Assessing the Connotative Meaning of Animals Using Semantic Differential Techniques to Aid in Zoo Exhibit Development

John Fraser, Jessica Bicknell & Jessica Sickler

ABSTRACT

This paper presents results from the testing of a simple visitor survey tool modeled on traditional semantic differential techniques to identify socially agreed traits or attributes that might influence audience bias toward an exhibit species. The authors suggest that understanding these connotative meanings can aid exhibit developers in the creation of experiences. Five tests were conducted with this methodology, each focused on a different animal (dolphins, sharks, cheetahs, zebras, and African wild dogs). With four of the subject animals, a set of traits emerged as those visitors commonly associated with the animal. For the fifth animal, the African wild dog, only one trait emerged as a strong descriptor, indicating a neutral response among the public. In each case, these findings were used by exhibit developers to shape the interpretive messages and plan for an exhibit. This article discusses the benefits and limitations of using this methodology in an exhibit design process and concludes that the method is useful for addressing preconceptions about what visitors think.

INTRODUCTION

In planning exhibitions and creating exhibit stories, zoo exhibit developers seek to create experiences that will resonate with visitors and promote an increased sense of concern for wildlife and wild place conservation. Zoo exhibit developers generally acknowledge that zoo visitors arrive with prior knowledge and attitudes about these subjects and about many of the animals on exhibit.

At the Wildlife Conservation Society (WCS), we suspected that visitors' incoming cognitive knowledge about specific animals was not the only factor influencing how an animal might be discussed or experienced at

a zoo exhibit. In addition to facts and knowledge about an animal, we felt that visitors' perceptions would be influenced by strongly held, socially agreed upon connotations related to specific animals. This seemed especially likely for well-known or emblematic species with which the public may commonly associate very specific traits and characteristics. Examples of this would include connotations of power and strength associated with a tiger or aversive traits and characteristics associated with sharks, as seen in sensational portrayals in mass media. Also of interest to the exhibit team at WCS was discovering if such characterizations existed for novel, unfamiliar species such as the African wild dog.

Another factor of interest to the WCS exhibit team was finding an evaluation method that could be implemented and analyzed quickly. Such a method would provide rapid feedback about visitor assumptions and perceptions to inform the framing of exhibit messages and prioritization of concepts for display. Traditional methods for front-end studies of visitor knowledge and attitudes about animals are valuable to this process, but they tend to require an investment of time for survey development, data collection, and data analysis, that is not always available or feasible in an exhibit development schedule. While these methods remain useful, we recognized the need for new tools to enable exhibit developers to quickly assess the connotative meanings visitors attribute to the living collection animals.

This paper presents results from preliminary research using a simple survey tool modeled on traditional semantic differential techniques. This tool may be useful for quickly assessing whether zoo exhibit animals are assumed to have socially agreed traits or attributes that might influence audience bias toward the species. Understanding these connotative meanings can aid exhibit developers in the creation of experiences that either build on or contrast with these established public stereotypes. This research was conducted in a shared effort by audience researchers and exhibit developers at the Wildlife Conservation Society (WCS) in New York City.

BACKGROUND

Human perceptions of zoo animals have been considered from a variety of perspectives. Kellert (1980) proposed a typology of attitudes toward animals (Utilitarian, Aversive, Aesthetic, Scientific, Humanistic, Moralistic, Dominionistic, Symbolic) that does not necessarily assist the exhibit developer because these types are not related to characterization of individual species. Kalof (2000) proposed that social experiences and upbringing may predispose some groups to have contrasting attitudes toward species. In pursuing this line of inquiry based on a Q methodology study, Kalof speculated that similarity in upbringing may have had influence on the degree of assumed concern her research participants accorded to specific types of animals. While Kalof's study illustrated that some animals may be characterized as aversive pests by some cultural groups while others view them as just another aspect of the natural world, the study did not provide characterizations of specific animals.

Both Kellert's and Kalof's academic studies, though rigorous, do not aid exhibit developers in creating engaging exhibit narratives because they do not explore perceptions of specific species. Our team felt that it would be valuable if we could find a simple evaluation instrument that would allow exhibit developers and researchers to quickly determine basic perceptions of visitors based on their pre-existing knowledge and assumptions and the connotations of animals to be exhibited at the zoo. The team also felt that such a tool could be very useful if it could test staff assumptions regarding what traits they believed the public ascribed to specific animals in order to either confirm or refute these staff biases.

