



Exploring the Factors That Influence Zoo Visitors' Perceptions of the Well-Being of Gorillas: Implications for Zoo Exhibit Interpretation

Jan Packer, Roy Ballantyne & Jerry F. Luebke

To cite this article: Jan Packer, Roy Ballantyne & Jerry F. Luebke (2018) Exploring the Factors That Influence Zoo Visitors' Perceptions of the Well-Being of Gorillas: Implications for Zoo Exhibit Interpretation, *Visitor Studies*, 21:1, 57-78, DOI: [10.1080/10645578.2018.1503878](https://doi.org/10.1080/10645578.2018.1503878)

To link to this article: <https://doi.org/10.1080/10645578.2018.1503878>



Published online: 14 Dec 2018.



Submit your article to this journal [↗](#)



Article views: 1



View Crossmark data [↗](#)



Exploring the Factors That Influence Zoo Visitors' Perceptions of the Well-Being of Gorillas: Implications for Zoo Exhibit Interpretation

Jan Packer,^a  Roy Ballantyne,^a and Jerry F. Luebke^b

^aUniversity of Queensland, Brisbane, Australia; ^bChicago Zoological Society-Brookfield Zoo, Brookfield, Illinois, USA

ABSTRACT

Modern zoos face increasing pressures to maintain and demonstrate both the physical and psychological well-being of animals in their care. However, the informal judgments that zoo visitors make about animal well-being may be based on criteria that are inappropriate or misleading. In this research, two self-administered questionnaires were used to explore the indicators that zoo visitors use, consciously or unconsciously, to judge the well-being of gorillas in a naturalistic zoo exhibit. One questionnaire was completed by 105 adult visitors as they exited a gorilla exhibit; another questionnaire was completed by a separate sample of 166 adult visitors while they were observing the gorillas in the exhibit. The results demonstrate that visitors are willing to make judgments of animal welfare, are able to articulate the reasons underlying their judgments, use different indicators when judging health and happiness, and are influenced by environmental aspects of the exhibit. Visitors' assessments of animal well-being were positively related to their emotional connections with the gorillas and their satisfaction with the visit. Suggestions are provided regarding interpretive information that zoos might provide to better inform visitors' perceptions of animal well-being.

Throughout their varied history zoos have changed and evolved in tandem with public expectations and attitudes. Early zoos, as sites of public recreation and leisure, used small enclosures and cages to ensure animals would be visible to visitors (Baratay & Hardouin-Fugier, 2002). Modern zoos, as sites of conservation education, provide more naturalistic environments that offer enrichment activities and opportunities for animals to engage in natural behaviors. In recent years, there has been increasing public interest in and concern about the welfare of zoo animals (Draper, 2016; Draper, Browne, & Harris, 2013). Zoos have thus been challenged to demonstrate that the positive conservation outcomes they achieve outweigh the negative impacts of keeping animals in captivity. If animals are seen to be suffering as a result of their captivity, the value of zoos will be questioned even if they are achieving their conservation goals (Chiszar, Murphy, & Iliff, 1990). High standards of animal care are legislated in many countries and considered an ethical responsibility by the international zoo community and zoo visitors themselves. Zoos are thus expected to not only display animals but also contribute to

the survival of the species, educate the public, and maintain both the physical and psychological well-being of their animals (Hutchins & Smith, 2003).

Recent research indicates that at zoos and aquariums around the world the factor that visitors report contributes most to their satisfaction with their zoo or aquarium visit is “seeing animals that are well cared for” (Ballantyne & Packer, 2016, p. 201). Visitors considered this item more important than being able to observe species they had never seen before, being able to get close to the animals, and being able to watch animals be fed. Similarly, Roe, McConney, and Mansfield (2014) reported that when visitors were asked in an open-ended question to specify “other” activities that should be a priority for zoos (i.e., not among the 11 typical zoo activities listed), 29% mentioned issues around animal welfare.

Zoos in general rely on a mixture of public funding, zoo membership, and ticket sales to fund their endeavors. All of these are dependent on the continuing goodwill and support of the general public. Thus, to survive economically, zoos must not only ensure the well-being of the animals they keep, but also be seen by their visitors to be doing so. Povey and Rios (2002) argue that improving visitors’ perceptions that animals are well cared for might lead to increased public support for the zoo. It is also possible that visitors’ perceptions regarding animal well-being may impact either positively or negatively on the extent to which they make an emotional connection with the animals they observe. This, in turn, prompts visitors to reflect on, and take subsequent action toward, the adoption of environmentally responsible behavior supporting animal conservation (Ballantyne, Packer, & Falk, 2011; Ballantyne, Packer, & Sutherland, 2011).

Given the importance of visitors’ perceptions of animal welfare for their satisfaction with their visit, and their willingness to support not only the zoo’s mission but indeed its very existence, it is necessary to understand the ways in which visitors make judgments regarding animal welfare and the impact it has on their visit satisfaction and emotional responses to the animals. However, there is little information available regarding the criteria visitors use to make judgments regarding animal health, happiness, and well-being. Although zoo veterinarians have established objective physical, physiological, and behavioral indicators of animal welfare that are specific to particular species, visitors are not always aware of these. It is therefore likely that many visitors have misconceptions about the meaning of different animal behaviors and base their evaluations of a zoo’s performance on interpretations that are inaccurate or misleading.

Melfi, McCormick, and Gibbs (2004) investigated the influence of two factors on visitors’ evaluations of animal welfare—enclosure style and animal behavior. They asked visitors to rank photographs of eight different primate enclosures according to how well they liked the enclosure, how well they thought a primate would like the enclosure, how well the enclosure met the physical needs of a primate, and the perceived welfare of the inhabitants. Although only 42 zoo visitors participated in the study, strong relationships were found between visitors’ own preferences and their perceptions of animal welfare. Thus, how well they themselves liked the enclosure was correlated with how well they thought the primates would like the enclosure, which in turn was correlated with their perceptions of animal welfare. Visitors consistently preferred more naturalistic rather than caged enclosures and considered that these would provide the best welfare for their inhabitants, although other enclosures had functional aspects that better catered for the animals’ physical needs. Similarly, using photographs of eight different tiger behaviors,

Melfi et al. (2004) found that the tiger behaviors participants most wanted to see at the zoo (playing, climbing, eating) were also the behaviors that they considered reflected good animal welfare, although visitors were aware that these behaviors were not necessarily common in the wild. The authors concluded that public perceptions of animal welfare are driven more by visitors' own feelings than by an understanding of how to make accurate judgments about welfare issues.

Further evidence regarding factors that influence visitors' evaluations of animal welfare is provided by Povey and Rios (2002). They compared visitors' responses to a leopard in a traditional exhibit and a leopard being used as an interpretive animal (being walked around the zoo by a handler who offered interpretive presentations when spontaneously encountered by visitors). Visitors frequently commented that the interpretive animal appeared happy and well cared for and rated items regarding both the animal's care and quality of life higher than that of the animal in the traditional exhibit. Open-ended responses at the traditional exhibit were often critical of the leopard's lack of freedom in the enclosure and described it as bored and lacking exercise. The interpretive animal, by contrast, was seen to be receiving more personal care through its relationship with its handler and was thus described as being stimulated and emotionally valued.

