

Using Animal Portraiture to Activate Emotional Affect

Environment and Behavior

1–27

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DOI: 10.1177/0013916520928429

journals.sagepub.com/home/eab



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Abstract

With growing concern for biodiversity loss, conservationists are faced with increased pressure to depict animals in ways that evoke empathy and lead to conservation. In recent years, conservation photographers have called on scientists to assist them in identifying the best ways to depict animals to elicit an emotional response. Collaborating with conservation photographers, we used an original survey experiment with 1,152 participants to answer this call by comparing how individuals respond to traditional wildlife photography and animal portraiture. Those who were exposed to animal portraits reported increased empathy and decreased positive and relaxed emotions. We engage critical anthropomorphism, arguing that it is an essential tool to encourage conservation efforts and that animal portraiture may be an ideal “attention grabber,” after which wildlife images can serve as “educators.” As the first study to make this quantitative comparison, our findings have important implications for conservationists and particularly conservation photographers.

Keywords

animal images, conservation photography, viewer emotion, anthropomorphism, PANAS, animal sociology, animal studies, environmental sociology

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Biodiversity Loss and Importance of Conservation

Global biodiversity is vital to the economic and social stability of the planet (Crist et al., 2017; Naeem et al., 2016). However, as Butchart and colleagues (2010) suggest, the threat to species and ecosystems is greater than it has ever been, and ecologists claim we are in the sixth mass extinction. In fact, the Millennium Assessment Board (2005), an assessment that included more than a thousand scientific experts, estimated the current extinction rate to be 24 species a day for a total of 8,700 a year. The United Nations Convention on Biological Diversity (2007) suggested the number could be much higher at a loss of 150 species per day for an estimated 18,000 to 55,000 species per year. In 2018, the United Nations Convention on Biodiversity conference argued that a problem of this scale demands the attention of numerous actors (Convention on Biological Diversity, 2019). While natural scientists can monitor ecosystems and species, and social scientists can assess how humans and natural systems interact, additional individuals are needed to effectively communicate the science and scale of the issue to the general public. Along with the scientific community, one group that has worked diligently to promote and protect biodiversity is conservation photographers.

Conservation photography is issue oriented. It combines various photographic techniques to document current and potential harms to the natural environment and the species who inhabit it in an effort to expand public awareness, enhance concern, and promote pro-conservation behaviors. Mittermeier (2005) writes that, "Conservation photography showcases both the vanishing beauty of our planet and its disappearing spirit, and it puts the image 'to work' . . . It is the pictorial voice used by many conservation organizations to further their message" (p. 8). The International League of Conservation Photographers was not founded until 2005 (International League of Conservation Photographers, 2019). However, the use of photography to engage and promote conservation began in the 1860s with Carleton Watkins's images that were used to establish Yosemite National Park (DeLuca & Demo, 2001).

Although wildlife, nature, and conservation photography are often grouped into the same conceptual category, they differ quite substantially, with purpose as the key differentiating factor. Traditional wildlife photography (also known as animal nature photography) is concerned primarily with documenting animals in their natural habitat. Although conservation may be part of this dynamic, it is not the defining characteristic. In recent years, the world's three largest international photography organizations—The Photographic Society of America (PSA), the Fédération Internationale de l'Art Photographique (FIAP), and The Royal Photographic Society (RPS)—have all agreed on a definition for wildlife photography: It restricts anthropomorphizing, promotes

visuals that incorporate the natural habitat, but allows for photographs depicting confined animals due to limitations in accessing some species in their natural habitat (International League of Conservation Photographers, 2019). However, when capturing animals who are confined, their enclosures should not be noticeable. Although documenting animals in their natural habitat has important implications for scientific communication, it may also distract viewers from seeing and recognizing the animal's true story, which is often filled with environmental ill and destruction (Kalof et al., 2011).

As attention is increasingly placed on environmental damage and its impact on biodiversity, conservation images have become critically important. Not only are conservation images featured in books, used by nongovernmental organizations (NGOs) in promotional materials, appear in high-profile popular science magazines such as *National Geographic*, and showcased in galleries across the world, they are also circulated on social media platforms. For many in the general public, these images become the primary way to visualize and engage with endangered species and the natural environment, especially with animals living in distant or remote environments (Whitley & Kalof, 2014). As Dunaway (2015) suggests, environmental images are central to the formation and reproduction of popular environmentalism and have lasting impacts on which issues do and do not get addressed.

Framing biodiversity loss is a critical component of engaging people in supporting conservation efforts (Schwartz, 2006). To date, art by conservationists is a key translator of information from science into culture, which leads to a broader and more inclusive popular understanding of environmental conservation (A'Bear et al., 2017). In assessing the importance of conservation photography as a "legitimate and highly relevant pedagogical enterprise," Farnsworth (2011, p. 769) asserts that professional conservation photographers serve dual roles as image creators and highly qualified environmental educators who increase eco-visual-scientific literacy. Given the importance of conservation photography on conservation culture, greater attention has recently been placed on better understanding images that attract viewer attention, how viewers respond to these images, and the dynamics of networks within this community (Whitley & Kalof, 2020). In fact, the first conservation photography symposium (held in 2005) and all subsequent symposiums have specifically listed working to better understand the best approaches to engaging viewers in conservation images as a leading concern (International League of Conservation Photographers, 2019). Mittermeier (2005) argues that "despite the critical importance in the crafting and delivery of messages, conservation professionals often opt for 'homemade' amateur or poorly executed images, based simply on the argument of cost" (p. 8). Part of the problem is that conservation photographers and scientists are not in

conversation about what photographic and stylistic techniques drive viewer perception, and more work should be conducted at the intersection of social science and photography. Mittermeier continues,

