76% of active participants correctly answered both questions versus 100% in passive only participants. The data suggest that survey respondents who were engaged in passive communication on Avian Pirates tended to better remember details, although the differences were not statistically significant. We believe that this somewhat

surprising pattern may be the result of survey structure as the vast majority (92%) of visitors who only participated in passive communication did not answer the related questions. Poor response rate among participants in the passive communication group resulted in a small and likely biased sample for this comparison. Visitors who engaged in active communication related to Avian Pirates responded to questions related to the exhibit significantly more frequently than those who did not. This could suggest they had a more meaningful experience since they were willing to take the time to respond. Increasing the scale of the active communication efforts would allow for increased sample size and therefore allow a more powerful test. Likewise, randomized sampling of park visitors would help to remove responder bias from our analysis. While the survey hinted that staff interactions could help to increase visitor retention of smaller details, further examination of this issue is needed. These results also suggest that effective signage can be highly informative for some visitors.

### *Conservation in Zoos*

There is little doubt that zoos recognize that conservation is an important part of their purpose (Patrick et al. 2007). Surprisingly, however, our results show that visitors to SHBP are not as convinced about the importance of conservation in zoos (figure 4). When asked if zoos were needed to maintain biodiversity (biodiversity being defined in the survey as keeping as many species alive as possible), 96% of visitors answered yes. However, when asked if the primary purpose of zoos was conservation, only 35% of visitors agreed. Furthermore, only 16% of visitors agreed that captive propagation was an important part of a zoo. Captive propagation was defined as “breeding animals” in the survey. It is interesting that visitor’s view zoos as

important to maintain biodiversity yet do not believe breeding animals is important component of zoos. How do zoo visitors believe zoos maintain biodiversity? It may be important for zoos to better communicate concrete conservation efforts in which they are participating. Zoos spend millions of dollars on active conservation (AZA 2016), however there appears to be a disconnect between this fact and public perception.

Research has shown that people can become overwhelmed when faced with large problems that do not have clear answer (Ballantyne et al. 2007). An important part of zoos is not only to educate individuals on conservation, but also to provide them with tangible solutions that can be incorporated into their daily lives. Our survey showed that only 27% of individuals listed daily activities such as reduce, reuse, and recycle as a practical way to support conservation, whereas 79% listed visiting a zoo as a practical approach. As previously suggested, visitors to SHBP believe that zoos are important to conservation via education, however fewer than one third of visitors believed that daily activities are a practical solution to conservation.

### *Entertainment in Zoos*

Our data suggests that younger cohorts answer yes more often when asked if the primary purpose of a zoo is entertainment. There was also a substantial difference between the development of zoo perception between men and women, with women placing more value on using zoos as an educational experience (figure 2). Zoos recognize that the majority of their non-student visitors are family groups that have come to teach their children about the natural world in addition to entertaining them (Dierking & Falk 1994; Bruni et al. 2008). Self-reflection and outdoor activities have shown to be beneficial for families (Therkelsen & Lottrup 2015).

## CONCLUSION

As zoos evolve to meet societies expectations they must continue to internally evaluate their methods in order to provide an educational setting that allows visitors to connect with nature in an enjoyable environment. Zoos must gain a better understanding of their personal visitation base so they will be able to create targeted signs that best facilitate learning. Active communication via Keeper Talks and staff interactions are an important form of communication for zoos. Future studies should be directed towards gaining a better understanding of how passive and active communication components relate to visitor learning. For passive communication via traditional signage, zoos must develop methods for evaluating the effectiveness of sign design. Our results show that this method is still a primary source of information for visitors at SHBP. We would predict that while effective, the traditional sign will give way to technologically interactive signs better utilized by future generations. As this new technology develops, it is critical that zoos understand their visitors so that information can be presented in the most effective manner. Active communication will continue to be a viable form of communication used to varying success depending on the size of the facility and the skill of the communicator. It should be noted that the caveat to voluntary surveys is that they are not a random sample of a population. It could be presumed that a zoo visitor is a unique subset of the general population (Swanagan 2000). For a voluntary survey, it is also likely survey respondents are people that enjoyed their experience at SHBP and were thereby willing to put the time into a survey. These biases should be considered when interpreting the findings here.