Animal welfare researchers have suggested that measures of animal well-being need to go beyond objective measures of general health and body condition and should include subjective measures of individual animals' feelings (Whitham & Wielebnowski, 2009). Although such an approach might be interpreted as anthropomorphic (attributing human characteristics to a non-human), Whitham and Wielebnowski (2009) argued that subjective assessments based on zookeeper expertise may contribute valuable information to the assessment of animal welfare in zoos. King and Landau (2003) found that zoo staff were able to reliably assess chimpanzees' subjective well-being, one of the components of which was the extent to which the animal was happy. They concluded "that to some degree humans and chimpanzees share common feelings of happiness and that the former species can assess those feelings in the latter species" (p.13).

Previous research has used visitors' perceptions of an animal's happiness as an indicator of the perceived impact of animal enrichment programs (McPhee, Foster, Sevenich, & Saunders, 1998). These authors used the word *happy* because they argued that visitors could easily relate to its meaning. In the present study, zoo visitors were asked to rate how *happy*, *healthy*, and *well cared for* the gorillas they observed in a naturalistic zoo enclosure appeared to be. The research aimed to answer the following questions:

1. What are the factors that influence zoo visitors' judgments regarding gorillas' well-being?
2. How important are perceptions of animal happiness and animal health in visitors' ratings of how well cared for the animals appear?
3. How do zoo visitors' assessments of animal well-being influence their emotional connections with the gorillas?
4. How do zoo visitors' assessments of animal well-being influence their satisfaction with their visit?
5. What demographic and psychographic characteristics of visitors influence their perceptions of the gorillas' well-being?

Based on the findings, suggestions are provided regarding interpretive materials that zoos might design to better inform visitors' perceptions of animal well-being. Helping visitors make more appropriate and realistic assessments of zoo animals' welfare can contribute to increasing their satisfaction with their visit, as well as maintaining public support for zoos in a climate of increasing concern regarding animal welfare.

Method

Research site

The study was conducted at the Tropic World exhibit at Brookfield Zoo (in Illinois). Built in the 1980s, Tropic World is a 100,000 square foot multi-species indoor immersion space focused mainly on primates from three continents: South America, Asia, and Africa. There are also major exhibit elements throughout the space such as waterfalls, rivers and streams, bridges, and interpretive signage. At the time of the study, the gorilla habitat within Tropic World contained four western lowland gorillas: three adult females and one adult male. Anecdotal evidence suggested that visitors often perceived the elderly male gorilla (silverback) to be depressed, because of his low level of activity, although such behavior was considered by veterinary staff to be typical for a gorilla of his age.

Procedures and participants

Two methods were used to address the research questions, both using self-administered questionnaires: an exit survey in which participants gave general ratings of the gorillas after leaving the Tropic World exhibit, and an observation survey in which a different group of participants rated two preselected individual gorillas while they were still in the exhibit area and the gorillas were in sight. The former survey focused on overall impressions and self-reported reasons for judgments regarding gorillas' well-being; the latter survey focused on the specific characteristics of the gorillas and their environment, thus allowing the implicit factors that influenced visitors' judgments to be identified using regression analysis. It was considered too great a load to request participants to answer both sets of questions, so two questionnaires were created. The exit data were also used to investigate the impact of visitors' perceptions of well-being on their overall satisfaction with their visit. The observation data were used to investigate the impact on their emotional connections with the individual gorillas. Further details of the ways in which the two questionnaires were used are presented in [Table 1](#).

For both surveys, trained staff systematically approached every second group that crossed an imaginary line at either the exit of the exhibit (exit survey) or at the beginning of the exhibit (observation survey). For both methods, daily data collection start times were randomly determined throughout the data collection period. The exit survey was completed by 105 adult visitors. The majority of participants were female (75%), had previously visited Brookfield Zoo (89%), tended to visit zoos in general one or more times a year (85%), and were between the ages of 30 and 59 years old (61%). The observation survey was completed by a separate sample of 166 adult visitors. For this sample, the majority of participants were female (67%), had previously visited Brookfield Zoo (91%), tended to visit zoos in general one or more times a year (73%), and were between the ages of 30 and 59 years old (51%).

Table 1. Summary of data collection and analysis.

Research question	Exit survey	Observation survey
1. What are the factors that influence zoo visitors' judgments regarding gorillas' well-being?	Content analysis of open-ended responses regarding the things that had led participants to make their judgments about the gorillas	Regression analysis using perceptions of each gorilla's behavior, appearance, and environment as predictors of how happy, healthy, and well cared for each gorilla appeared
2. How important are perceptions of animal happiness and animal health in visitors' ratings of how well cared for the animals appear?		Regression analysis using perceptions of happiness and health as predictors of visitors' ratings of how well cared for the animals were
3. How do zoo visitors' assessments of animal well-being influence their emotional connections with the gorillas?		Regression analysis using perceptions of happiness, health, and care as predictors of emotional connection with the animals
4. How do zoo visitors' assessments of animal well-being influence their satisfaction with their visit?	Regression analysis using visitors' perceptions of happiness, health, and care as predictors of reported satisfaction with their visit	
5. What demographic and psychographic characteristics of visitors influence their perceptions of the gorillas' well-being?	Bivariate correlations between visitor characteristics (age group, gender, previous zoo visitation, attitudes to animals and the environment) and visitors' ratings of happiness, health, and care	

Instruments and analysis

Exit survey (see [Appendix A](#)). Visitors were asked to:

1. Give a general rating of gorillas in the exhibit, according to how happy, healthy, and well cared for they appeared to be, using 10-point rating scales ranging from 1 (*very unhappy*) to 10 (*very happy*).
2. Rate the extent to which they had felt an emotional connection with the gorillas using a 10-point scale ranging from 1 (*not at all*) to 10 (*very much*).
3. Give open-ended responses regarding the things that had led them to make their judgments about the gorillas.
4. Rate their satisfaction with their visit using a single item, "I was satisfied with my experience at the gorillas today," rated on a 6-point Likert-type scale.
5. Rank the relative importance they placed on the gorillas being (a) happy, (b) healthy, and (c) well cared for.
6. Rate nine items regarding their attitudes to animals (based on Kellert's 1984 typology).
7. Rate six items regarding their attitudes to the environment (based on Dunlap, Van Liere, Mertig, & Jones's [2000] New Ecological Paradigm).
8. Provide information about their age group, gender, and previous zoo visitation.

Content analysis of the open-ended responses was used to ascertain the factors that consciously influence zoo visitors' judgments of gorillas' well-being (RQ1); regression analysis was used to explore the relations between visitors' assessments of animal well-being and

their satisfaction with their visit (RQ4) and the relations between visitors' demographic and psychographic characteristics and their perceptions of the gorillas' well-being (RQ5).