We will need to clearly articulate the irreplaceable contribution of images to achieve measurable conservation outcomes, and we will need to become active participants in the conservation process in order to create the images most relevant to the ever-evolving conservation agenda. (p. 10)

One of the most effective appeals in animal conservation is the use of kinship symbolism because characterizing nonhuman species and nonliving resources as kin to humans promotes a willingness to contribute to conservation (Qirko, 2017). Thus, anthropomorphism, or the attribution of human characteristics to animals and even the natural world, is recognized as a valuable tool for conservation (Root-Bernstein et al., 2013). As a photographic technique, animal portraiture is an approach that frames animals in ways that mimic the human studio portrait and has been established as influential in invoking feelings of kinship with animals (Kalof et al., 2011, 2016). Whereas the vast majority of animal conservation images are of wildlife roaming free or of wild animals who have been exploited by human-driven commodification, the influence of traditional wildlife photography on viewers' emotions has yet to be examined. Our study fills that gap. We assess the relative influence on viewers' emotions of traditional wildlife photography compared with animal portraiture that anthropomorphizes animals.

Background and Theoretical Framework

Humans have caused massive environmental problems, putting at risk the Earth's ecological community of living beings, of which a staggering number have gone extinct. Although it is up to humans to change the trajectory away from destruction of the natural world, we must be "emotionally touched to spur us into action" (Flach, 2012, p. 11). One of the most effective emotional triggers for humans is visual communication, particularly photographic images that influence viewers' moods, beliefs, and attitudes (Berenguer, 2007; Martínez-Soto et al., 2014; O'Neill & Nicholson-Cole, 2009). That visual representations influence human cognitive processes comes as no surprise. Contemporary cultural critics have long argued that the effects of photography on aesthetic perception are profound and constitute the underpinnings of ideological belief systems. Visual representations of animals are not only particularly salient cultural tracers (Kalof, 2007), but they can also be used to bring about a change in the position of animals in human culture because the

animal as a visual object structures human emotional response (Burt, 2004, p. 11). Photography is perhaps the most significant and influential aspect of contemporary visual culture. Photography has completely changed the global visual environment and means of information exchange (Gaskell, 1991), and, as Sontag (2003) argued, we remember photographs best, and the single image serves as the basic unit for apprehending and memorizing something.

Visual representations of animals trigger the built-in attractions humans have for animals and the natural world (Wilson, 1984). For example, the human visual system is good at locating animals in the environment, and this “animate-monitoring” by humans is found in experiments that show people are quicker to spot the movements of an elephant than those of a minivan even when shape, size, and speed of movement are similar (New et al., 2007). Even very young infants pay more attention to films of real animals than they do to films of inanimate objects (DeLoache et al., 2010). The rapid identification of the category to which an object belongs (animal, plant, person, tool, or terrain) and what its presence signifies (predatory danger, food/prey, offspring at risk) were central to our human ancestors’ adaptation to the environment (New et al., 2007). In addition, based on experiments showing that humans have faster and more accurate detection of people and animals compared with artifacts and plants, neuroscientists have established that the processing and response to animate stimuli arise in human subcortical structures (Wang et al., 2014).

Anthropomorphism in Conservation Photography

People interpret the world with humanlike models because human thought and action are the highest organization they know (Airenti, 2018). Anthropomorphism is a basic human attitude that begins in infants and persists throughout life, and is grounded in interaction rather than specific belief systems (Airenti, 2018). Recent research suggests that one of the most effective ways to increase support for conservation is to “personalize” nature (Rosenzweig, 2003), which can activate an empathetic response. Thus, conservation donations go to animal causes or organizations that represent animals who are more phylogenetically similar to humans (Colléony et al., 2017; Daston & Mitman, 2005). In addition, anthropomorphizing nature is associated with connectedness to the natural world (Tam, 2013) and connectedness to nature is essential to conservation (Mayer et al., 2009).

In animal photography, depicting animals with humanlike characteristics is considered an anthropomorphic approach. There is a lengthy literature on the ethical issues of anthropomorphizing animals, suggesting that such an application is nonscientific and may misallocate empathy as it fails to

acknowledge animal otherness (Ruether, 1993; Taylor, 2011). Yet, Bekoff (2000) makes an argument for “biocentric anthropomorphism,” or using human terms to explain animal emotions or feelings, thus making other animals’ worlds accessible. Doing rigorous science is possible through the use of “critical anthropomorphism” (Burghardt, 2007) that uses sources of information such as human perceptions, intuitions, and identification with the animal to gain a better understanding of the animal’s world (Bekoff, 2000). Chan (2012) argues that the purpose of anthropomorphism in conservation is to create empathy toward animals and their ecosystems by emphasizing their human characteristics, such as cognitive ability, ability to suffer or experience pain, and prosocial behavior. However, it is important to acknowledge that limiting the utility of anthropomorphism in conservation to those three human characteristics may exclude species who “are not like humans in the ‘right’ ways” (Root-Bernstein et al., 2013, p. 1577). Indeed, there are numerous other characteristics that capture the concept of anthropomorphizing other animals, such as attributions of personality, individuality, and self-expression. We engage this literature to assert that addressing biodiversity loss begins with enhancing individual connections to animals, which demands a critical anthropomorphic application to have the greatest impact.