The methodology presented here is based on semantic differential research, which has been shown to be an effective tool for determining attitudes, perception, and connotative meaning (Osgood, Suci, & Tannenbaum, 1967). We selected the semantic differential survey technique as a way to understand potential stereotypes because the surveys would be simple to administer, incur minimal disruption to the flow of the visitor's experience, and allow exhibit developers to test their own preconceptions regarding public beliefs about a species' inherent characteristics. Our purpose in using a semantic differential technique was not to develop a generalizable principle regarding species that could be applied in all zoo settings, but rather, to create a useful tool for exhibit developers working on projects at the WCS zoos or aquarium to understand the socially agreed traits ascribed to an animal by visitors.

As a test, we employed this methodology to examine perceptions of five species that were the subject of new exhibits at the New York Zoos and Aquarium. These species included familiar land mammals (Grevy's zebras, cheetahs), marine life (sharks, dolphins), and an animal known to be unfamiliar to zoo visitors (African wild dogs) (Owen, 2001). We felt that repeated use of this methodology would allow us to assess its usefulness in creating

exhibits that either build on or contrast with commonly held stereotypes, in order to promote conservation thinking or reframe widely held misconceptions about an animal.

METHOD

We chose to test the semantic differential method in these studies for its capability to assess underlying connotative meaning. A semantic differential questionnaire presents participants with a series of word-pairs that represent bipolar traits or attributes (e.g., happy/sad, cute/ugly). Between each pair of bipolar traits is a seven-point scale, on which respondents indicate the point in the continuum that best represents their connotation of the stimulus. In this case, the stimulus about which they responded was the specific animal. After collecting respondents' connotative associations, we looked at the mean scores for each word-pair to assess the profile of traits that were most strongly associated with the stimulus animal.

The first step in this process is selection of the word-pairs for the study. The standards for developing word-pairs described by Osgood et al. (1967) are based on surveying how something is generally described, using words that are commonly understood and are within the semantic space in which

Zebras. © Wildlife Conservation Society

the object in question is considered in common conversation. In experimenting with this method, the adjectives for the scales were generally selected according to Osgood et al.'s dimensions of semantic space: evaluative (how good or bad a thing is judged to be), activity (how active or passive), and power (how weak or strong). However, we did not believe that all of Osgood et al.'s word-pairs were necessarily valuable or valid for the animals that were the subjects for this study.

The purpose of the five studies presented here was to obtain results for specific species that could offer insight to an exhibit development team about what socially agreed traits the public associates with these animals, especially in relation to how the exhibit developers sought to describe the animals. Consequently, the lists of adjectives that were selected varied slightly between animals, based on reviews with zoo staff about preconceptions they believed zoo visitors might hold about these animals. Final decisions on the word-pairs were made by the research team based on the words' hypothesized relevance to the stereotype of each animal and to the conservation education goals of the future exhibit in question. Between nine and eleven word-pairs were selected for each species (see Appendix for total list). For all surveys, the adjective-pairs were placed on either end of a seven-point scale, numbered 1, 2 and 3 around a neutral mid-point (0) to indicate neither or both traits (i.e., neither happy nor sad or both happy and sad, equally).

In all five studies, we used opportunistic sampling, with surveys administered to individual visitors at the Bronx Zoo or New York Aquarium. Because each of these studies was conducted on behalf of individual exhibit development projects and teams,

Table 1.   Sample size for each of the five studies

Species	N
Dolphin	30
Shark	30
Cheetah	78
Zebra	89
Wild dogs	89

the sample sizes varied from 30 to 89 participants (see Table 1), reflecting staff availability, budgetary, and seasonal constraints unique to individual projects, as well as the study's relationship to other evaluation efforts in the project. Age and gender were used to confirm that the participants reflected the general demographics of zoo/aquarium visitors, with slightly more women than men responding to these surveys and a slightly higher percentage of those respondents between the ages of 25 and 40.

Each study sought to inform the exhibit development process by assessing commonly agreed traits assigned to animals during the zoo or aquarium experience, as opposed to the common perception of the public at large. The research team acknowledged that some animals are well-known in general society because of their widespread use in popular media such as advertising, literature, and news. For most people, just the common name of these familiar animals calls to mind a mental image that would be sufficient stimulus for completion of the questionnaire. Other animals exhibited at the zoo, however, are novel and unfamiliar to the general public. Despite this unfamiliarity, the research team sought to investigate what types of connotative impressions would be reported by visitors upon their initial visual encounter with the species in a

zoo exhibit. Therefore, it was felt that in the case of more novel animals, the procedure should provide participants with a minimal amount of visual information that would be consistent with a first encounter during a zoo/aquarium experience.