Observation survey (see [Appendix B](#)). While still in the exhibit area, visitors were asked to rate two individual gorillas on a range of items. One male and one female were selected because the behavioral activity between male and female gorillas are normally very different. The female was selected based on her age (she was not the oldest or the youngest of the three adult females). The male was the only silverback in the exhibit. After confirming they could accurately identify these two particular gorillas, participants were asked to:

1. Rate these two individual gorillas on a range of items, including
 - a. the types of behaviors they had seen the gorilla display, using a checklist of 10 active and 3 inactive behaviors (based on prior research by Luebke, Watters, Packer, Miller, & Powell, 2016, and Powell & Bullock, 2014); and
 - b. perceptions of each animal's appearance, behavior, and mood using 29 semantic differential¹ statements (e.g., bored-interested) on a 7-point scale (from -3 to +3).
2. Rate their perceptions of the gorillas' physical environment using 21 semantic differential statements (e.g., confined-open) on a 7-point scale (as above, from -3 to +3).
3. Rate how happy, healthy, and well cared for each of the two target gorillas appeared to them, using a 10-point scale ranging from 1 (*very unhappy/very unhealthy/very poor*) to 10 (*very happy/very healthy/very well cared for*).
4. Rate the extent to which they had felt an emotional connection with each gorilla using a 10-point scale ranging from 1 (*not at all*) to 10 (*very much*).
5. Respond to Items 5–8 as described for the exit survey, regarding the relative importance of the gorillas being happy, healthy, and well cared for; their attitudes to animals; their attitudes to the environment; and basic demographic characteristics.

Principal axis factor analysis with Varimax rotation was used to reduce the ratings of individual and environmental characteristics to six and three dimensions respectively. Composite scores were calculated on these nine dimensions. Regression analyses were used to ascertain the factors that unconsciously influence zoo visitors' judgments of gorillas' well-being (RQ1). Regression analyses were also used to explore the relative contributions of animal happiness and animal health to visitors' ratings of how well cared for the individual animals appeared (RQ2), and the contributions of visitors' assessments of animal well-being to their emotional connections with the gorillas (RQ3).

Results

Overall, visitors perceived the gorillas to be very well cared for and healthy but just above the midpoint of the scale for happy ([Table 2](#)). In the observation survey, the individual ratings for the two target gorillas were slightly lower than the overall ratings of the group of four gorillas on the exit survey, especially in relation to happiness. This may be due to the placement of the individual ratings after a series of ratings of the individual gorillas' characteristics and environment, or to the request to rate individuals rather than the group as a

Table 2. Visitors' perceptions of how happy, healthy, and well cared for the gorillas appeared.

Data source	Happy, <i>M</i> (<i>n</i>)	Healthy, <i>M</i> (<i>n</i>)	Well cared for, <i>M</i> (<i>n</i>)
Exit survey – gorillas as a group	7.64 (105)	9.17 (105)	9.25 (105)
Observation survey – average of two individual gorillas	6.18 (146)	8.52 (146)	8.72 (147)
Observation survey – female gorilla	6.66	8.66	8.76
Observation survey – male gorilla ^a	5.69	8.38	8.67

^aThe male gorilla received significantly lower happy and healthy ratings than the female gorilla (mean difference of 0.97 on the 10-point scale from 1 [*very unhappy*] to 10 [*very happy*], $t_{143} = 5.08$, $p < 0.001$; mean difference of 0.28 on the 10-point scale from 1 [*very unhealthy*] to 10 [*very healthy*], $t_{145} = 2.74$, $p = 0.007$). There was no significant difference between the two individuals in relation to well cared for (mean difference of 0.09 on the 10-point scale from 1 [*very poor*] to 10 [*very well cared for*], $t_{145} = 1.62$, $p = 0.109$).

whole. The male gorilla received significantly lower ratings of happiness and health than the female gorilla (Table 2) and was also observed as being less active and less sociable.

What are the factors that influence zoo visitors' judgments regarding gorillas' well-being?

Research in psychology and behavioral economics suggests that people's judgments can be influenced by factors that fall outside their awareness; regression analysis is one means that has been used to reveal the implicit or tacit cues that influence such judgments; these implicit factors can then be compared with explicit self-assessments (see review by Newell & Shanks, 2014). In this study, the factors that influence zoo visitors' judgments regarding gorillas' well-being were addressed using both explicit and implicit methods (exit survey and observation survey) with two independent samples. Participants in the exit survey were asked, in an open-ended question, to give the reasons for their ratings of how happy, healthy, and well cared for the group of gorillas appeared. Participants in the observation survey rated various characteristics of two individual gorillas. These were entered into a regression analysis to identify the best predictors of visitors' ratings of how happy, healthy, and well cared for the individual gorillas appeared. It was considered that the first method (self-reported reasons) would reveal the conscious or explicit factors and the latter method (regression analysis) the unconscious or implicit factors that visitors used to judge well-being. The findings from the two methods are presented separately and then compared.

Method 1: Self-reported reasons for ratings. Participants' self-reported reasons for their judgments of happiness, health, and care were content analyzed separately to identify the main categories of responses emerging for each type of judgment. A total of 27 concepts were derived directly from the data. These were then categorized into six higher-order constructs that were consistent with those identified in the quantitative factor analysis (described under Method 2, below). Individual responses were then reclassified using these higher-order constructs. Finally, the number of responses in each of the high-order categories were counted separately for each type of rating (happy, healthy, well cared for). This analysis revealed distinct differences in the ways people judged the gorillas' happiness, health, and quality of care. Table 3 reports the percentage of total responses within each type of rating that fell into each of the six higher-order categories, together with examples of actual verbatim responses.

- Judgments of happiness were based mainly on the animals' behavior, in particular whether they were engaged and active (e.g., alert or playful rather than bored

or tired); whether they appeared calm, comfortable, and contented; and whether they were sociable (interacting with each other or with visitors). Some participants mentioned the pleasant environment as a reason for inferring happiness.

- Judgments of health were based mainly on the animals' physical condition (e.g., whether they appeared to be well-fed, clean, without injury, and with a shiny coat). Whether the animals were engaged and active was also important. Some participants mentioned the supportive environment as a reason for inferring health (e.g., cleanliness, spaciousness, presence of food or water).
- Judgments that the animals were well cared for were based mainly on environmental factors, including both pleasant and supportive aspects but predominantly the latter. Some participants mentioned the animals' physical condition.

Generally, visitors gave a greater variety of reasons for their happy ratings than their healthy or well cared for ratings. It should also be noted that most of the reasons were

Table 3. Summary of participants' self-reported reasons for their judgments, with examples of verbatim responses.

Self-reported reasons	Happy	Healthy	Well cared for
Number of responses ^a	115	50	61
Engaged and active	37%	24%	—
I see them playing and having fun			
They love swinging around and the one gorilla was clapping his/her hands			
They seemed bright and alert			
They seemed sort of bored and lazy			
They lay around depressed or sit as if bored			
The one gorilla sits in the corner all day			
Calm, comfortable, and contented	29%	—	2%
They seem so calm and unaffected by us watching them			
Relaxed, not a care in the world			
They are content enough to be calm			
They seem relaxed and comfortable			
Sociable	26%	5%	2%
Playing around with other animals			
Enjoying each other's company			
Sitting together, very close			
They make eye contact with people			
They're all huddled as far down, as far apart, with their arms crossed			
They appeared rather solitary			
Physical condition	1%	62%	13%
They looked well fed and groomed			
They seem to be a good size - not too skinny or heavy			
Their fur looks shiny and eyes look healthy			
They don't have any rashes or injuries			
Coats looked dry, not shiny			
Pleasant environment	8%	—	28%
Variety of places to play			
They have a lot to play with or to keep them entertained			
They appear to be in natural habitats			
Environment looks good ... water, trees, grass, etc.			
Comfortable climate			
Supportive environment	—	8%	56%
Have room to exercise			
Clean food and water			
The environment is clean			
Room to move and climb			
They don't have enough food			
The cage is dirty and boring for them			

^aCount of number of responses excludes responses that did not provide a reason for the judgment (e.g., "they seem like they are happy" or "don't know" were excluded). Some participants gave more than one response.

mentioned in the negative to explain low ratings, as well as in the positive to explain high ratings. This was particularly the case for engaged and active and sociable (see [Table 3](#)).