Animal Portraiture

Animal portraiture is a representational approach used in conservation photography that is designed to highlight animal personality and character and evoke emotion from the viewer. Although traditional wildlife photography produces a romanticized view of animals, but in a distant world, the aim of animal portraiture is to bring humans closer to understanding other animals, thus fostering an emotional connection (Riedel, 2018). Animal portraiture is anthropomorphic—it emphasizes the animal’s human characteristics, bridging animal “otherness” with “sameness.” There is evidence that animal portraiture increases viewers’ feelings of kinship or perception of sameness with animals. In two qualitative studies of the impact of animal portrait photographs on viewers, researchers found that animals placed in a visual context associated with human representation increases viewers’ feelings of kinship with animals and the perceptions of animals as individuals with personality (Kalof et al., 2011, 2016). In another study on the impact of animal portraiture on perception of human and animal closeness, Amiot and Bastian (2017) found that people reported an increase in perception of solidarity with animals when they viewed animals in portrait settings compared with the same species in contexts that emphasized their difference from humans such as animals grazing in a field.

These studies serve as foundational models to further assess from a quantitative perspective whether the changes in feeling and emotional response after viewing animal portraits are statistically significant. We examine viewers' reactions to photographs of wildlife pictured in natural settings compared with the same species photographed in a portrait setting. We designed our study to statistically document the differences in emotional responses of viewers of traditional wildlife photography versus animal portraiture.

Data

An original experimental survey was launched on October 10, 2018, to test the hypothesis that animal portraiture would have a greater influence on evoking emotional response from viewers compared with traditional wildlife photography. The survey was housed on the Qualtrics platform, and Mechanical Turk (MTurk) was used to solicit participants. To limit self-selection bias for participation, the survey was listed as "Let Us Know About Your Attitudes on Various Social Issues." Participation was limited to adults living in the United States. Participants were paid the equivalent of minimum wage for participation. On average, participants took 11 min to complete the survey, which equated to \$1.33 for completion. A total of 1,152 people completed the survey within 24 hr. Recently, concerns have been raised about Virtual Private Servers (VPSs) or bots compromising data collection. Kennedy and colleagues (2018) suggest that overcoming this issue is relatively easy using a few different methods depending on the platform. We used their Hypertext Preprocessor (PHP) code approach to block fraudulent respondents from participating and seemed to have no problems with our survey.

Compared with the U.S. population, the sample was very similar in terms of race and income. According to the U.S. Census, 76% of the population identifies as White; our sample revealed that 75% identified as White (U.S. Census Bureau, 2018). The median income for the United States is \$57,652 (U.S. Census Bureau, 2018). Our sample median income was between \$50,000 and \$60,000. Similar to other MTurk studies, our sample was more educated, with 55% having at least a bachelor's degree compared with 31% across the United States (U.S. Census Bureau, 2018). Our sample was also slightly more female dominated, with 62% identifying as female, compared with 51% in the population (U.S. Census Bureau, 2018). However, the median age of our sample was 39 years, while the median age of the population is 38 years, so essentially equivalent (U.S. Census Bureau, 2018). Although demographic characteristics are important to report to get a sense of how a sample compares with the population, they are less important when conducting an experimental survey. In most cases, such experimental designs

are executed in undergraduate classrooms with little comparison with the U.S. population. Conducting an experimental survey online allows for the capturing of a greater diversity of people than convenience samples and, in many cases, if protocols are followed, can provide good quality data (see, for example, Berinsky et al., 2012; Clifford et al., 2015; Hauser & Schwarz, 2016; Peer et al., 2014). It is also significantly cheaper and less time-consuming than conducting a nationally representative survey.

Survey Experiment

Each participant was randomly assigned to one of 11 groups. Each group except one received an animal image that they were required to engage with for 30 s. The use of 30 s was chosen because L. F. Smith et al. (2017) found that, on average, people spend 27.2 s looking at art in which they are interested so we rounded the view time up to 30 s. Once the 30 s had ended, participants were directed to the next page, where they were asked to answer a series of questions. The pictures that were selected for the assignments were all professional animal images from National Geographic Society–affiliated photographers. All of these images have been published previously and are freely viewable online (see supplemental material). Two groups of images were selected: traditional wildlife photographs and animal portraits. Because the focus of this project was on assessing how images impact emotions, we selected to present images of well-known vulnerable or endangered charismatic megafauna to minimize people seeing new or different animals who might automatically grab their attention regardless of compositional structure. The animals included are tigers, lions, polar bears, gorillas, and hippopotami. For each animal type, we selected two photographs, one animal portrait and one traditional wildlife photograph. The image pairings (one portrait and traditional wildlife photograph for each species) were carefully selected and reviewed by a team of researchers based on specific criteria. All wildlife photographs had to be by a professional photographer, previously published online or in book form, associated with *National Geographic* (to add another level of validity), showcase the animal in its natural environment, and not show more than one animal because groupings, baby animals, or other things would add an additional dimension of complexity that we would not be able to account for in the portraits. All animal portraits were photographed by Tim Flach (2017), a leading conservation photographer and one of the key figures in conservation photography promoting animal portraiture. Thus, five groups received animal portraits and five groups received traditional wildlife photographs. One group was the control and did not receive any images. In addition, it should be noted that as social science