Some of the well-known species included in this report are dolphins and sharks, which are well represented in all forms of popular media. In these cases, visitors were approached as encountered on the zoo or aquarium grounds without support of visual aids and asked to complete a semantic differential survey based on their pre-existing knowledge and beliefs. In cases where animals were already housed in an exhibit, but where the signage was subject to renovation, such as cheetah or Grevy's zebra, the team assessed visitors' responses to the animal in front of the exhibit, before they encountered any signage. Lastly, where an animal was not housed in the zoo and not considered familiar to visitors, as was the case with African wild dogs (Owen, 2001), the animal was introduced visually to visitors by showing a one-minute close-up video of a pack of wild dogs exhibiting the same napping and resting behavior typically seen on exhibit. This video was edited to appear as if the film was taken in a zoo exhibit similar to that proposed for the zoo and having a viewpoint matching that of the future visitor viewing window. These choices for the stimuli were chosen as "best-case scenarios" to replicate what visitors would bring to the table when they encounter animals on exhibit. Although some researchers may consider it valuable to investigate more general public connotations regarding species, for the purpose of exhibit development for live collections, what is important in the method described here is that the information is quick to collect and represents the connotative meanings that may attach to animals when they

are encountered in a zoo or aquarium setting.

To analyse the data, we assigned each position on the scale a score from +3 (the most positive rating) to -3 (the most negative rating) and determined the mean, median, and mode ratings for each scale. The mean ratings were examined for any adjectives that visitors collectively indicated to be a strong descriptor of the animal, as we were solely looking for general trends of visitor perception. A trait was considered to be a strong descriptor if its mean rating was -1.5 or lower, or +1.5 or greater. This score was used as a cut-off because it represented the two most extreme quarters of the rating scale. Median and mode scores were examined to verify consistency in ratings, ensuring that mean scores accurately reflected the general profile of scores received. For all strong descriptors, mean ratings were consistent with the median and mode, but this was not always the case for traits that were considered weak descriptors. In principle, the method sought to understand the responses of zoo visitors, not to demonstrate generally held views on a species in the wider society or traits that could be assigned to animals in other settings.

RESULTS

In four of our five studies, three or more traits emerged as strong descriptors of the target animal, representing a commonly held stereotype among New York Zoo and Aquarium visitors. Regarding wild dogs, however, only one trait, "interesting", emerged as a strong descriptor, indicating that zoo visitors do not hold a strong social stereotype about this animal. Most of the mean ratings for wild dogs hovered around the mid-point of 0, ranging between -0.3 and 0.9. On the whole, these trait-

pairs were consistently rated neutrally by visitors. However, on four of the eleven pairs (valuable/unimportant, cute/unappealing, passive/aggressive, and strong/weak), there was far greater disagreement, with modal scores being more extreme (+3, +2, -2 and +2), even though mean ratings were neutral.

In contrast to the results from wild dogs, the average ratings for dolphins indicated that respondents strongly identified with seven out of nine positive traits (see Table 2). This reflects the very strong and very positive public characterization of this species among the aquarium-going public. Although the stereotypes of the other target animals were less strongly held than that of dolphins, the strong descriptors for each distinguish them from the neutral perception found for wild dogs.

Sharks prompted an interesting mix of a few defining characteristics, including "interesting", "valuable", and "dangerous". This was the only animal to emerge with a negative characteristic in its stereotype. However, other negative characteristics such as aggressive, angry, and violent consistently received neutral responses. The trait-pairs of desirable/undesirable and intelligent/stupid received mixed
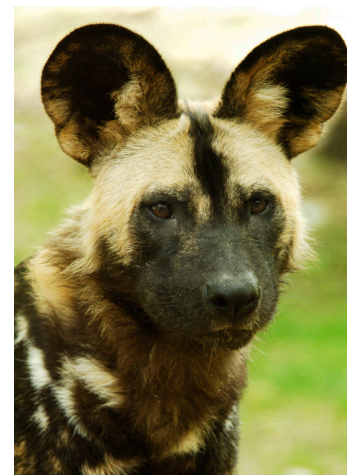
Wild dog. © Wildlife Conservation Society

Table 2. Strong descriptors, by animal, with mean ratings

Dolphin		Shark		Cheetah		Zebra		Wild Dogs	
Interesting	2.8	Interesting	2.5	Valuable	2.6	Valuable	2.3	Interesting	1.8
Friendly	2.6	Valuable	2.2	Interesting	2.5	Interesting	2.1		
Intelligent	2.6	Dangerous	-1.8	Strong	2.3	Good	2.0		
Cute	2.6			Intelligent	1.9	Friendly	1.7		
Social	2.5			Cute	1.7	Passive	1.6		
Happy	2.2			Good	1.6	Cute	1.6		
Attractive	1.6			Endangered	1.5	Harmless	1.5		

reactions, with ratings being divided among very positive, neutral, and very negative. This resulted in neutral mean and median ratings, but mode ratings of +3. Thus desirability and intelligence may be traits that reflect stronger feelings for some individuals, rather than a common social attribute.