Method 2: Regression analysis of characteristics associated with visitors' ratings. Before conducting the regression analyses, factor analysis was used to reduce the 29 individual gorilla characteristics to six dimensions, and the 21 characteristics of the gorillas' environment to three dimensions. These dimensions are listed in [Table 4](#), together with the semantic differential items that loaded on each.

A series of regression analyses was undertaken to identify the individual characteristics, environmental characteristics, and observed behaviors that were best able to predict visitors' ratings of happiness, health, and care for each of the two gorillas. In all cases, all

Table 4. Items included in the six dimensions of individual characteristics and three dimensions of environmental characteristics.

Dimensions	Semantic differential items
Characteristics of individual gorillas	
Engagement/apathy	Cheerful–depressed Interested–bored Happy–sad Enthusiastic–apathetic Playful–serious Inquisitive–indifferent
Dominance/submission	Confident–fearful Powerful–powerless Secure–insecure Dominant–submissive Strong–weak Wild–tame
Comfort/agitation	Contented–discontented Comfortable–uncomfortable Calm–agitated
Good/poor condition	Healthy–unhealthy Good weight–overweight Well fed–underfed Good physical condition–poor physical condition Cared for–neglected
Activity/passivity	Noisy–quiet Active–passive Fast–slow
Sociability/loneliness	Sociable–solitary Befriended–lonely Friendly–unfriendly
Characteristics of the environment	
Pleasant/unpleasant	Stimulating–depressing Pleasant–unpleasant Good–bad Comfortable–uncomfortable
Supportive/unsupportive	Suitable–unsuitable Safe–dangerous Clean–dirty Adequate–inadequate
Open/confined	Open–confined Spacious–cramped Free–imprisoned Large–small

predictors were entered together (rather than stepwise) and regression weights (β) were used to identify the best predictors. Finally, the best predictors overall (with $\beta > 0.40$) were entered together to assess their relative contributions. Results are summarized in Table 5.

The results of the regression analyses indicate that:

- As for self-reported reasons, there was a greater variety of factors that influenced visitors' happy ratings than healthy or well cared for ratings.
- Also consistent with self-reported reasons, engagement/apathy was a strong predictor of happy ratings, good/poor condition was a strong predictor of healthy ratings, and supportive/unsupportive environment was a moderately strong predictor of well cared for ratings.

Table 5. Results of regression analyses.

Predictors of visitors' ratings	Happy	Healthy	Well cared for
Individual characteristics	$n = 121$	$n = 122$	$n = 121$
<i>Male gorilla</i>	$R^2 = 0.380$	$R^2 = 0.225$	$R^2 = 0.225$
Engagement/apathy	$\beta = 0.400^{***}$		$\beta = 0.291^{**}$
Comfort/agitation	$\beta = 0.238^{**}$		
Dominance/submission	$\beta = 0.160^*$		
Sociability/loneliness	$\beta = 0.192^*$		
Good/poor condition		$\beta = 0.481^{***}$	$\beta = 0.416^{***}$
<i>Female gorilla</i>	$R^2 = 0.277$	$R^2 = 0.283$	$R^2 = 0.330$
Engagement/apathy	$\beta = 0.585^{***}$		$\beta = 0.299^*$
Comfort/agitation	$\beta = 0.167^*$		
Ominance/submission		$\beta = -0.203^*$	
Activity/passivity	$\beta = 0.245^*$		
Good/poor condition		$\beta = 0.535^{***}$	$\beta = 0.514^{***}$
Environmental characteristics	$n = 132$	$n = 135$	$n = 133$
<i>Male gorilla</i>	$R^2 = 0.129$	$R^2 = 0.204$	$R^2 = 0.289$
Pleasant/unpleasant	$\beta = 0.379^{***}$	$\beta = 0.236^*$	$\beta = 0.377^{***}$
Supportive/unsupportive		$\beta = 0.400^{***}$	$\beta = 0.338^{***}$
<i>Female gorilla</i>	$R^2 = 0.328$	$R^2 = 0.174$	$R^2 = 0.216$
Pleasant/unpleasant	$\beta = 0.472^{***}$		$\beta = 0.391^{***}$
Supportive/unsupportive		$\beta = 0.382^{***}$	$\beta = 0.242^*$
Observed behaviors	$n = 147$	$n = 149$	$n = 148$
<i>Male gorilla</i>	$R^2 = 0.078$	$R^2 = 0$	$R^2 = 0$
Sitting	$\beta = -0.272^{**}$		
<i>Female gorilla</i>	$R^2 = 0.111$	$R^2 = 0.060$	$R^2 = 0.042$
Interacting with other gorillas		$\beta = 0.225^*$	
Sitting		$\beta = 0.210^*$	$\beta = 0.206^*$
Best predictors overall	$n = 124$	$n = 126$	$n = 125$
<i>Male gorilla</i>	$R^2 = 0.325$	$R^2 = 0.334$	$R^2 = 0.373$
Engagement/apathy	$\beta = 0.491^{***}$	$\beta = 0.161^*$	$\beta = 0.167^*$
Good/poor condition		$\beta = 0.382^{***}$	$\beta = 0.311^{***}$
Pleasant/unpleasant environment			$\beta = 0.282^{**}$
Supportive/unsupportive environment		$\beta = 0.218^*$	$\beta = 0.196^*$
<i>Female gorilla</i>	$R^2 = 0.413$	$R^2 = 0.349$	$R^2 = 0.400$
Engagement/apathy	$\beta = 0.296^{***}$		
Good/poor condition		$\beta = 0.446^{***}$	$\beta = 0.438^{***}$
Pleasant/unpleasant environment	$\beta = 0.398^{***}$		$\beta = 0.297^{***}$
Supportive/unsupportive environment		$\beta = 0.229^*$	

Note. Only significant effects are reported. R^2 provides an estimate of the proportion of the variation in visitors' ratings (of happiness, health, well cared for) that can be explained by all the predictor variables together. β (standardized regression coefficient) provides an estimate of the size of the relationship between each predictor (independent) variable and the criterion (dependent) variable.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

- In contrast with self-reported reasons, environmental factors were relatively strong predictors of happy, healthy, and well cared for ratings.
- The factors that most influenced visitors' happy ratings were whether the gorillas appeared engaged rather than apathetic, and how pleasant their environment was seen to be.
- The factors that most influenced visitors' healthy ratings were whether the gorillas appeared to be in good physical condition, and how supportive their environment was seen to be.
- The factors that most influenced visitors' well cared for ratings were whether the gorillas appeared to be in good physical condition, and how pleasant their environment was seen to be.