researchers, we designed and conducted this study with a highly recognized professional conservation/wildlife photographer who serves as one of the coauthors. This is an important factor to mention as scientific, conservation, and photography communities call for increased collaboration between science and art to address environmental ills. With the exception of Kalof et al. (2011, 2016), there have been very few published studies assessing animal photography or conservation photography from a science–art collaboration. Our work continues to fill this important gap.

Dependent Variables

Given that our work builds on foundational articles (see Kalof et al., 2011, 2016), we wanted to use a well-established word association tool to capture emotional affect. We chose to use a modified Positive Affect and Negative Affect Scale (PANAS), an instrument that has been cited well over 30,000 times (Clifford et al., 2015; Hauser & Schwarz, 2016; Peer et al., 2014; Watson et al., 1988). The PANAS is a mood scale that measures two dominant dimensions: positive or negative feelings and emotions. Conservation photographers readily admit that they are trying to get viewers to react to images, but not just in terms of positive and negative emotions. Many are interested in evoking empathy and feelings of calmness or relaxation through connection. Empathy is a key driver in conservation engagement (Berenguer, 2007; Colléony et al., 2017), and relaxation and calmness have been documented as important in connecting people to nature (Fuegen & Breitenbecher, 2018). Thus, we added supplementary words (empathy, sympathy, relaxed, harmonious, at peace, serene, restful, calm, and inspired) to the original PANAS scale and piloted the modified scale in two undergraduate college classrooms. The resulting scale includes 28 words (see Table 1). After viewing an image (unless they were in the control group), people were asked to “Read each item. Indicate to what extent you feel this way RIGHT NOW.” The choices included from 1 = *not at all* to 5 = *a great deal*. Factor analysis of the 28 words revealed four dominant emotion scales: empathy, relaxed, positive, and negative. We recognize that the empathy scale only includes two words (empathy and sympathy) and that these terms are conceptually different. Statistical practices assert that it is best to combine a minimum of three items unless the correlation between two variables is high and the combination can produce an alpha correlation within acceptable range. In this case, the correlation between the two variables is .75 (Cronbach’s $\alpha = .86$), suggesting that combining these terms is reasonable. We use the term *empathy* to categorize this grouping for two reasons. First, when comparing the mean scores between empathy and sympathy, the mean score for empathy

Table 1. Rotated Factor Loadings and Unique Variances for Modified PANAS Scale.

Affect	Negative affect	Positive affect	Relaxed affect	Empathetic affect	Uniqueness
Distressed	.71				.41
Upset	.75				.35
Guilty	.73				.41
Scared	.82				.32
Irritable	.80				.34
Ashamed	.73				.40
Nervous	.80				.32
Afraid	.85				.27
Jittery	.81				.32
Hostile	.81				.32
Interested		.49			.61
Excited		.61			.49
Strong		.69			.41
Enthusiastic		.69			.39
Proud		.66			.42
Alert		.63			.58
Determined		.78			.35
Attentive		.65			.54
Active		.75			.38
Relaxed			.77		.33
Harmonious			.64		.36
At peace			.85		.19
Serene			.77		.33
Restful			.68		.46
Calm			.78		.29
Inspired			.39		.39
Empathy				.83	.24
Sympathy				.78	.30

Note. PANAS = Positive Affect and Negative Affect Scale.

($M = 3.05$) is statistically higher ($p < .001$) than that for sympathy ($M = 2.85$). Second, in the open-ended text box, many respondents discussed “imagining” what it would be like to be the animal in the image, which is an empathic response, rather than sympathizing with the animal’s emotion. The orthogonal varimax factor loadings and uniqueness for the 28 items are presented in Table 1. Orthogonal rotation was chosen although it assumes no

Table 2. Factor Analysis: Orthogonal Varimax Rotation With Eigenvalues and Cronbach's Alphas ($n = 1,152$).

Factor	Eigenvalue	Difference	Proportion	Cumulative	Cronbach's alpha
Positive affect	6.44	1.38	.37	0.37	.91
Negative affect	5.06	0.82	.29	0.66	.94
Relaxed affect	4.23	2.45	.24	0.90	.92
Empathetic affect	1.79		.10	1.0	.86

correlation because additional analysis revealed that correlation among factors ranged from $-.11$ to $.58$, not high enough to warrant concern. The eigenvalues and Cronbach's alphas for all scales are presented in Table 2. Cronbach's alphas were used to assess scale reliability (Cronbach, 1951). As expected, all Cronbach's alphas were well above the $.70$ cutoff (Nunnally & Bernstein, 1967), ranging from $.86$ to $.91$.