Results for cheetahs and Grevy's zebras each indicated a strong association with seven of the eleven traits. While these positive connotations were not as strongly held as those for dolphins, all ratings were relatively consistent across the visitors surveyed. In comparing the strong ratings for zebras and cheetahs, two animals that would be exhibited near one another at the Bronx Zoo, we noted that cheetahs tended to be identified more as strong, intelligent, and endangered, whereas zebras were uniquely perceived as friendly, passive, and harmless.

APPLICATION OF THE RESULTS

Where visitors strongly associated particular traits with the target animals, exhibit developers were able to directly craft exhibit messages that responded to these traits to enhance appreciation and/or address misconceptions. In the case of dolphins, the marine mammal research community was concerned that the public be made aware of the intelligence of the animals (Sickler et al., 2006) and these results demonstrated that the aquarium-going public was already aware and believed the animals were intelligent, allowing the exhibit developers to focus directly on how visitors understand animal intelligence.

Similarly, in the case of a shark exhibit, the design team was able to dispel the notion that visitors have strongly held misconceptions regarding the ferocity of sharks. This allowed designers to focus on issues pertaining to species conservation rather than responding to a fictionalized vilification of the species. Though the animal was described as dangerous, it was also seen as valuable and important, suggesting that aquarium guests have a practical understanding of sharks as important ocean carnivores.

In the case of cheetahs and Grevy's zebras, the team was surprised by the agreement within the data and interested in the differences between the two animals. While both species are endangered in the wild, designers were interested to note that the zebra was not perceived to be endangered while the cheetah was. In these cases, exhibit developers realized that for zebra, greater interpretation regarding why the animal is endangered was a necessary addition to the exhibit messages, while the cheetah exhibit could quickly build on this assumption by addressing how WCS was acting to protect the species. It was also interesting to note that cheetah were considered intelligent, allowing exhibit developers to focus on hunting strategies, while an assumed harmlessness and friendliness of zebras provided potential entry points for interpreting the conservation realities for this species in the wild.

Lastly, in the case of wild dogs, the lack of strong preconceptions about traits ascribed to the species, apart from the general agreement that the species is interesting, helped confirm for zoo management that the species would enhance the public experience. An animal that is both novel (having no preconceived idea regarding its attributes) and interesting creates a unique scenario for exhibit developers. In this case, the goals of the interpretive program were redefined to increase the information regarding its natural history and to directly address how conflict with humans has impacted its survival in the wild. Because the animal was not considered aversive or ascribed negative characteristics in the zoo setting, the interpretive team also chose to use affective language to encourage

behavioral observation and to compare relationships within the pack to human family relationships to increase empathy and potentially enhance the perceived value of the animal.

DISCUSSION

The purpose of this paper is to provide information to other visitor studies professionals on how the semantic differential research method can be applied to animals in a practical setting to enhance the exhibit development process. Use of the semantic differential method has proven to be a quick and easy way of assessing public perceptions of animals, can enhance the understanding of where efforts need to be placed in information delivery prior to the expense of formative evaluation for exhibit messages, and helps to characterize the semantic space surrounding a species as a guide for development of exhibit text. Unlike open-ended surveys of knowledge, the semantic differential method allows exhibit researchers to characterize the underlying connotations that influence visitor perceptions of animals irrespective of actual natural history knowledge.

The five semantic differential studies reported here were in large part performed to test the utility of this method for quickly collecting information about visitor perceptions of animals in a way that was valuable for exhibit developers in the zoo setting. From the testing and results presented above, we determined that there are both pros and cons to using the semantic differential methodology for exhibit development purposes.

One of the most positive aspects of this methodology is the speed and ease with which these surveys can be developed, administered, and analyzed. As the needs and timelines of the

exhibit development process can change quickly, it is beneficial for the research team to have a methodology that can be implemented so rapidly.

Additionally, we found value in this methodology for providing a quantifiable measure of visitors' perceptions of the animals we exhibit, as opposed to the more qualitative measures obtained by many other front-end evaluation methods. Using the semantic differential tool, we can provide exhibit developers not only with the adjectives and traits used to describe each species, but with a quantified measurement of how strongly visitors, as a whole, associate those traits with the animal. Another strength of the semantic differential scale is that it allows us to measure the strength of association with both positive and negative traits, while also allowing for the expression of neutrality.