Summary of findings regarding the factors that influence zoo visitors' judgments of gorillas' well-being. Using both qualitative and quantitative methods, a combination of individual and environmental characteristics was found to be important in explaining visitors' judgments of gorillas' well-being. Judgments of happiness depended mostly on the animal's perceived level of engagement and comfort (as opposed to apathy and agitation) and having a pleasant environment. Judgments of health depended on the animal's perceived physical condition and having a supportive (safe and clean) environment. Judgments of being well cared for depended on the animal having a supportive and pleasant environment and being in good physical condition. Although there was a high level of consistency between the qualitative and quantitative findings, environmental characteristics emerged as more important in the quantitative than the qualitative findings especially regarding ratings of happy and healthy, suggesting that visitors may not be consciously aware of the impact of the animals' environment on these ratings.

How important are perceptions of animal happiness and animal health in visitors' ratings of how well cared for the animals appear?

Regression analysis was used to assess the relative contributions of perceptions of happiness and health to visitors' ratings of how well cared for the animals were. This was done separately for each gorilla. For both gorillas, ratings of health contributed more to the prediction of well cared for than ratings of happiness ($\beta = 0.684, 0.134$ respectively for the male gorilla; $\beta = 0.633, 0.254$ respectively for the female gorilla), although happiness did contribute significantly to the prediction for both gorillas. When visitors were asked which of the three they thought was the most important, approximately half of the sample (in both the exit survey and the observation survey) considered health the most important, with approximately 25% selecting each of the other options (happy and well cared for).

How do zoo visitors' assessments of animal well-being influence their emotional connections with the gorillas?

Regression analysis was used to assess the relative contributions of perceptions of happiness, health, and care to visitors' ratings of the emotional connection they felt with the individual gorilla. For both gorillas, the happiness rating was the only significant predictor of visitors' emotional connection with the individual animal ($\beta = 0.349, 0.405$).

How do zoo visitors' assessments of animal well-being influence their satisfaction with their visit?

Visit satisfaction was assessed on the exit questionnaire. Perceptions of health and care had a weak but significant relationship with satisfaction ($\beta = 0.292, 0.286$, respectively); perception of happiness did not ($\beta = 0.185$).

What demographic and psychographic characteristics of visitors influence their perceptions of the gorillas' well-being?

Visitors were asked to provide information about their age group, gender, and previous zoo visitation, and to rate 15 items regarding their attitudes to animals and the environment. Bivariate correlations were used to identify which of these variables were significantly related to visitors' ratings of happiness, health, and how well the animals were cared for. These analyses were conducted using data from the exit survey. Only two items were found to be significantly correlated with visitors' ratings of animal happiness—the extent to which they agreed with the statement “I dislike, feel afraid of, or don't particularly care about animals and the natural world” (people who agreed gave more positive ratings of happiness, $r = 0.251, p = 0.017$); and the extent to which they agreed with the statement “I am concerned regarding the right and wrong treatment of animals” (people who agreed gave less positive ratings of happiness, $r = -0.226, p = 0.032$). This might then be interpreted as a kind of animal liberationist effect, where those who care deeply about animals are unlikely to consider them to be perfectly happy in a zoo. This is illustrated by the open-ended responses:

“A zoo is a zoo, so they can only be so happy here to an extent. However, the zoo they're in now seems nice.”

“I feel like they are as happy as possible in captivity.”

None of the demographic or psychographic items correlated significantly with perceptions of animal health or how well cared for they appeared.

Discussion

Participants in this study were mostly willing not only to make judgments regarding the welfare of the animals they were observing, but also to articulate the reasons underlying their judgments. Many of the indicators used by visitors were appropriate criteria that veterinary staff would also refer to (e.g., body condition and activity levels). However, other criteria, such as the pleasantness of the environment, were also found to be significantly influencing visitors' judgments. This finding suggests that visitors were using their own environmental preferences, either consciously or unconsciously, to make judgments about animal happiness (Melfi et al., 2004). The nature of their open-ended comments about the animals' physical condition (e.g., in relation to their size, the condition of their coat or fur, and grooming) also suggests that they were applying knowledge of their own pets to make judgments about the health and level of care of a different species. As noted by Melfi et al.,

animal welfare is probably a subject which most people feel they understand intuitively; as such, it is not surprising that many visitors to zoos feel capable of judging the welfare of the animals simply on what they see when they pass an enclosure. (Melfi et al., 2004, p. 99)

Interestingly, visitors did make a distinction between the concepts of animal health and happiness and used quite different indicators to judge each. In judging happiness, visitors focused on the animal's perceived comfort or contentment as well as their level of engagement or activity. The gorillas were considered to be happy if they appeared calm and contented, but unhappy if they appeared bored or inactive. In some cases, such judgments may lead to misconceptions, for example, in the case of the male gorilla in this study whose inactivity was judged by visitors as a sign of unhappiness but considered by experts to be typical of a gorilla of that age, even in the wild. Thus, although visitors' perceptions of activity level were accurate, their interpretation of this observation was not appropriate. In judging health, visitors focused more on the animal's physical condition. They were considered to be healthy if they appeared well-fed, had a shiny coat, and had no obvious illnesses or injuries.

Environmental characteristics emerged as important predictors of visitors' judgment of both happiness and health, although only a minority of visitors reported that the environment had influenced their judgments. It is likely that environmental characteristics, in particular how pleasant, safe, and clean the enclosure appeared, were influencing visitors' assessments at an unconscious level. Zoos therefore need to not only provide an environment that meets the animals' needs, but also to consider visitors' perceptions of a pleasant and supportive environment. The environment needs to be visually pleasing, clean, and spacious, with observable provision for food, water, socialization, and play, as visitors infer from these that the animals are well cared for and, to some extent, healthy and happy. These considerations may influence decisions regarding environmental enhancements and enrichment programs.

Visitors' ratings of how well cared for they considered the animals to be are particularly important in the light of previous research findings regarding the contribution of such perceptions to visitors' satisfaction with their visit (Ballantyne & Packer, 2016). In this study, ratings of how well the gorillas were cared for were found to be more closely associated with health than with happiness and were also more consciously influenced by environmental characteristics. Further, perceptions of both animal health and level of care were more strongly related to visitors' satisfaction with their visit than were perceptions of animal happiness. Perceptions of animal happiness were, however, related to the emotional connection that visitors experienced with the gorillas. The direction of this effect cannot be confirmed, as it is possible that visitors who felt a strong emotional connection with the animals may have inferred greater happiness.

As noted above, our study suggests that visitors' inferences regarding the quality of animal care may be influenced by their own preferences and extrapolations of their own feelings. Previous research suggests that identifying with an animal's perceived feelings may contribute to a greater sense of empathy, or emotional connection with the animal (Ballantyne, Packer, & Sutherland, 2011). Traditionally, zoo staff have been taught to discourage anthropomorphic thinking (Whitham & Wielebnowski, 2009). However, to ensure that zoo visitors leave their visit with an accurate and well-informed opinion of the well-being of the captive animals in their care, zoos need to acknowledge that visitors will naturally make these comparisons and thus they need to address these issues as part of their education programs.