Independent Variable Controls

Although we were interested in the influence of the experiment on the four emotion dimensions, we included standard sociodemographic values and behavior variables as controls in our regression models because these factors may be important in predicting emotional states. It is well known that these factors have been previously shown to be influential in predicting general concern for the natural world (Gifford & Nilsson, 2014). However, less is known about these factors in predicting emotional affect. Specifically, we include environmental values and environmental behavior to address a growing body of literature in the field of sustainable happiness that suggests that those who are environmentally friendly report greater levels of happiness because caring about the environment produces a sense of meaning (Andreou, 2010; Mzoughi, 2014; O'Brien, 2008; Veenhoven, 2004; Venhoeven et al., 2017). However, being environmentally friendly does not necessarily decrease negative emotions as people often engage in pro-environmental behavior because of their concern for the environment (Venhoeven et al., 2017). In addition, there is a growing body of literature addressing how values influence emotional affect (Tamir et al., 2016). We would expect those who are more environmentally conscious in their values and behaviors to report greater empathy and positive emotions. However, we would hope that regardless of environmental concern level, the experimental design would have an impact.

Sociodemographics. Political orientation was measured with six categories, from 1 = *very liberal* to 6 = *very conservative*. We treated it as a continuous variable. Individuals were asked what gender they identify with. We gave male and female as options, but also left a space to include additional identities. In all, 12 people used the text box. These 12 people were not included in this analysis, because of lack of statistical power. Additional studies should be done to assess if nonbinary and gender diverse individuals experience these conservation images differently. We included the same racial categories listed on the U.S. Census, but collapsed the category down to White and non-White for statistical power and ease of analysis. Income was measured with 12 categories, but was treated as continuous. Education was measured with six categories, but was treated as continuous. Finally, we included a variable to measure adherence to biblical literalism, which was dichotomous. While religiosity has often been used as a predictor of emotional affect, quantifying religiosity is complicated because degree of religiosity means different things across different religions and denominations. There is some research that suggests that evangelical Christians are happier than non-Christians (Ritter et al., 2014; Wilkins, 2008). Yet, Christians seem no more likely to enact on empathetic emotions by giving to charitable organizations (C. Smith et al., 2008). Demographics have been shown to have mixed influence on affective emotion, with gender the most consistent predictor, where women report higher positive affective emotion compared with men (Diwan et al., 2004).

Environmental values. We controlled for environmental values. Values are broad motivational goals, or guiding principles individuals hold for their life (S. H. Schwartz, 2012). Environmental values, based on Shalom Schwartz's work on basic human values (S. H. Schwartz, 2012), were first formulated by Stern, Dietz, and Kalof (Dietz, 2015; Dietz et al., 2002, 2005, 2017; Stern et al., 1995). Values are thought to be rather stable over time, but can be enhanced in college (Whitley et al., 2018). We included six environmental values: humanistic altruism, biospheric altruism, animal altruism, egoism, willingness to change, and traditionalism. As guiding principles in one's life, humanistic altruism measures commitment in equality and social justice for all, biospheric altruism measures commitment in respecting the Earth and living in harmony with nature, egoism measures commitment to influencing others and accumulation of wealth, willingness to change measures commitment to having a stimulating and varied life, and traditionalism measures commitment to security and self-discipline. Recently, scholars advocated for including animal altruism, suggesting that commitment to the welfare of the environment generally and concern for humans was distinct from holding a guiding principle of commitment to animals (Dietz et al., 2017). Thus, we

Table 3. Cronbach's Alphas for Additional Control Variables.

Variable	Items	α
Environmental values		
Humanistic altruism	3	.88
Biospheric altruism	3	.91
Egoism	3	.75
Animal altruism	3	.90
Traditionalism	3	.73
Willingness to change	3	.85
Environmental behavior		
Conservation behavior	7	.82
Environmental citizenship	7	.73

included animal altruism as well. We also find this to be an important inclusion as there is a growing body of literature that suggests people who are more connected to, concerned with, and engaged with animals are happier (Jau & Hodgson, 2018). Thus, these individuals might report higher positive and empathetic emotional states. Individuals were asked to rate a series of 18 items on how important these items are as guiding principles in their life on a 5-point scale. We used confirmatory factor analysis to generate scales. The Cronbach's alpha for each value is reported in Table 3. Once again, the Cronbach's alphas were well above the .70 cutoff, ranging from .73 to .91. Overall, scholars have examined the influence of values on affective states and have found that people who adhere to altruism report greater empathy, those who adhere to egoism report greater negative emotion, those who adhere to being open to change report greater interest and excitement, which would be associated with positive feelings in the PANAS, and those who adhere to traditionalism report greater calmness (Tamir et al., 2016). We would expect our results to align similarly.