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## REFERENCES

- Allen CT. 1982. Self-Perception Based Strategies for Stimulating Energy Conservation. *Journal of Consumer Research* 8:381-390. 10.1086/208878
- Allen S. 2004. Designs for learning: Studying science museum exhibits that do more than entertain. *Science Education* 88:S17-S33. 10.1002/sce.20016
- Andersen LL. 2003. Zoo education: from formal school programmes to exhibit design and interpretation. *International Zoo Yearbook* 38:75-81. 10.1111/j.1748-1090.2003.tb02066.x
- AZA. 2016. AZA and Animal Program Conservation Initiatives Available at <https://www.aza.org/aza-and-animal-program-conservation-initiatives> (accessed January 2016).
- Ballantyne R, Packer J, Hughes K, and Dierking L. 2007. Conservation learning in wildlife tourism settings: lessons from research in zoos and aquariums. *Environmental Education Research* 13:367-383. 10.1080/13504620701430604
- Bruni CM, Fraser J, and Schultz PW. 2008. The Value of Zoo Experiences for Connecting People with Nature. *Visitor Studies* 11:139-150. 10.1080/10645570802355489
- Davies NB. 2000. Cuckoos, cowbirds and other cheats. Poyser: London.
- Dierking LD, and Falk JH. 1994. Family behavior and learning in informal science settings: A review of the research. *Science Education* 78:57-72. 10.1002/sce.3730780104
- Falk JH. 2006. An Identity-Centered Approach to Understanding Museum Learning. *Curator: The Museum Journal* 49:151-166. 10.1111/j.2151-6952.2006.tb00209.x

- Fogelberg K. 2014. Unsilencing voices: a study of zoo signs and their language of authority. *Cultural Studies of Science Education* 9:787-799. 10.1007/s11422-013-9566-8
- Hyson J. 2004. Education, Entertainment, and Institutional Identity at the Zoo. *Curator: The Museum Journal* 47:247-251. 10.1111/j.2151-6952.2004.tb00122.x
- Mony PRS, and Heimlich JE. 2008. Talking to Visitors about Conservation: Exploring Message Communication through Docent–Visitor Interactions at Zoos. *Visitor Studies* 11:151-162. 10.1080/10645570802355513
- Patrick PG, Matthews CE, Ayers DF, and Tunnicliffe SD. 2007. Conservation and Education: Prominent Themes in Zoo Mission Statements. *The Journal of Environmental Education* 38:53-60. 10.3200/JOEE.38.3.53-60
- Perdue BM, Stoinski TS, and Maple TL. 2012. Using Technology to Educate Zoo Visitors About Conservation. *Visitor Studies* 15:16-27. 10.1080/10645578.2012.660839
- Roe K, McConney A, and Mansfield CF. 2014. How Do Zoos ‘Talk’ to Their General Visitors? Do Visitors ‘Listen’? A Mixed Method Investigation of the Communication Between Modern Zoos and Their General Visitors. *Australian Journal of Environmental Education* 30:167-186. 10.1017/aee.2015.1
- Rust RT, and Huang M-H. 2014. The Service Revolution and the Transformation of Marketing Science. *Marketing Science* 33:206-221. 10.1287/mksc.2013.0836
- Swanagan JS. 2000. Factors Influencing Zoo Visitors' Conservation Attitudes and Behavior. *The Journal of Environmental Education* 31:26-31. 10.1080/00958960009598648
- Therkelsen A, and Lottrup M. 2015. Being together at the zoo: zoo experiences among families with children. *Leisure Studies* 34:354-371. 10.1080/02614367.2014.923493
- Woods B. 2002. Good zoo/bad zoo: Visitor experiences in captive settings. *Anthrozoös* 15:343-360. 10.2752/089279302786992478