Given their influence on visitors' satisfaction and emotional engagement, which has been shown in previous research to facilitate conservation learning (Ballantyne, Packer, Hughes, & Dierking, 2007; Powell & Bullock, 2014), it is clearly important that visitors' judgments (and possible misconceptions) of animal happiness, as well as animal health and level of care, be given attention through interpretive information and messages. In this regard, there are a number of steps that zoo interpreters and educators can take to help visitors make assessments that are appropriate for the species and individuals they observe. Interpretive materials could address some of the issues identified in this study by:

- Providing information about individual differences between gorillas and the kinds of behaviors that are normal for each (including, for example, sex- or age-related behaviors).
- Providing information to help visitors interpret solitary behaviors that give the appearance of being bored.
- Providing information about accurate indicators of health, in particular, how visitors can judge the appropriate size of each gorilla, signs of a healthy coat, appropriate expectations regarding activity levels, and explanations for any obvious injuries or signs of ill health.
- Providing expert assessments of the well-being of the animals.
- Encouraging and providing opportunities for visitors to report instances of animal care that they consider to be in need of improvement.
- Explaining the presence of enrichment activities, especially if they appear unnatural.
- Educating visitors about how the zoo is caring for the physical needs of the animals and the rationale underlying the positioning or timing of food and water provisions.

Finally, it should be noted that this study was exploratory, being one of the first to address the factors that influence visitors' judgments regarding the welfare of animals in zoos. The research was limited to one species in one zoo exhibit in North America, and the findings need to be tested and extended at other sites and with other species. It is quite likely that visitors will use a range of different criteria for different species. Targeted research is necessary to inform interpretation at each site, as different environmental features of the enclosure are likely to also have an impact on visitors' judgments.

In conclusion, as this study has demonstrated that visitors' perceptions of animal well-being are positively related to both their satisfaction with their visit, and their emotional connection with the animals, it is important that zoos provide interpretive information and messages to address visitors' misconceptions, and help them make more species-appropriate assessments of animal well-being. The research findings suggest that such interpretation might contribute to increasing visitor satisfaction, as well as helping zoos respond positively to current and emerging public expectations and attitudes.

Note

1. A semantic differential scale measures attitudes by asking respondents to choose where their position lies on a scale between two polar opposite adjectives. In this case, the scale points were numbered from 3 on the left, through 0 in the middle, to 3 on the right and then

entered as -3 through +3 for analysis. The items were balanced so that positive adjectives were placed equally often on the left and the right.

Acknowledgments

The authors would like to thank the Chicago Zoological Society for supporting this research, the research assistants who distributed the visitor questionnaires, and the visitors who generously gave their time. Their efforts are greatly appreciated.

ORCID

Jan Packer  <http://orcid.org/0000-0003-2250-1175>

References

- Ballantyne, R., & Packer, J. (2016). Visitors' perceptions of the conservation education roles of zoos and aquariums: Implications for the provision of learning experiences. *Visitor Studies*, 19(2), 193–210. doi:10.1080/10645578.2016.1220185
- Ballantyne, R., Packer, J., & Falk, J. H. (2011). Visitors' learning for environmental sustainability: Testing short- and long-term impacts of wildlife tourism experiences using structural equation modelling. *Tourism Management*, 32(6), 1243–1252. doi:10.1016/j.tourman.2010.11.003
- Ballantyne, R., Packer, J., & Sutherland, L. (2011). Visitors' memories of wildlife tourism: Implications for the design of powerful interpretive experiences. *Tourism Management*, 32(4), 770–779. doi:10.1016/j.tourman.2010.06.012
- Ballantyne, R., Packer, J., Hughes, K., & Dierking, L. (2007). Conservation learning in wildlife tourism settings: Lessons from research in zoos and aquariums. *Environmental Education Research*, 13(3), 367–383. doi:10.1080/13504620701430604
- Baratay, E., & Hardouin-Fugier, E. (2002). *Zoo: A history of zoological gardens in the West*. London, UK: Reaktion Books.
- Chiszar, D., Murphy, J. B., & Iliff, W. (1990). For zoos. *The Psychological Record*, 40(1), 3–13. doi:10.1007/BF03399568]
- Draper, C. (2016, Summer). Opinion: Gorilla in the midst of a zoo fog. *Journal of Animal Welfare Law*, 16–18.
- Draper, C., Browne, W., & Harris, S. (2013). Do formal inspections ensure that British zoos meet and improve on minimum animal welfare standards? *Animals*, 3(4), 1058–1072. doi:10.3390/ani3041058
- Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). Measuring endorsement of the new ecological paradigm: A revised NEP scale. *Journal of Social Issues*, 56(3), 425–442. doi:10.1111/0022-4537.00176
- Hutchins, M., & Smith, B. (2003). Characteristics of a world-class zoo or aquarium in the 21st century. *International Zoo Yearbook*, 38(1), 130–141. doi:10.1111/j.1748-1090.2003.tb02073.x
- Kellert, S. R. (1984). Urban American perceptions of animals and the natural environment. *Urban Ecology*, 8(3), 209–228. doi:10.1016/0304-4009(84)90036-6
- King, J. E., & Landau, V. I. (2003). Can chimpanzee (*Pan troglodytes*) happiness be estimated by human raters? *Journal of Research in Personality*, 37, 1–15.
- Luebke, J. F., Watters, J. V., Packer, J., Miller, L. J., & Powell, D. M. (2016). Zoo visitors' affective responses to observing animal behaviors. *Visitor Studies*, 19(1), 60–76. doi:10.1080/10645578.2016.1144028
- McPhee, M. E., Foster, J. S., Sevenich, M., & Saunders, C. D. (1998). Public perceptions of behavioral enrichment: Assumptions gone awry. *Zoo Biology*, 17(6), 525–534. doi:10.1002/(SICI)1098-2361(1998)17:6<525::AID-ZOO6>3.0.CO;2-W
- Melfi, V. A., McCormick, W., & Gibbs, A. (2004). A preliminary assessment of how zoo visitors evaluate animal welfare according to enclosure style and the expression of behavior. *Anthrozoös*, 17(2), 98–108. doi:10.2752/089279304786991792

- Newell, B. R., & Shanks, D. R. (2014). Unconscious influences on decision making: A critical review. *Behavioral and Brain Sciences*, 37(1), 1–19.
- Povey, K. D., & Rios, J. (2002). Using interpretive animals to deliver affective messages in zoos. *Journal of Interpretation Research*, 7(2), 19–28.
- Powell, D. M., & Bullock, E. V. W. (2014). Evaluation of factors affecting emotional responses in zoo visitors and the impact of emotion on conservation mindedness. *Anthrozoös*, 27(3), 389–405. doi:10.2752/175303714X13903827488042
- Roe, K., McConney, A., & Mansfield, C. F. (2014). The role of zoos in modern society—A comparison of zoos' reported priorities and what visitors believe they should be. *Anthrozoös*, 27(4), 529–541. doi:10.2752/089279314X14072268687808
- Whitham, J. C., & Wielebnowski, N. (2009). Animal-based welfare monitoring: Using keeper ratings as an assessment tool. *Zoo Biology*, 28(6), 545–560.

About the authors

Jan Packer is a Research Fellow in the University of Queensland Business School, Australia. Jan's research focuses on applying principles from educational, environmental, and positive psychology to understand and improve visitor experiences at natural and cultural tourism attractions such as museums, zoos and aquariums, botanic gardens, national parks, ecotourism, and wildlife tourism attractions. Address correspondence to: Jan Packer, UQ Business School, University of Queensland 4072, Australia. E-mail:  j.packer@uq.edu.au.