Finally, by examining the scores across visitors for each animal we are able to identify specific traits that reflect common consensus among visitors' perceptions, traits about which there is great variability and disagreement between individuals, and traits that generally do not elicit a strong response. These data are particularly useful for helping zoo managers recognize where emphasis is *not* needed because visitors already accept some of the basic concepts the staff would like to present in an exhibit.

We also recognize several limitations and challenges to the utility of this methodology. The first of these relates to establishing the reliability of the word-pairs chosen for the scales in the study. In our test cases, we selected word-pairs based on the exhibit development team's assumptions about visitor perception of the animals, as this seemed to be the most expedient way to answer developers' questions.

However, this does raise concerns about the validity of the specific scales used in these examples. For future use and refinement of this methodology, we would recommend that selection of the word-pairs be more deliberately drawn from and grounded in scales that have been tested and validated in prior research, while still making selections based on developers' hypothesized stereotypes and needs for the interpretive planning.

While this method provides insight into the preconceptions of visitors about the connotative meaning attached to an animal, we recognize that this may not represent changeable ideas among the public. In other words, it may be difficult to significantly modify these sets of connotations that visitors associate with an animal through just the exhibit context. Further research using the method with visitors exiting an exhibit would be necessary to test the extent to which connotations are able to be influenced.

It is also possible that the results of these studies were impacted by a social desirability factor. Two characteristics, interesting and valuable, did emerge almost universally among animals in our studies. This may represent a bias inherent in surveying zoo and aquarium visitors, who might be predisposed to value and have interest in all or most animals. It could also reflect a bias of social desirability. This possible bias or predisposition calls into question the value of including these two traits in future studies.

A final factor to consider when employing this methodology for front-end exhibit research is that it is limited to examining perceptions and connotations about a subject. It does not provide in-depth information about visitor knowledge or attitudes about the species, which is also valuable

for exhibit developers to know. To provide the exhibit teams with a well-rounded body of information about visitors' preconceptions about an animal or topic, we feel that the semantic differential is most useful as one tool to be combined with other methodologies and techniques.

CONCLUSION

These initial tests showed the WCS exhibit team that the semantic differential methodology was useful for providing insight into visitors' incoming perceptions of animals. We have found it most useful as an assessment tool used in conjunction with other studies, realizing that it provides a unique set of information to guide the creation of an exhibit story that is equally responsive to conservation science and to promoting visitor interest and concern.

One of the most useful attributes of this method, for the staff at WCS, is the ease with which it can be administered by exhibit development staff, allowing them to collect needed information with minimal assistance from a trained researcher. For these reasons, we hope to continue to advance the use of this technique by testing and establishing a more stable set of word-pairs so that exhibit developers can continue to use these surveys to guide their interpretive designs.

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THE AUTHORS

John Fraser, Director, Public Research and Evaluation Program, Wildlife Conservation Society Institute, 2300 Southern Blvd., Bronx, NY 10460,

Email: jfraser@wcs.org

Jessica Bicknell is an Exhibit Developer at the Wildlife Conservation Society's Bronx Zoo.

Jessica Sickler is a Research Associate at the Wildlife Conservation Society Institute's Public Research and Evaluation Program.

Appendix: List of word pairs used in each study

Dolphin	Shark	Cheetah	Zebra	Wild Dogs
Friendly/Hostile	Friendly/Hostile	Friendly/Hostile	Friendly/Hostile	Friendly/Hostile
Attractive/Unattractive	Interesting/Dull	Valuable/Unimportant	Valuable/Unimportant	Valuable/Unimportant
Interesting/Dull	Intelligent/Stupid	Interesting/Dull	Interesting/Dull	Interesting/Dull
Intelligent/Stupid	Good/Bad	Stupid/Intelligent	Stupid/Intelligent	Stupid/Intelligent
Happy/Sad	Cute/Unappealing	Sad/Happy	Sad/Happy	Sad/Happy
Cute/Unappealing	Valuable/Unimportant	Unappealing/Cute	Unappealing/Cute	Unappealing/Cute
Social/Solitary	Safe/Dangerous	Endangered/Plentiful	Endangered/Plentiful	Endangered/Plentiful
Safe/Endangered	Passive/Aggressive	Good/Bad	Good/Bad	Good/Bad
Passive/Aggressive	Plentiful/Endangered	Passive/Aggressive	Passive/Aggressive	Passive/Aggressive
	Calm/Angry	Dangerous/Harmless	Dangerous/Harmless	Dangerous/Harmless
	Passive/Violent	Weak/Strong	Weak/Strong	Weak/Strong