Environmental behavior. While sociodemographics and values may be important indicators of affective emotional response, general environmental awareness and behavior may also be influential, but have received less attention. For instance, research shows that those who are more environmentally conscientious are more willing to donate to organizations supporting animal conservation such as the World Wildlife Fund (Thomas-Walters & Raihani, 2017). This suggests that these people likely have a greater predisposition toward an empathic response. We included two environmental behavior scales that come from the Pro-Environmental Behavior Scale (PEBS), which

measures conservation and environmental citizenship. In many cases, these items serve to quantify an individual's engaged environmental concern or engaged empathic response. By controlling for these measures, should the experiment remain significant, we are able to say that above and beyond someone's predisposition to environmental engagement, these images had an impact on their emotional response. The conservation scale accounts for individual engagement in environmental conservation behaviors such as regularly turning off lights when leaving a room, turning down heat to save energy, or limiting shower time. The environmental citizenship scale assesses how active a person is in advocating for environmental reform in being a member of an environmental organization, contributing money to conservation, and talking with others about environmentalism. We expected those who were actively engaged in protecting the environment would report greater empathy because they were sympathetic to environmental distress. The Cronbach's alphas are reported in Table 3. The alphas were solid, ranging from .73 to .82.

Data Analysis

Factor analysis with rotation was used to assess the latent structure of the emotional affect variables. Confirmatory factor analysis was applied for established scales, and Cronbach's alphas were calculated to assess the reliability of control variable scales. One-way ANOVA was used to determine if there was any statistical difference between the means of the groups. The Tukey post hoc comparison of means test was used to compare the mean emotional response scores across those who received the different types of images or no image. Finally, regression analysis was used to assess if the influence of the experimental design held when controlling for other factors associated with affective emotional states related to environmental concern. All analysis was done using Stata 15.1 software.

Results

Comparing Mean Affect Scores

One-way ANOVAs were conducted to compare the effects of the image recipients received (animal portrait, wildlife photo, no image) on the four emotion scales (positive, negative, relaxed, and empathic). The three image conditions resulted in significantly different positive, $F(2, 1187) = 5.85$, $p = .003$; negative, $F(2, 1187) = 8.57$, $p = .002$; relaxed, $F(2, 1187) = 15.40$, $p < .001$; and empathic affects, $F(2, 1187) = 23.84$, $p < .001$. Given the

Table 4. Tukey Test Comparison of Means With Reported Difference in Mean Scores and Significance.

Experiment	Positive affect	Negative affect	Relaxed affect	Empathic affect
Wildlife vs. No image	-.28*	-.05	-.08	.23
Portrait vs. No image	-.34**	.16	-.40**	.66***
Portrait vs. Wildlife	-.06	.21***	-.32***	.42***

* $p < .05$. ** $p < .01$. *** $p < .001$.

significant ANOVA, Tukey post hoc comparisons were calculated to evaluate the mean feeling scores across groups (animal portrait, wildlife photograph, and no image). Results are reported in Table 4. Although respondents in both the wildlife and portrait groups saw one of five different animals, there were no differences in emotional responses based on the animal viewed, suggesting the type of animal was not a factor in eliciting emotional affect. All animals selected were popular charismatic megafauna.

The post hoc comparisons indicated that those who received a portrait ($M = 2.614$, $SD = .91$) reported significantly lower positive affect than those who did not receive an image ($M = 2.950$, $SD = .82$), though there was no statistical difference between them and those who received a wildlife image ($M = 2.671$, $SD = .99$). In contrast, for negative affect, the only significant difference was between those who received a portrait ($M = 1.719$, $SD = .84$) and those who received a wildlife image ($M = 1.510$, $SD = .85$), with those receiving the portrait reporting greater negative emotions. Finally, for both relaxation and empathic affect, significant differences existed between those who received a portrait and those who received both the wildlife image and no image, but there was no significant difference between those who received the wildlife image and no image. Those who received the animal portrait reported lower relaxation scores ($M = 2.781$, $SD = 1.06$) than both those receiving the wildlife image ($M = 3.098$, $SD = 1.04$) and those who did not receive an image ($M = 3.180$, $SD = .89$) but greater empathic affect ($M = 3.205$, $SD = 1.21$) than those who received a wildlife image ($M = 2.784$, $SD = 1.19$) and those who did not receive an image ($M = 2.550$, $SD = 1.06$). These results indicate that, although the images were viewed for a limited time, they had a significant impact on respondents' emotions. This is consistent with Kalof et al. (2011, 2016), and is a key finding, as it demonstrates that past qualitative results can be replicated quantitatively using a relatively large sample that approximates the U.S. population. From this, we conclude that animal portraiture evokes feeling, but that portraits do so in different ways

and to a greater extent than traditional wildlife photography. We explain these results in greater detail below.

Viewing animal portraiture compared with viewing no image. Receiving an animal portrait resulted in average positive affect that was .34 points lower ($p < .001$), and a sense of relaxation that was .39 points lower ($p < .010$) than receiving no animal image. In contrast, it resulted in an average sense of empathy that was .66 points higher ($p < .001$). While the magnitude of impact may not seem substantial, one must consider the context. In the case of empathy, viewing one animal portrait for a limited period of time (30 s) in a controlled environment with no title or caption increased empathetic feelings by .66 points on a 5-point scale, which is more than a 10% increase (13.1%). It is likely that the addition of a caption, title, and perhaps other information could heighten context and produce a greater impact.