Roy Ballantyne is Research Professor at the University of Queensland Business School, Australia. His current research focuses on environmental learning in free-choice learning environments with an emphasis on facilitating visitors' adoption of environmentally sustainable behavior. He has published widely in the areas of environmental education, environmental interpretation, free-choice environmental learning, wildlife tourism, and ecotourism. He is the joint author of *Contemporary Issues in Heritage and Environmental Interpretation* and *Designing Effective Interpretive Signs and Exhibits: Principles in Practice* and joint editor of the *International Handbook on Ecotourism*.

Jerry F. Luebke is a Senior Manager of Audience Research at the Chicago Zoological Society-Brookfield Zoo. Jerry is responsible for conducting various audience research studies and exhibit evaluations. His current research is focused on informal learning experiences of visitors including their affective reactions to observing zoo animals.

Appendix A

Exit Survey (formatting has been altered to conform with the journal's style requirements)

1. Overall, on a scale from 1 to 10, where 1 is very unhappy and 10 is very happy, how happy would you say our gorillas appear to you (circle one)?

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

2. Overall, on a scale from 1 to 10, where 1 is very unhealthy and 10 is very healthy, how healthy would you say our gorillas appear to you (circle one)?

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

3. Overall, on a scale from 1 to 10, where 1 is very poor and 10 is very well cared for, how well cared for would you say our gorillas appear to you (circle one)?

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

4. Overall, on a scale from 1 to 10, where 1 is not at all and 10 is very much, to what extent did you feel an emotional connection with the gorillas (circle one)?

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

5. Please could you explain some of the things that led you to make those judgements? What did you notice about the gorillas that either concerned or reassured you about:

(a) their happiness

(b) their health

(c) how well cared for they are

6. Please rank, from 1 (*most important*) to 3 (*least important*), how important it is to you that the gorillas are:

For example,	Happy <u> 2 </u>	Healthy <u> 1 </u>	Well Cared For <u> 3 </u>
--------------	--------------------	----------------------	-----------------------------

Your rating:	Happy <u> </u>	Healthy <u> </u>	Well Cared For <u> </u>
--------------	---------------------	-----------------------	------------------------------

7. Please indicate the extent to which you agree or disagree with each of the following statements:

	<i>Strongly disagree</i>	<i>Disagree</i>	<i>Slightly disagree</i>	<i>Slightly agree</i>	<i>Agree</i>	<i>Strongly agree</i>
I have an interest in and affection for wildlife and the outdoors.	1	2	3	4	5	6
I am concerned for the environment as a system, for the interrelationships between wildlife and natural habitats.	1	2	3	4	5	6
I have an interest in and affection for individual animals, e.g., pets.	1	2	3	4	5	6
I am concerned regarding the right and wrong treatment of animals.	1	2	3	4	5	6
The practical and material value of animals and the natural environment are important to me.	1	2	3	4	5	6
I enjoy situations that involve mastery and control of animals and nature, e.g., hunting and fishing.	1	2	3	4	5	6
I dislike, feel afraid of, or don't particularly care about animals and the natural world.	1	2	3	4	5	6
I have knowledge and experience in looking after animals.	1	2	3	4	5	6
I believe animals have emotions.	1	2	3	4	5	6
I was satisfied with my experience at the gorillas today.	1	2	3	4	5	6

8. To what extent do you agree or disagree with the following statements?

	<i>Strongly disagree</i>	<i>Disagree</i>	<i>Slightly disagree</i>	<i>Slightly agree</i>	<i>Agree</i>	<i>Strongly agree</i>
The balance of nature is very delicate and easily upset.	1	2	3	4	5	6
Plants and animals exist primarily to be used by humans.	1	2	3	4	5	6
When humans interfere with nature it often produces disastrous consequences.	1	2	3	4	5	6
Humans have the right to modify the natural environment to suit their needs.	1	2	3	4	5	6
Humans need not adapt to the natural environment because they can remake it to suit their own needs.	1	2	3	4	5	6
Humans must live in harmony with nature to survive.	1	2	3	4	5	6

9. Age: < 20 20–29 30–39 40–49 50–59 60 +

10. Gender: Male Female

11. Have you ever visited this zoo before?

- No, this is my first time
 Yes, I have visited here before

12. How many times a year do you visit zoos (not just this one)?

- Less than once a year
 Approximately once a year
 More than once a year

Thank you for your assistance.

Appendix B

Observation Survey (formatting has been altered to conform with the journal's style requirements)

Please rate your observations of [name of male gorilla]

Please indicate the types of behaviors you saw this gorilla display today. (Check all that apply.)

- | | | |
|---|--|--|
| <input type="checkbox"/> Not visible at times | <input type="checkbox"/> Repetitive behavior | <input type="checkbox"/> Interacting with other gorillas |
| <input type="checkbox"/> Sitting | <input type="checkbox"/> Playing | <input type="checkbox"/> Pacing |
| <input type="checkbox"/> Lying down | <input type="checkbox"/> Chewing/eating | <input type="checkbox"/> Manipulating or exploring objects |
| <input type="checkbox"/> Sleeping | <input type="checkbox"/> Grooming self | <input type="checkbox"/> Displaying aggressive behaviors |
| <input type="checkbox"/> Active – moving around | <input type="checkbox"/> Interacting with people | <input type="checkbox"/> Other (please specify): _____ |

Please rate your impressions of [name of male gorilla]

Active	3	2	1	0	1	2	3	Passive
Aggressive	3	2	1	0	1	2	3	Easy-going
Weak	3	2	1	0	1	2	3	Strong
Behaving naturally	3	2	1	0	1	2	3	Behaving unnaturally
Bored	3	2	1	0	1	2	3	Interested
Calm	3	2	1	0	1	2	3	Agitated
Comfortable	3	2	1	0	1	2	3	Uncomfortable
Contented	3	2	1	0	1	2	3	Discontented
Inquisitive	3	2	1	0	1	2	3	Indifferent
Depressed	3	2	1	0	1	2	3	Cheerful
Fearful	3	2	1	0	1	2	3	Confident
Happy	3	2	1	0	1	2	3	Sad
Insecure	3	2	1	0	1	2	3	Secure
Lonely	3	2	1	0	1	2	3	Befriended
Playful	3	2	1	0	1	2	3	Serious
Self-assured	3	2	1	0	1	2	3	Nervous
Solitary	3	2	1	0	1	2	3	Sociable
Powerful	3	2	1	0	1	2	3	Powerless
Fast	3	2	1	0	1	2	3	Slow
Noisy	3	2	1	0	1	2	3	Quiet
Enthusiastic	3	2	1	0	1	2	3	Apathetic
Neglected	3	2	1	0	1	2	3	Cared for
Tame	3	2	1	0	1	2	3	Wild
Unfriendly	3	2	1	0	1	2	3	Friendly
Well fed	3	2	1	0	1	2	3	Under fed
Unhealthy	3	2	1	0	1	2	3	Healthy
Submissive	3	2	1	0	1	2	3	Dominant
Good physical condition	3	2	1	0	1	2	3	Poor physical condition
Overweight	3	2	1	0	1	2	3	Good weight

Please rate your observations of [name of female gorilla]

Please indicate the types of behaviors you saw this gorilla display today. (Check all that apply.)

- | | | |
|---|--|--|
| <input type="checkbox"/> Not visible at times | <input type="checkbox"/> Repetitive behavior | <input type="checkbox"/> Interacting with other gorillas |
| <input type="checkbox"/> Sitting | <input type="checkbox"/> Playing | <input type="checkbox"/> Pacing |
| <input type="checkbox"/> Lying down | <input type="checkbox"/> Chewing/eating | <input type="checkbox"/> Manipulating or exploring objects |
| <input type="checkbox"/> Sleeping | <input type="checkbox"/> Grooming self | <input type="checkbox"/> Displaying aggressive behaviors |
| <input type="checkbox"/> Active – moving around | <input type="checkbox"/> Interacting with people | <input type="checkbox"/> Other (please specify): _____ |

Please rate your impressions of [name of female gorilla]

Active	3	2	1	0	1	2	3	Passive
Aggressive	3	2	1	0	1	2	3	Easy-going
Weak	3	2	1	0	1	2	3	Strong
Behaving naturally	3	2	1	0	1	2	3	Behaving unnaturally
Bored	3	2	1	0	1	2	3	Interested
Calm	3	2	1	0	1	2	3	Agitated
Comfortable	3	2	1	0	1	2	3	Uncomfortable
Contented	3	2	1	0	1	2	3	Discontented
Inquisitive	3	2	1	0	1	2	3	Indifferent
Depressed	3	2	1	0	1	2	3	Cheerful
Fearful	3	2	1	0	1	2	3	Confident
Happy	3	2	1	0	1	2	3	Sad
Insecure	3	2	1	0	1	2	3	Secure
Lonely	3	2	1	0	1	2	3	Befriended
Playful	3	2	1	0	1	2	3	Serious
Self-assured	3	2	1	0	1	2	3	Nervous
Solitary	3	2	1	0	1	2	3	Sociable
Powerful	3	2	1	0	1	2	3	Powerless
Fast	3	2	1	0	1	2	3	Slow
Noisy	3	2	1	0	1	2	3	Quiet
Enthusiastic	3	2	1	0	1	2	3	Apathetic
Neglected	3	2	1	0	1	2	3	Cared for
Tame	3	2	1	0	1	2	3	Wild
Unfriendly	3	2	1	0	1	2	3	Friendly
Well fed	3	2	1	0	1	2	3	Under fed
Unhealthy	3	2	1	0	1	2	3	Healthy
Submissive	3	2	1	0	1	2	3	Dominant
Good physical condition	3	2	1	0	1	2	3	Poor physical condition
Overweight	3	2	1	0	1	2	3	Good weight

Please rate your impressions of the gorillas' environment

Nice	3	2	1	0	1	2	3	Awful
Artificial	3	2	1	0	1	2	3	Natural
Stimulating	3	2	1	0	1	2	3	Depressing
Pleasant	3	2	1	0	1	2	3	Unpleasant
Dirty	3	2	1	0	1	2	3	Clean
Ugly	3	2	1	0	1	2	3	Beautiful
Uninteresting	3	2	1	0	1	2	3	Interesting
Good	3	2	1	0	1	2	3	Bad
Unsuitable	3	2	1	0	1	2	3	Suitable
Inadequate	3	2	1	0	1	2	3	Adequate
Comfortable	3	2	1	0	1	2	3	Uncomfortable
Important	3	2	1	0	1	2	3	Unimportant
Spacious	3	2	1	0	1	2	3	Cramped
Dangerous	3	2	1	0	1	2	3	Safe
Stressful	3	2	1	0	1	2	3	Peaceful
Light	3	2	1	0	1	2	3	Dark
Free	3	2	1	0	1	2	3	Imprisoned
Simple	3	2	1	0	1	2	3	Complex
Confined	3	2	1	0	1	2	3	Open
Quiet	3	2	1	0	1	2	3	Noisy
Large	3	2	1	0	1	2	3	Small

On a scale from 1 to 10, where 1 is very unhappy and 10 is very happy, please indicate how happy each gorilla appeared to you.	[male gorilla]	1	2	3	4	5	6	7	8	9	10
	[female gorilla]	1	2	3	4	5	6	7	8	9	10

On a scale from 1 to 10, where 1 is very unhealthy and 10 is very healthy, please indicate how healthy each gorilla appeared to you.	[male gorilla]	1	2	3	4	5	6	7	8	9	10
	[female gorilla]	1	2	3	4	5	6	7	8	9	10

On a scale from 1 to 10, where 1 is very poor and 10 is very well cared for, please indicate how well cared for each gorilla appeared to you.	[male gorilla]	1	2	3	4	5	6	7	8	9	10
	[female gorilla]	1	2	3	4	5	6	7	8	9	10

On a scale from 1 to 10, where 1 is not at all and 10 is very much, please indicate the level of emotional connection you felt with each gorilla.	[male gorilla]	1	2	3	4	5	6	7	8	9	10
	[female gorilla]	1	2	3	4	5	6	7	8	9	10

Please rank, from 1 (*most important*) to 3 (*least important*), how important it is to you that the gorillas are:

<i>For example,</i>	Happy <u> 2 </u>	Healthy <u> 1 </u>	Well Cared For <u> 3 </u>
<i>Your rating:</i>	Happy <u> </u>	Healthy <u> </u>	Well Cared For <u> </u>

Please indicate the extent to which you agree or disagree with each of the following statements:

	<i>Strongly disagree</i>	<i>Disagree</i>	<i>Slightly disagree</i>	<i>Slightly agree</i>	<i>Agree</i>	<i>Strongly agree</i>
I have an interest in and affection for wildlife and the outdoors.	1	2	3	4	5	6
I am concerned for the environment as a system, for the interrelationships between wildlife and natural habitats.	1	2	3	4	5	6
I have an interest in and affection for individual animals, e.g., pets.	1	2	3	4	5	6
I am concerned regarding the right and wrong treatment of animals.	1	2	3	4	5	6
The practical and material value of animals and the natural environment are important to me.	1	2	3	4	5	6
I enjoy situations that involve mastery and control of animals and nature, e.g., hunting and fishing.	1	2	3	4	5	6
I dislike, feel afraid of, or don't particularly care about animals and the natural world.	1	2	3	4	5	6
I have knowledge and experience in looking after animals.	1	2	3	4	5	6
I believe animals have emotions.	1	2	3	4	5	6

To what extent do you agree or disagree with the following statements?

	<i>Strongly disagree</i>	<i>Disagree</i>	<i>Slightly disagree</i>	<i>Slightly agree</i>	<i>Agree</i>	<i>Strongly agree</i>
The balance of nature is very delicate and easily upset.	1	2	3	4	5	6
Plants and animals exist primarily to be used by humans.	1	2	3	4	5	6
When humans interfere with nature it often produces disastrous consequences.	1	2	3	4	5	6
Humans have the right to modify the natural environment to suit their needs.	1	2	3	4	5	6
Humans need not adapt to the natural environment because they can remake it to suit their own needs.	1	2	3	4	5	6
Humans must live in harmony with nature to survive.	1	2	3	4	5	6

Age: < 20 20–29 30–39 40–49 50–59 60+

Gender: Male Female

Have you ever visited this zoo before?

- No, this is my first time
 Yes, I have visited here before

How many times a year do you visit zoos (not just this one)?

- Less than once a year
 Approximately once a year
 More than once a year

Thank you for your assistance.