Viewing animal portraiture compared with viewing a traditional wildlife image. As with receiving no image, when the mean scores of emotional affect were compared for viewers of animal portraits and traditional wildlife images, several significant differences emerged. Those who saw an animal portrait reported negative emotions that were .21 points ($p < .001$) higher, relaxed emotions that were .32 points ($p < .001$) lower, and empathic emotions that were .42 points ($p < .001$) higher than those who viewed wildlife images. The average score for positive affect between these groups was not statistically different. These findings suggest that limited exposure to an animal portrait more effectively activates negative and empathic emotions than exposure to a traditional wildlife image. For example, viewing the portrait evoked 12.5% greater empathy than viewing the wildlife image.

Viewing traditional wildlife images compared with no images. Finally, compared with those who did not receive an image, those who received a traditional wildlife photograph reported a .28 decrease in positive affect ($p < .050$), suggesting that viewing the traditional wildlife image actually made people feel less upbeat. To better understand why this might be, we assessed the open-ended comments allowed in this survey. Based on these comments, we believe that this finding reflects respondents' recognition of the vulnerability of the animal. For instance, respondents noted that they feel "sad," "sorry," "concerned" for the animal, and some also noted that the animal is likely in captivity. Although people rarely used the word "endangered," we wondered about their perception of the conservation status of the animals we selected, because so many viewer comments pertain to feeling concerned and sad for the animal being pictured regardless of whether the image was a wildlife or

portrait photograph. It is possible that, given their prominent status in conservation narratives, the vulnerability of the animals selected for our study might have influenced the respondents' positive feelings.

Although respondents who viewed the traditional wildlife image reported lower positive affect, empathy, relaxation, and negative emotions were not statistically different. If, as studies suggest, evoking feelings such as empathy is an important factor in eliciting support for conservation, then traditional wildlife images appear to be falling short. These images have limited impact on those viewing them, as viewers report similar emotions as those who saw nothing at all. While these findings are limited to rapid exposure, they are important because, with an increasingly digital lifestyle, research has demonstrated that people have an attention span of about 8 s for digital content (Microsoft, 2015), suggesting that much of the public views wildlife images for very limited periods of time.

Regression Analysis

In an experimental design, it is often enough to do comparisons across groups to establish influence; however, we took this process a step further to evaluate whether our results held when controlling for other factors known to influence affective emotion. Because we had four emotional response variables—negative, positive, empathetic, and relaxed affect—we evaluated four ordinary least square regressions with robust standard errors, which are presented in Table 5.

Collectively, these models show that even when controlling for socio-demographics, values, and behavior, the experiment remains significant, with the animal portrait having the greatest impact on emotions. In these models, viewing no image is the reference category. As in the ANOVA, when compared with those who saw no image, seeing an animal portrait decreased positive ($\beta = -.35, p < .001$) and relaxed emotions ($\beta = -.40, p < .001$) and increased empathetic ($\beta = .67, p < .001$) and negative emotions ($\beta = .16, p < .01$). The significant increase in negative emotion in the regression is not surprising, as it approached significance in the pairwise comparison of means test. As with the portrait, seeing the traditional wildlife image decreased positive emotion ($\beta = -.27, p < .001$) and increased empathetic emotion ($\beta = .23, p < .01$), though by significantly smaller magnitudes than for portraits. Wildlife images had no impact on negative or relaxed emotions when compared with not seeing an image at all. Finally, the control variables performed largely as expected. Few demographic, values, and behavior variables were significant across all emotional affects, though two results warrant some attention. First, adhering to biblical literalism was significant and

Table 5. Coefficients and Robust Standard Errors From Ordinary Least Square Regression Analysis of Impact of Experiment on Affect Controlling for Predictors of Environmental Concern ($n = 1,152$).

Variables	Negative affect		Positive affect		Relaxed affect		Empathetic affect	
	B	SE	B	SE	B	SE	B	SE
Experiment								
Wildlife	-.04	(.08)	-.27***	(.08)	-.09	(.10)	.23*	(.11)
Portrait	.16*	(.08)	-.35***	(.08)	-.40***	(.10)	.67***	(.11)
Sociodemographics								
Income	.00	(.01)	.00	(.01)	.01	(.01)	.01	(.01)
Education	-.01	(.02)	.02	(.02)	.03	(.03)	.04	(.03)
Biblical literalism ^a	.10***	(.02)	.10***	(.02)	.05*	(.02)	.06**	(.03)
Political ideology ^b	-.04	(.03)	-.01	(.02)	-.03	(.03)	-.05	(.03)
Political party ^c	.01	(.03)	.02	(.02)	.01	(.03)	.00	(.03)
Gender ^d	-.02	(.05)	-.15**	(.05)	-.14*	(.06)	.02	(.07)
Race ^e	-.06	(.06)	-.07	(.06)	-.12	(.07)	.05	(.08)
Env. values								
Humanistic altruism	-.04	(.04)	-.02	(.04)	.02	(.05)	-.02	(.06)
Biospheric altruism	.04	(.04)	.08	(.04)	.06	(.05)	.20***	(.06)
Animal altruism	-.02	(.03)	.06	(.03)	.09*	(.04)	.15***	(.05)
Egoistic	.20***	(.03)	.22***	(.03)	.10**	(.04)	.02	(.04)
Traditional	-.20***	(.04)	-.01	(.04)	-.03	(.05)	-.04	(.06)
Will. to change	.00	(.03)	.08*	(.04)	.10*	(.04)	.05	(.05)
Env. Behavior								
Env. Citizenship	.11*	(.05)	.20***	(.06)	.02	(.06)	.31***	(.07)
Conservation behavior	.02	(.04)	.09*	(.04)	.09	(.05)	.01	(.05)
Constant	1.66***	(.22)	0.99***	(.22)	1.77***	(.27)	0.37	(.29)
R ²	.13		.22		.12		.17	

^aIncreasing in biblical literalism.

^bLiberal to conservatism.

^cDemocrat to Republican.

^dMale = 1; female = 0.

^eWhite = 1; all other races = 0.

* $p < .05$. ** $p < .01$. *** $p < .001$.

positive for all affective emotions, not just positive affect as was anticipated. Further tests assessing the interaction between viewing a particular image and adhering to biblical literalism showed no significance. The influence of religious identity on how people view animal portraiture should be explored further in subsequent studies as we include only one rather simplistic variable. Second, men reported less positive and relaxed affect, which is relatively consistent with the literature (Diwan et al., 2004).

Discussion and Conclusion

Social science has long been at the forefront in trying to address how to engage people in protecting biodiversity (Freyfogle & Newton, 2002; Kempton et al., 1996; Peterson et al., 2005). While there are numerous ways to do this, one way is through visual communication designed to evoke an emotional response. The field of conservation photography documents environmental ills in an attempt to get the public interested in conservation efforts. Most conservation photography depicts animals in a degraded environment; however, a few conservation photographers have taken a different approach by producing animal portraits with the goal of eliciting a deeper emotional response. These portraits involve anthropomorphizing the animal. Historically, anthropomorphism has received much criticism, yet scholars also recognize the strategic benefits to anthropomorphizing animals, especially for conservation promotion. When done intentionally, but critically, this translates into a biocentric or critical anthropomorphic approach that allows humans to gain access to animal worlds (Bekoff, 2000; Burghardt, 2007). Critical anthropomorphism in environmental conservation promotes the attribution of human characteristics to animals to galvanize public attention and concern for conservation or protection.

Projected Impact of Study

Because biodiversity loss is a serious global problem, conservation photographers are now turning to science to assist in assessing what images and compositional structures evoke the greatest emotion (Farnsworth, 2011). Only a few scholars have responded to this call, mostly through qualitative analysis. What this emerging body of literature demonstrates is that images that anthropomorphize animals have the greatest impact on increasing feelings of kinship (see Amiot & Bastian, 2017; Kalof et al., 2011, 2016). This literature is already having huge impacts on conservation photography and the images that grace popular science magazines such as *National Geographic*. As such, high-profile conservation photographers have used and discussed these studies as

providing inspiration to enhance their craft (see Flach, 2017; Flach & Fowler, 2018; Sustainable Jungle, 2018; TEDx, 2018), which is a real reflection on how social science can reach millions by working with practitioners. Adding to this relatively new discussion, we accomplished four things with this research. First, we demonstrated that we were able to replicate and statistically validate previous results by running an original survey experiment with a large U.S. sample that was approximately representative. Second, we focused on emotional responses and not just kinship with the recognition that emotional response drives conservation engagement. Third, our team included social science researchers and a world-renowned conservation photographer, adding validity to our methodology. Finally, we provided insight into future research.

Overview and Limitations

Using a survey experimental design, we divided our sample into 11 groups with each group, except one, receiving an animal image and then being asked a series of questions. We found that those who received an animal image compared with those receiving no image or a traditional wildlife image reported the greatest increase in emotional response. Specifically, those who received an animal portrait compared with those who received the traditional wildlife photograph felt more negative, less relaxed, and more empathetic. Analysis of the open-ended text comments indicates that people were concerned for the animal's well-being and captive status. This made them feel uneasy and sad about the state of the world. The real question that needs to be addressed in future research is the following: Can these emotions be translated into actions, and how does this transition occur? Now that we have established a statistically significant relationship between viewing animal portraits and emotional response, more attention should be placed on investigating how these images influence empathetic emotion specifically and associated conservation engagement. This is particularly important because we know that empathy with animals, and not necessarily animals' endangered status, drives conservation engagement (Colléony et al., 2017). While our study shows that viewing animal portraiture did increase empathetic emotions, the scale relies on only two variables, which perform well together, but might not be the best indicators of empathy or get at the nuances of empathetic response. Additional research should address this issue.

It is clear that the animal portraits had the greatest impact on emotional affect, but this does not mean that traditional wildlife images are not important. The purpose of the animal portrait is to grab attention, to get the viewer to make a quick connection to the subject of the photograph. Once this

connection is made, individuals may be more likely to read text about the animal and/or view additional images. We see this as a two-stage approach: “attention grabbing” and “education.” Whereas animal portraits would fall within the first stage, traditional wildlife photography that visually educates viewers about the natural habitat of the animal would be powerful in the second stage. Future research should assess this assertion in an experimental design to see if people who view animal portraits are more likely to engage in additional learning about the animal being depicted.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was funded by a grant from the National Science Foundation (Award SES-1247824).

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Supplemental Material

Supplemental material for this article is available online at <https://wp.wvu.edu/ctwhitley/home>.

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